**Feb 2017 TGDC Transcript**

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## TGDC Day 1: February 13, 2017

### Pledge of Allegiance

### 8:30 – 9:00 AM: Opening Remarks

Matt Masterson -- All right, I'll call this meeting of the Technical Guidelines Development Committee to order. Welcome to all of you and good morning. I wanted to start this meeting first with the pledge of allegiance. So if we could all stand and pledge allegiance. I pledge allegiance to the flag, of the United States of America and to the republic for which it stands one nation, under God, indivisible with liberty and justice for all. All right, next up I'm gonna have Mary Brady introduce our chairman from NIST and so Mary I'll turn it over to you.

Mary Brady -- Thank you Commissioner. Good morning everyone. My name is Mary Brady I'm the manager of the NIST voting program at the National Institute of Standards and Technology. I'd like to welcome everyone here with us in the room as well as those joining us via Webcast. Many thanks to our gracious hosts here at the access board. You have a wonderful facility and I thank you very much for offering to host us, the technical guidelines development committee yet one more time. At this point I'd like to introduce Dr. Kent Rochford the acting under secretary of Commerce for Standards and Technology and the acting director of NIST. As many of you know and this previous Director William A retired on January 3rd. Kent also the NIST associate director for laboratory programs and in that role he serves the functions of director whenever the director is not available. Kent began his current position in 2015 and has worked at NIST for more than 20 years at both our Gaithersburg headquarters and at our campus and Boulder, Colorado. Kent established and was the first director of NIST communications technology laboratory in Boulder which focuses on measurement science to assist first responder communications, spectrum sharing and advanced communications technologies. Is an electrical engineer by training and has led NIST's quantum electronics and other advanced electronics research groups for our agency. Kent has quickly gotten up to speed on our committee's work and a strong supporter of your efforts. Kent.

#### Kent Rochford

Kent Rochford -- Thank you, Mary. I am very glad to be here today, and I actually did read the three-inch binder that Mary gave me last week over the weekend. Verifiable fair elections are the foundation of our US system of government. And the work that this committee does in providing technically sound advice to the Election Assistance Commission and by extension to the states that administer elections is essential to our democracy. This specific charge to this committee to assist the EAC in developing voluntary standards and guidelines for voting equipment technologies is a critical requirement for making our elections verifiable and fair. As you know, this committee was established by the Help America Vote Act 2002.

The acts specified that NIST director service chairman of the committee and it is an honor for NIST and for me to serve in this capacity. I've been asked to brief new administration officials this morning, so I actually have a meeting at ten to give the NIST 101 lecture. And I can't unfortunately participate in the full meeting. However, you'll be in good hands in keeping with the TGDC charter commissioner Masterson, the designated federal official will take over as chair. And in addition Mary Brady has agreed to provide any assistance they needed. So thank you Commissioner Masterson and Mary.

On behalf of the commissioners and NIST I would like to thank each of the committee members for your commitment to serving and proving voting system guidelines. Concerns about the integrity of the voting process have been expressed by US political parties and by our elected officials, but with a wide range of different perspectives. So, I just want to acknowledge that the task of this committee to serve as the technical adviser to the EAC has never been more complex or more important.

Since the committee's last meeting in September. Three committee members have had to resign for various personal reasons. Helen Purcell from the Board of Advisors, Jeremy Epstein from IEEE and Scott Cooper from Mancy. I'd like to thank Helen Jeremy and Scott for their advice and their service to the TGDC and wish them well. We have received the nomination of Mary Saunders for Mancy and we're awaiting nominations from the Board of Advisers for IEEE to fill the other two positions. We'll be working through the vetting process and the hopefully out the new members joining us for the next meeting. You have a busy agenda in the next couple days.

The overarching theme of discussion will be how can the TDGC update and improve its main guidance documents to the EAC? The next generation voluntary voting system guidelines. We'll be discussing how to do it in ways that address rapidly changing technologies and interconnectivity while still helping the EAC and the states maintain trust in the voting process.

So first we're going to hear election officials describe their observations from the November elections. There'll be a discussion about progress made by NIST, EAC public working groups for guidelines on interoperability, usability, accessibility and cybersecurity. We'll address testing, the new public working group on testing and the ways testing is both conducted today and may be improved tomorrow. We'll look into whether the current scope of the VVSG should be expanded and if so what specific functions should be included. That will be followed by presentations from NIST Cybersecurity Framework, the NIST Cybersecurity Center of Excellence, and the recent designation by our colleagues at the Department of Homeland Security a voting systems is critical infrastructure. Finally, the last session we will discuss coordination of the public working groups with the Standards Board, the Board of Advisers, and the National Association of State Election Directors. Each of you have been asked to serve on this committee because of your unique experience. I know you all have very busy careers very busy lives and we truly appreciate your volunteer service to this committee and to the nation. I look forward to seeing the fruits of your work in the coming months and throughout the year. So thank you very much.

Matt Masterson -- Thank you so much Mr. Chairman for those words and thank you for being here to open the meeting, I appreciate it. Next I want to turn it over briefly to Mark Guthrie the representative from the US access board and I want to say thank you Mark to the US access board for once again hosting us here. This facility is fantastic and it's nice to be downtown as well. So I just wanna allow you to give a brief introduction.

#### Marc Guthrie

Marc Guthrie -- Thanks Matt, just want to welcome everyone. You've been here before. So you know where the restrooms are and I think and that's important and welcome you in behalf of Dave Capose our executive director and Matt McCullough and the balance of our board, and the pillar that sort of helps keeps us up back there, Bruce Bailey, a member of staff. Thank you for coming. We enjoy having you.

#### Matthew Masterson

Matt Masterson -- Thank you Mark and thank you to all the staff at the access board for working with us on this. And I know Matt will be joining us a little bit later as well and so we'll recognize him.

Before we get to TGDC introductions, I just wanna take a moment to give a little opening remarks and first wish you good morning and thank you for being here. Over the next two days we're going to tackle incredibly important work and I wanna start by thanking NIST and the staff at NIST for their preparation and work with the EAC staff in preparing for this meeting. I know there was a lot of work put in up to the very last minute indeed to make this meeting happen. And so I wanna thank all of the staff at EAC and NIST for getting ready for this meeting. Most of all I wanna thank all of you For being here for dedicating your time, and for being willing to work on this important work. And also to those who participated on the public working groups the response of the public working groups has been tremendous. The activity on the groups as we're here today has been incredibly productive, contentious at times but in a productive manner which is good. I also wanna offer congratulations and I didn't plan this but the election officials with the exception of Greg all sat together.

Congratulations to the election officials on this board for a incredibly successful Presidential Election, you all deserve our gratitude and our thanks and you don't hear that enough from us. You all ran a process that was accurate, secure and accessible on the face of challenges that quite frankly I hadn't seen before and I think many of you hadn't neither. I've had many election officials tell me that despite all the conversation, this was the best run election that they had experienced in part because election officials dialed in on what needed to be done, and executed the process. Your hard work allowed voters to have confidence in the integrity of their process and you all should be applauded.

I also want to take this moment to thank the three members who have dropped off the board, their commitment and work is incredibly beneficial or was incredibly beneficial to this board. I specially want to thank Helen Purcell. Helen Purcell this is the first TGDC meeting ever, the first TGDC meeting ever without Helen Purcell on the TGDC and so we would not be here. We would not be where we are without her incredible dedication and work and I greatly value what she did for this body.

Today we move forward with the next step the voting system standards and as was already mentioned this work is more important than ever and the work of this body is more important and needed than ever. It's incumbent on all of us to push the process forward and to move with urgency. There's an expectation in the election community to have these standards and to use these standards to improve the process.

The Standards Board will meet in April, the board of advisors will meet in May and they are eagerly anticipating the work of this board to review and weigh in on. Also, the working groups, the public working groups, are constantly working to review the work. And so they're waiting to see the results of this meeting to push the process forward, and to develop the next set of standards.

We should leave tomorrow with a definitive scope on the standards and a clear understanding of the principles, that will define the guidelines moving forward.

I wanna thank you all in advance for your time, your commitment and your energy to getting this done and to moving this process forward with urgency and with that I'll turn it over to Mary to go over the agenda.

#### TGDC Member Introductions

Mary Brady -- Thank you Matt. Maybe before the agenda we, would you like to go over the TGDC Introduction?

Matt Masterson -- Yes I would. She keeps me in line. Let's go around the table and do introductions and we'll start with Greg and go around. Thank you Mary.

Greg Riddlemoser -- Greg Riddlemoser, I'm a local election official from Stafford, Virginia.

Marc Guthrie -- Marc Guthrie from Columbus, Ohio Public Member of the Access Board.

David Wagner -- I'm David Wagner, I'm from University of California, Berkeley.

Diane Golden -- Diane Golden with the Association of Assistive Technology Act Programs.

McDermot Coutts -- McDermott Coutts, Director of software development at Unison Hollis Solutions.

Mary Brady -- Mary Brady, the Manager of the NIST voting program.

Ross Hein -- Good morning. My name's Ross Hein, I'm the Election Supervisor for the Wisconsin Elections Commission.

Bob Giles -- Good morning, I'm Bob Giles, I'm the Director of the New Jersey Division of Elections and I am the State Member for the EAC standard Board.

Lori Augino -- Good morning I'm Lori Augino I'm the State Elections Director from Washington State and I serve as a member of the National Association of State Elections Directors.

Linda Lamone -- Good morning hi, I'm Linda and I'm Administrator of elections for the state of Maryland and I'm here because I serve on the EAC board of advisors and I would like to introduce Natasha Walker who works with me in my office and who's going to be presenting this morning. Thank you.

[UNKNOWN-SPEAKER] -- [COUGH]

### 9:00 – 9:15 AM: Walk-through Agenda

Matt Masterson -- Thank you all and now the agenda tells me to let you walk through the agenda.

[UNKNOWN-SPEAKER] -- [LAUGH]

Mary Brady -- Well I think we've already got a bit of an overview of what's going to be in the agenda but let me start by telling you what's in the packet in front of you.

I think they're all blue not really sure. What we have is a draft of the VVSG 2.0 principles and guidelines. In addition to remember from the last meeting we had the usability and accessibility principles and guidelines. The cybersecurity working group and interoperability groups have also produced a set of principles and guidelines in addition of [COUGH] the Ben Long from NIST has gone through what we've referred to as the rest of the VVSG. [LAUGH] And that's those portions of the the VVSG that are beyond what the three working groups are covering. And has produced a set of principles and guidelines for your review. That's, one piece of paper that's in there.

The second is a, [COUGH] the set of abbreviated core requirements from the human factors working group. We've repeated the principles and guidelines here, and provided for you the requirements that will go with those principles and guidelines. That's in the second packet.

And the third, is in the human factors working group there's been a number of white papers that have been discussed. The third, is a draft of a special pub containing the information from all of those white papers, and Sharon will go over that in more detail when she presents.

This morning, after hearing lessons learned from the election officials from the 2016 elections will go right into the work of the working groups starting with interoperability. Then after lunch moving to cybersecurity and audit ability.

Lunch will be on your own. I suspect there are several places around here that we can go get our lunch maybe bring it back. And take a little bit of a break. After this cybersecurity working group readouts will move on to human factors. Have another break. Then we'll present the work that he's done with rest of the VVSG. Then we'll move on to Section called testing in the real world. We have a manufacturer, McDermott. And a member of our one of the testing labs Jack Cobb is here from probing B to discuss how testing goes on today. And I think from those two a part of what's in the rest of the VVSG is what types of documentation have to be prepared for tasking. And what are the requirements as you go through the testing process. After we have the presentations on those topics we'll discuss how to charge the testing working group going forward. And I know McDermott you have some thoughts about how to kick off that group and we'll be looking for feedback from the rest of you all.

On day two, we'll discuss scoping the VVSG. This is a continued discussion from our last TGDC meeting. Since that time, Brian Hancock and Ryan from the EAC have sent out a set of election functions and have looked for feedback from the standards board. The board of advisors on what function should be in the VVSG. So we'll continue that scoping discussion and by the end of that discussion hopefully we'll have final agreement on scope.

[UNKNOWN-SPEAKER] -- [LAUGH].

Mary Brady -- And for the final working session, well I shouldn't say that the final two sessions in the afternoon we'll take a look at, we'll return again to Cybersecurity. And look at some programs that NIST has in the Cybersecurity framework. Hear a little bit about how this might apply to the voting community in terms of how you go about creating a profile for this hybrid for voting in that depends on the Cybersecurity framework. And Josh also give an overview of the Cybersecurity Center of Excellence where he's done some some work.

We again, have our colleagues from DHS here to provide us with additional details on the DHS services that they offered during the November elections. As well as what, offer some advice on critical infrastructure and what that means to election officials. And finally after all of that work, well we'll need to do some coordination among this body, the public working groups. And as said upcoming Standards Board and board of advisors meeting. It's a busy couple of days, I look forward to engagement of the folks here. And as always I'm sure we'll have a very lively discussion about all of these topics. Back to you, Adam.

Matt Masterson -- Thank you Mary. We'll give you a chance to get situated and introduce your Matt and you're welcome. Before we get started with the next portion of the program, I wanna kind of tee up the context. I don't know if you all heard, but there was a presidental election last year. And some things happened and now election officials are gonna talk about their experience with that. And the purpose of this conversation is to engage you all to understand how the technology was used in this election to serve the process. And perhaps how the standards and the technology and the functionality as we'll talk about it can be improved upon to better serve election officials and voters. And so each one of the election officials was gracious enough to speak to their experience and specific portions of their experience. So Ross is gonna talk a little bit about the recount in Wisconsin and we'll have lots of questions for him about the recount in Wisconsin. Bob's gonna talk a little bit about physical security and the steps New Jersey took to secure the systems. And Lori is gonna talk about the process used in Washington to secure the process. And then Marilyn is gonna walk through their auditing procedure post-election auditing procedure. And Greg's going to give you're the only local here my friend. Give the local perspective of boots on the ground during the last presidential election. So what I hope to do is be able to use this as a feedback loop as we look at the standards and most importantly the functionality that we'll be testing as a part of the standards. And how we can do it better, and better serve election officials and voters. So with that I think you're up first Lori. Wherever you're most comfortable. And while you're getting situated I will introduce Matt McCollum from the US Access Board. Mark was nice enough to welcome us. But thank you for having us here and hosting us.

Matt McCullough -- Thank you, good morning my name is Matthew McCollum. I'm a public [INAUDIBLE] with [INAUDIBLE].

Matt Masterson -- Okay you're ready.

### 9:15 – 10:45 AM: Relating Lessons Learned from 2016 election to the VVSG

#### Lori Augino

Lori Augino -- Thank you. Good morning everybody. Again I'm Lori I'm a state elections director in the great state of Washington and appreciate the opportunity to talk with you today. About some of the lessons learned.

For you elections administrators in the room. It's no secret that elections are a little bit of a roller coaster ride. And there's those of us that ride the roller coaster like this with our eyes closed and scared. And then there's those of us that are super excited and screaming all the way down. I would say I'm probably more like one of these kind of roller coaster rides and 2016 was no exception to the rule. We had new challenges and I think Matt already touched on some of those challenges that we faced in 2016. But those challenges came on hot and heavy from the beginning and I think that forced us to start communicating.

And really this was I think what made us more successful in 2016 than ever before was the fact that we had these relationships these partnerships built. And I'll talk a little bit more about that but this communication not only up with our federal partners but down to our local elections administrators too. And making sure that that chain of communication between elections administrators up and down the chain was constant and all consuming. But that did help us, I think, run one of the most well-run elections that I've seen because of that, again that constant communication.

So, I would say balancing security and accessibility was at the forefront. I talked about. It's pretty much on a daily basis when I'm talking about the work that we do and any policies that we might be recommending about future experiences. We always talk about that balance between security and accessibility. And evermore those two things were in constant maybe battle with each other. Although I think that I tend to try to keep those as the balance the counterbalance between those policies that we implement within elections. It was our banner mantra for years but more than ever before I found that that constant balance between security and accessibility was definitely at the forefront. It started early in the year for us. In Washington we had a mandate from our disability community to ensure that all of our tools were accessible.

All of these online tools that we had been providing to our voters for a number of years, be accessible to all voters. And so we said you know what you're right and we need to not wait for our modernization effort. Which had been our plan all along was to ensure that we were rolling out modernization effort that was fully accessible. But in the meantime we knew that 2016 was important. It was an important year on a lot of fronts. And so we invested some time early on in making sure that that technology those online tools that we offer are voters. Such as online voter registration, elected official look up tools, voter history look up. But most importantly that electronic ballot delivery tool were fully accessible for all voters.

Most of you know that we have been providing electronic ballot delivery tools for our military and overseas voters. Washington State is a vote by mail state, so our voters across Washington are using that electronic ballot delivery tool that's getting a blank ballot delivered. Voters are using that as a replacement ballot or provisional ballot in some cases. And so it was incredibly important for us to ensure that those tools were all accessible while also ensuring that they were secure. Not return just delivery and we did that. We did it in record time. It took about three months for us to roll out those improvements, and they were very well received by all voters, most importantly, by our disability community in Washington State.

We heard that they're easy to use, they were accessible with multiple screen readers across multiple disabilities, and offered in multiple languages, but while we made this significant improvement in record time, we did learn a little lesson along the way, and there were a couple of fields that were not public record that were embedded in the background page, embedded in the data, a code that feeds the page. And so, the lesson learned, it was a phone number and email, lesson learned for me is that our IT developers need to be tightly aligned with our elections officials.

Our elections officials absolutely 100% knew that those were not public record under Washington State law, they are in other places, [LAUGH], they are public record in parts of our law, but not tied to voter registration. However, our IT developers just assume, it's just your, that's your contact information, of course that's public, because I'm contacted by candidates all of the time. And so, well intentioned could have been prevented by ensuring that our IT partners are tightly aligned with our elections administrators, lockstep every step of the way. After weathering that issue in the primary, that was in time for our Presidential primary, after weathering that issue, we were flooded with questions about our system security. I think, it-

[UNKNOWN-SPEAKER] -- [LAUGH]

Lori Augino -- Right? I know you're laughing. It was, I would say, I think, between local every, every local paper, every local radio station, on a daily basis had questions, we had our larger media markets, as well, and national media markets, everyone you could possibly think of wanted to write a story, and then that prompted our citizens calling and asking questions.

So for the first time ever, I posted system security talking points on our website, it was one of the hottest pages on our website, because folks were able to really go to those talking points, and then we could direct our reporters to those talking points as well, and that would help feed some of their stories, but also, more importantly, I think it provided a confidence, a new level of confidence in our system. [LAUGH] I kind of joked at one point, I've heard Tammy's stories about her work on the Presidential Commission for Elections administration and some of the drinking glass, water drinking games that they would, water, always water, always water in this biz, and our new drinking game was air gapped, any time anybody said anything air gapped, I think I said air gapped five, six, seven times a day, that was the hot, hot word of the day for sure. [COUGH]

So, I think my next lesson learned was, it's really all about the partnerships, and thanks to our friends at the EAC, they helped partner us with our new friends over at Department of Homeland Security, who I see are in the room, and this partnership really helped, again, ensure the citizen confidence in our system. We already had cybersecurity experts on staff at the Secretary of State's office, and then partnerships with our state IT infrastructure as well. But this new partnership provided this new opportunity to augment the cyber hygiene and cyber security that we already had in place, and again, I think that helped to provide citizen confidence, and evidently now we're critical, elections are critical. So as now we're focused, so as we are focused on this partnership, and working with Department of Homeland Security last year, we're now focused on what this critical infrastructure designation means, and although we would have preferred to have citizen input along the way, or excuse me, elections administrator input into that decision and what that decision meant, we are looking forward to working with you on identifying what that means in the future. Additionally, we partnered with our state cyber security elections experts, we did additional monitoring during our peak times.

Another lesson learned, however, through, is through these diligent efforts to be very mindful about keeping the bad guys out, sometimes you can keep the good guys out too. And we accidentally locked out our partners in King County, blocked them when they were trying, we just had a high number of hits from the same IP address, that's got to be a problem, we gotta lock out the bad guys. And got a phone call from the Director of Elections in King County within a few minutes, that all of a sudden they were having trouble serving their voters at their voting center because they couldn't access their online look up tools, because we had blocked them. So, in our zealous efforts to block the bad guys, we inadvertently blocked some of the good guys. And of course, NIST has been a very integral partner with our long range planning and we'll continue to work with you through this effort, and through whatever efforts might be coming to us in the future.

Next lesson learned, and this, to much of the chagrin of some of my fellow elections directors, some in the room, a paper ballot is a good thing. After countless discussions with reporters, legislators, citizens, one of the things that I was able to rely on that provided a lot of citizen confidence in the system that we have is the fact that I could say our voters are marking their choices on a paper ballot and that paper ballot is the official record. Now we do have some touch screens in use in Washington State, there are less than 1% of our voters that are voting in person on this touch screen technology. Our voters, by and large, are relying on that paper ballot that they are mailed, because all of our voters receive a ballot in the mail. There are a certain small percentage of folks that are using that online ballot as a replacement ballot, but by and large, our voters are voting on the paper ballot that they receive in the mail. Interesting to note, they're not necessarily choosing to return it through the mail, however, most, where we have ballot drop boxes saturated throughout counties across Washington, we're seeing 60% and 70% of those ballots returned through a ballot drop box. But being able to say that our voters are marking their ballot on a piece of paper, and that paper ballot is the official record of their choices, it helped, it helped. We also talked about the fact that we conduct post election audits, so those ballots that are marked by voters, we can conduct those audits to ensure that the technology is counting them as the voter intended it, and, of course, in close elections we conduct hand recounts.

So those kind of fundamental principles really helped me when I was talking about the system that we have in place, and all of the fail safes that we use and that we rely on. And then, of course there's politics, this was a really tough election year, particularly for me. My boss was running for reelection, and it was a pretty tough campaign, and I would say that, so again, as you're an election official riding the wild ride roller coaster ride, you just kinda have to Just take what the day might bring and that was my philosophy each day, had no idea what today might bring but you just be ready for it. And I would say that the political environment that we were in lended itself to this kind of I felt like we were under this uber microscope all of the time. Because so many folks were just waiting for us and watching and wait and looking for something that they could pounce on and use in not a great way. And so that's nerve wracking. But as elections administrators we're used to that, have been in the biz for a while and I do think that that helps you ensure, knowing that that's the kind of environment that pressure cooker environment that we're working in. It helps to ensure on the front end that you're gonna have good policies in place and also those really good lines of communication open, not only with your citizens, with the media. And then again as I said up and down with your local elections administrators other state election officials that you can learn from, and then our federal partners as well. [COUGH]

So what's next? Our counties are not waiting. We have tabulation upgrades in progress in my state right now. King and Pierce counties, our two largest counties in Washington will be implementing new technology this year and then other counties are watching closely. There are some counties that don't want to be the first to go back out with new technology but they're watching those two counties closely Pierce County will be operating their April election on their new technology. And I'm expecting King will be going live if not later this year probably early next year.

So, optical scan is almost a thing of the past in Washington and really digital scan is what tends to be at least the future of right now for Washington State elections. But, what's prompting me, now that we have our largest counties operating in this digital scan environment, that's causing us to look at our policies that support those.

So things like logic and accuracy testing, what does that mean in a digital scan environment? How is that different from the largely optical scan world that we've been living in? And audits, what kind of new technology is available to help make our audits smarter? And so we're working collaboratively, bringing our counties together to the table to look at new administrative code that we can adopt and possibly some plot changes that we might want to suggest, on what we might want to do in terms of logic and accuracy testing and audits but also recounts. Right now we have been using our recount laws have been on the books and how we calculate these automatic recounts. Some of those are conducted by machine and some are conducted by hand. But in a digital scan environment does that still make sense? And we're looking at changes potentially on what triggers a recount, when we would conduct it.

We're also modernizing our voter registration system. We've been in progress working closely with our friends some of our friends around the room. EAC has helped us with our business requirements. And we are right now working on a budget request to modernize our election system. So everything but tabulation is what we are in the market for replacing and modernizing right now. There's also a legislative push in Washington state to mandate a state standard setting process combined with a uniform tabulation system. I ventured, I guess that's probably a topic in other states as well. But that's scares me a little bit, and some of the feedback that I've been giving to legislators is to let this process play out first. The standard setting that we're doing here will be something that we can tie our state standards to. And it's important to me to make sure that this process continues to play out before we try to see our state do that for us.

And there is also a continued push for electronic return in my state. I had to testify against a bill in the last couple of weeks calling for electronic return by email and fax for all voters across Washington, not just our military and overseas voters who, we have this fail safe built in for. And why I had to say that is because we're not ready. And so that has been an ongoing push from our legislature, to try to continue to mandate electronic return in an email environment for all. And in an environment where we're voting largely by mail, that is concerning for us. So I guess my message, my closing comments to you are that elections officials are moving forward whether we finish our work or not.

So I echo Matt's comments from this morning to say that we must move swiftly. It's important to me and to my state to continue to move swiftly and finish this work that we've done. And I wanna give a particular thanks to NIST and the public working groups because as we were off being busy in this 2016 election cycle you guys did an awful lot of work to be prepared for today. So I appreciate the work that you've done to get us to where we are today as well, so thank you. I think Bob is up next.

Matt Masterson -- Bob is next. If you want to step up and we'll do questions for all the election officials, yeah, at the end. So next up is Bob Giles, the election director for the state of New Jersey, who's going to talk election review, and I think physical securities, is that right Bob?

#### Bob Giles

Bob Giles -- Yes, great thanks. Good morning everyone. Thank you for being here today and for those who are watching. We have a lot of work to do and I want to thank my colleagues around the room. And just thinking about what Lori said, I think I'm more of a bungee jumping kind of election official. Kind of get to the edge, have faith in your bungee cord process and just jump and that's what a lot of us do, once you leave the edge there's no turning back so.

So what I wanna talk about today is some of the stuff we in New Jersey saw and how maybe can apply some of that stuff to the VVSG moving forward. So specifically as it relates to voting machine security. So the first issue that came up was cybersecurity and at first we thought this is great, we're not connected to the Internet so we're off the hook on the cybersecurity concern.

Not quite so and as Lori said we were air gaping everything, we're trying to keep our voting machines away from the Internet as best we can.

But obviously cybersecurity touched a lot of other areas in elections and some of the stuff we learned from that, we can now apply to the processes of our voting machines, and how we prepare for elections with our voting machines.

So, even though cybersecurity wasn't as big of a concern with the voting machines because we didn't touch the Internet, it raised the concern of physical security of our voting machines. In New Jersey we do a lot with our physical security, we're a DRE state so all of our voting machines are electronic DRE type machines. So physical security has been at the forefront for us, so I'm gonna talk a little bit about that.

And the other thing we heard a lot about. This election was who is making our voting machines and how are they being made? That became a big concern, and we had to answer a lot of questions concerning that. So I'm going to touch on that a little bit to see if there's a way to either bring it into the VVSG, or have a discussion and see if it's in scope or out of scope, some of these items. But I want to bring some of these items up, just for, like Matt said, discussion purposes to see where they may or may not fall.

So I going to go over some of the physical security stuff we do in New Jersey and then you can kind of see my thought process as to how maybe some of that could be applied out to the VVSG.

So in New Jersey, we have a statewide seal use protocol. And in that, as part of that protocol, every voting machine technician has to take a seal use protocol training class. And we develop these protocols and this training class with the help of Department of Homeland Security back in 2010. So we've been working with Homeland Security for a long time as it relates to voting machines and election security. Also, anyone who works on our voting machines has to have a criminal background check before they can work on the machines. The state purchases all the voting machine seals. Any vendor who makes seals for the state has to be ISO 9001 certified, which is a quality management standard. So if you want to do business with us, as it relates to security seals, you have to be ISO 9001 certified. Seal inspections are done before and after any election.

Voting machine delivery is tracked, when it leaves the voting machine warehouse, when it's delivered, when it's picked up, and when it's returned. So, we track the machines as they go out, and as they come back, so we know the time the machines are in transit. One of the potential problems was somebody pulls over the side of the road and let's the bad guy in the truck to do something to the machines. Well, now we know that if you leave at 9:00, you should be at your first stop at a certain time. We can track all that and know that there's been no issue of delay in the delivery of the machines.

We also have a statewide pre-election testing protocols as well, to kind of add to our seal use protocols. And in this, prior to every election cycle, all machines have to either go through a maintenance diagnostic or preventative maintenance and that has to be recorded and tracked. Ballot verification has to be done, and again, tracked and we have forms that they fill out, so we know that the verification has been done on all the voting machines. And then test voting has to be done and a lot of this sounds like it's normal stuff, but one of the most important things is it has to be in either ascending or descending pattern. Because just pushing the button one time for each candidate, or filling the oval out one time, tells you that oval is reading correctly, or that button is working correctly. But if you don't do an ascending or descending pattern, you can't prove that John Smith was supposed to get two votes. He got two. Bill Jones was supposed to get one. He got one. So it's critical that we do these kinds of patterns, and again, all this is recorded, and then their certification for all the stuff you see here. For every election, the county election officials have to certify that they've done all these things.

So, it comes down to access to the voting machines, and that's a critical component of setting up an election. So for election officials, one of the things I kind of was thinking as far as what we are looking to do, is the password strength to log into the system. We're in the process of modernizing our statewide voter registration system, and so I'm taking some of the stuff we're learning from that, and we are working with the standards and the recommendations that DHS has sent out. And we're also working with our state homeland security very closely on what we can do in our new voter registration system.

So applying some of this stuff to voting machine security may be helpful. So we're looking at the length, special characters, expiration of the password, these kinds of things that in the past, we didn't. Everybody was their name, plus one, two, three. So my password was Bob123, and and life was good. So now though those kinds of things don't work in the world we live in now, so we're looking to strengthen our passwords.

And then in our statewide voter registration system, we're doing a multi-factor, or two-factor, authentication, which is basically something you have and something you know. So the thought is, is this an example of something that we should be talking about whether it be in scope or out of scope, when we're talking about the VVSG. So basically two-factor authentication can be a smart card or it can be a token. What we're looking to do right now for our new statewide voter registration system is you'll have your normal username and password, but now you have this additional passcode and this is how the token works. It's in sync with the software for the voter registration system. So each time you log on, you're going to have a different code here that has to go in here. And if it doesn't match, it's not going to let the user log in. We think that's important. It helps when you tell everybody, please don't put your password on a post it note under your keyboard. But those are difficult things to prevent because you can't police everybody. At least here, it's something you know, which is the password, and something you have, which is the token.

So again, that's something we can discuss and whether technicians logging into the system or logging into a voting machine to program it, should we be upping our security levels and maybe not being specific to any one type of multi-factor authentication. But talking about having multi-factor authentication in the VVSG or a standard we can point to.

So the other issue about accessing the voting machines is the manufacturers who are building the machines for us and who may be servicing the machines. One of the big things I talked about earlier was company ownership. That became a big issue this election. We got a lot of questions on who actually owns the voting machine company, who is working on your voting machines, what is their background, and are foreign countries owning voting machines in our country? So this to me was something that I think a discussion should happen. And then also the company's policies and procedures, are they following certain standards that I talked earlier about, the ISO 9001? Are standards like that being followed, and should those kinds of standards be part of the VVSG, or should they be something outside the VVSG, and leave it up to the individual states when somebody comes to be a vendor in their state.

So in New Jersey, just to give you a couple examples of what we're doing with our vendors, to show that I'm just not pulling this stuff out of the air. We are actually doing a lot of this stuff. So you can see, I'm just going to go through a few of the things. The purpose of the forms, we require vendors to fill out is this first one, these procedures is to establish access rules, security expectations, and responsibilities for the sponsoring agencies and business entities when information technology services are planned. And then over on the second page in section B, the business entity must complete the security controls assessment checklist. The checklist must be reviewed and approved by the statewide office of information security prior to the system or application going into production.

So some of the things we look at on this, this is the form that a vendor selling any kind of IT product to the state is required to fill this out and on the second page there, the contractor must provide a security plan for the proposed solution. The documents shall describe the administrative, physical, technical, and systems controls to be used by the system and/or services. The contractor security plan must at a minimum provide security measures for the following areas, facilities, physical security and environmental protection, system security, system data security, network security, administrative and personnel security. And then moving down, when we're talking about system administrative personnel security, security responsibilities include responsibilities for administration of the infrastructure, implementing or maintaining security, and the protection of the confidentiality integrity and availability of information systems or processes. And then under the workforce security, the control process for hiring and terminating of contractors' employees and methods used for granting and denying access to the contractors' network systems and applications. And then further we talk about password management, the appropriate password management controls to meet defined regulation or security requirements. Vulnerability security assessment, the products and methods used for scanning for vulnerabilities and remediation of the vulnerabilities, identify nad define methods used for initiating and completing security assessments.

All systems and applications shall be subject to vulnerability assessment scans by an independent and accredited third party on an annual basis. And I can tell you as part of our statewide voter registration system, that is a requirement that we do these third party risk and vulnerability assessments and will be partnering with DHS on that, once we get up and running.

We had a third party do it for this election but moving forward, we're going to partner with DHS. We currently do the cyber scans right now, the cyber hygiene scans right now, with DHS, so we plan on expanding that a little bit further.

And then, one final one was the contractor shall maintain network security that conforms to standards set forth and maintained by the National Institute of Standards and Technology, including those at, and it gives a website to go to.

So and then finally I know there's the framework for improving critical infrastructure cybersecurity that's out there. And my understanding is there's a draft version of 1.1 out there as well. So a lot of stuff I just showed you was just to kind of get the conversation going. Say where should we be going, security obviously has become a huge issue in elections, and especially with voter registration systems and voting equipment. So, and we've talked about this through this whole process of pointing to other standards. Not necessarily going in and saying you must have a token for two-factor authentication. But if there's a standard out there, and whether it's this particular document or another, utilizing that so we're not constantly worrying about updating the standard. It just says you must comply with the current standard. So those were some of the thoughts I had as far as what I saw this election as it relates to security. I wanna thank you for allowing me to talk about it and I will turn it over to the next speaker, thanks.

Matt Masterson -- Thank you, Bob. You've teed up Josh's discussion tomorrow nicely as well with the framework discussion, yep. And also that's the first presentation I've ever seen you give without a video, so well done. Well done [LAUGH]. Next is Natasha Walker. Natasha works in the State of Maryland Board of Elections for Linda and she's going to talk about the post-election audit process that they used in the State of Maryland to get us thinking about the standards regarding auditibility of systems. So, turn it over to you, Natasha, thank you for being here.

#### Linda Lamone, Natasha Walker, Brandon Mulvey

Natasha Walker -- Thank you for having me. And good morning. I'm very excited to talk about the 2016 election audits that we conducted in Maryland. For some background, the 2016 election was the first election that we used a paper voting system statewide. The voting system captured our ballot images which allowed us to audit the election results at a ballot level while also eliminating the need to physically touch the ballots. And after the primary election, we piloted three different audit methods.

Natasha Walker -- What is an audit? An audit, whoops, sorry. Not used to doing two things at once. [LAUGH] What is an audit? The comparison of two independently produced results that are derived from the same data. And why do we audit election results? To protect and ensure the integrity of the election process. To verify and confirm the accuracy of the voting systems reported results. To ensure that the voting system is accurately tabulating ballots. To ensure that the winners of the contests are correctly called and to increase confidence in the election results.

After the primary, we piloted a ballot level audit applying risk limiting principles, a fixed percentage audit and an independent automated software audit. For the ballot level audit, we consulted with Dr. Dennis McGrath, a statistician and professor at the University of Baltimore. He selected the contest with the smallest margin of victory. He then used Dr. Philip Stark's publicly available tools to determine the number of ballot images to review and which ballot images to review. And those images and cast vote records were put into batches and were manually reviewed and tallied. For the fixed percentage audit, we again consulted with Dr. Dennis McGrath. He applies statistical methodology to ensure that each ballot cast in the county had an equal chance of being selected. Based on the number of votes cast by precinct, he assigned a range for each precinct in each county. The local election official then rolled a ten sided dice to roll a six digit number and then selected the precinct that fell within that range.

The ballot images from that precinct were put into batches and tallied manually. And then the total for that precinct was compared to the voting system report. For the independent automated software audit, prior to the election, we sent the ballot PDFs to the vendor for the purposes of creating the ballot definition files and the voting systems zero report by precinct. And then after the election, the local election officials sent all the ballot images to the vendor. The vendor then provided us a result report that we verified to make sure it was complete. Once we verified that the report was complete, we sent the vendor the voting system report by precinct and they then provided us the four different audit reports listed up here. And although all three audit methods verify the accuracy of the voting system, we determined that the ballot level audit applying risk limiting principles was unpredictable, was complex, and required the assistance of a statistician, was difficult to implement because we didn't know how many images were needed to be reviewed.

The planning process cannot begin until after the election for the same reason. The local election officials cannot accurately budget and plan staffing needs because the number of ballots is unknown. A close margin could necessitate a complete re-tabulation of all the ballot images. And human error required in our case an additional review of the ballot images and the cast vote records. The fixed percentage audit does not generate a high level of confidence because a single or small number of precincts could be selected. It requires again the assistance of a statistician, is unpredictable because you don't know what size. Precinct is going to be selected. And it raises the question of effectiveness, because a precinct of only 15 ballots could be selected. Hundreds of thousands of ballots could have voted in the county, and 15 ballots isn't sufficient. And then human errors could require a second or third manual review. I think in our pilot that was at least two times we had to go over the ballots.

The independent automated software audit retabulated 100% of the ballot images using independent software that was different from the voting system. It maximized the use of technology in election administration, which is a Maryland legislative mandate. It required very little resources from us in the local boards. Can be completed prior to election certification deadlines. And eliminates the subjective and error prone human element, and it was user friendly. So the criteria guided us was to maximize the technological functions of the new voting system. We wanted to minimize human error and eliminate chain of custody issues. We wanted to minimize the use of staff time after the election. We wanted to complete the audit prior to the legally sort of binding certification and swearing in deadlines. We wanted it to be conducted at the ballot level, and be independent of the primary voting system. For all those reasons, Maryland selected to use an independent automated software audit for the 2016 general election. The vendor selected was Clear Ballot Group who's here today.

And this audit confirmed the accuracy of our voting system but we also discovered a lot more than we anticipated. So what other discoveries were made as a result of the tools provided with this type of audit?

With the oval visualization tool we discovered that folds to the right in area resulted in votes. So in Maryland we count a write in whether the oval is filled in or not. And the way the scanner does that is it detects marks within this writing panel. In this particular case it wasn't a mark created by the voter, but a fold. So as a result of this audit and the way we were able to visually see these write-in boxes, this issue was discovered prior to certification and was corrected. See when we clicked into the write-in panel we could see the whole ballot, and you can clearly see the fold.

And then residue and scratches on the scanner lens resulted in overvotes. Again hovering over the write-in panel showed the vertical lines. Clicking in showed that the line went all the way through the ovals in that far column. And when you compared it to the voting system cast vote record, the voting system reported that each one of those contests is overvoted. So obviously the ability to see the full ballot and see those images really made it clear what was happening. And this was corrected and identified prior to the certification of our election results.

The third issue was a double pull on the high-speed scanners. So that is when two ballots are being scanned and they're picked up at the single page. So, what we saw in the last two slides, here are the typical write-in boxes which we expected to see. But we also see ballot question text. When you hover over a write-in panel that we expect to see you see the contest that you're reviewing. Which in this case it was Judge of the Circuit Court. When we hovered over the ballot question text, we didn't see Judge of the Circuit Court anymore, but we instead saw ballot questions. And then clicking into that panel, you can then see clearly that in that image that two pieces of paper were scanned as one. And again, this was picked up prior to certification and was corrected. And then what kinds of questions can be answered as a result of this type of audit that are challenging, if not impossible, to do without one? And these are actual questions that we received and were able to answer as a result of this audit. So there was a large number of overvotes in the presidential contest. Why would voters show up to the polls and vote for more than one presidential candidate? So we were able to use the contest visualization tool from the audit. We sorted by contests, selected the overvotes and reviewed every single one of those overvoted contests for president. And we're able to confirm that in fact people did overvote these contests. The similar question but the opposite, why would somebody show up and not vote for anybody for president? And again, instead of overvoters we've checked blank votes, went through every single one of those contests. It was very fun actually for me. I was able to hit fast forward and just watch them go through, and again determine that they were in fact blanks. Or I think in this case also, the voter might have made some other mark within that contest that was outside of the oval. But there is a lot of variety as you can imagine. And then what else can an independent software audit, sorry too fast. So, this was blank ballot. Again, the question was why would people show up to the polls and decide to cast a completely blank ballot? And we used the ballot visualization tool. We were able to pull up all these ballots and review them, and confirm that in fact they were blank.

So what else can an independent automated software audit identify? It can help identify voting locations where additional poll worker training is necessary. In this particular case, the voter went in to the polling location. The poll worker gave him a ballot with the stub attached. They voted that ballot. They then went to the scanner and the poll worker at the scanner also accepted that ballot with the stub attached. The stub have been removed at the check in table, and it wasn't. And we can see that from this type of audit. And we can identify equipment issues. So the image on the left is a ballot printed by our ballot marking device, which is this. When we pulled up the image we thought initially that it was a scanner issue, but then upon closer inspection we saw the bottom of the ballot in the actual image that was exported. So we were able to identify that this was not an issue with the scanner but an issue with the ballot marking device and the printer. And then the second and third images are camera calibration issues. One is extremely dark. One is extremely light. In all cases though, the vendor did tabulate the ballots correctly. It's just a matter of the images being different densities. And what else? You can easily see the interesting ways that voters mark their ballots. And I could have spent hours looking at these because it was really very interesting. I don't think Linda would have let me spend hours but it was very interesting to see this. And what else can it do? It can help resolve recount issues or allow for more targeted recounts. It can inform election administrators on issues with ballot design that lead to voter confusion. And it can assist election administrators in evaluating how certain precincts are doing. And what about the future? So we would like to use this technology to analyze logic and accuracy images prior to the election to identify any issues with the equipment ahead of time. We would like to include an algorithm that could automatically detect ballot images that are long so we can pick up any issues, such as double pulls or the stub being scanned. And the third one is, for me, really key, and it would really be nice to be able to compare the voting system cast vote records side by side with the audit cast vote record. What we had to do in the general was once we discovered an issue in the audit system, we had to note that cast vote record ID number. Then go into the voting system cast vote record export, which could be up to eight for our larger counties, find that cast vote record number, and then do a manual comparison of each one of those rows. So to see them side by side integrated so you can tell at this ballot to this ballot, and what the differences are between the two, would really be amazing. And this is my last slide. So I really wanted to say that this was a game changer for us in terms of post-election audits. Everything was at our fingertips, and we definitely couldn't have answered the questions we were able to answer without it, to be honest. And I have questions here, but I don't think I'm the last one. So I guess we're waiting to the end, right? [LAUGH]

Matt Masterson -- Yeah, we'll wait to the end, Natasha. Thank you, fantastic stuff. We also know that you define fun differently than some others.

[UNKNOWN-SPEAKER] -- [INAUDIBLE]

Matt Masterson -- [LAUGH] No, so much good stuff there. I have a laundry list of questions from that as well. Next up is Ross Hein. He is from the newly renamed Wisconsin Election Board. Is that right?

[UNKNOWN-SPEAKER] -- Election Commission.

[UNKNOWN-SPEAKER] -- Election Commission, excuse me.

[UNKNOWN-SPEAKER] -- Yes.

Matt Masterson -- And Ross will be talking about a recount that you all may have heard of that took place in the State of Wisconsin.

#### Ross Hein

Ross Hein -- Thank you Commissioner Masterson. So, when I was thinking about the presidential recount, we focus a lot on that and I'm gonna get into that.

But the discussions that we've had so far today really made me think about all the preparations that went into the election, and all the concerns with security, cyber security. We had a number of different court cases that made last minute changes to our residency requirements, and requirements regarding the new photo ID law and absentee changes. And so, when we got done with the presidential election, we were feeling pretty good, we made it through.

We also had the transition from different agencies. And so, this was the first major election that we made it through successfully. And we thought, we were able to then focus on other things that were neglected after all of that time. We were wrong. And the reason being is because we had the requirement to conduct a recount.

And Wisconsin, on election night, President-elect Trump was up by 22,000 votes. And when you compare that with 3 million votes cast and the percentage, we didn't think there was really any chance whatsoever for a recount. Wisconsin statutes do provide that any candidate for that office can petition for a recount, but if the difference between the leading candidate is greater than a quarter percentage point, the petitioner, the candidate is responsible for paying for the entire cost of the recount, which we really didn't think was gonna happen and we were wrong.

Jill Stein's campaign for the Green Party on November 25th, right around the Thanksgiving holiday season, submitted a recount petition alleging that there were inaccuracies, potential tampering with voting equipment, with statewide voter registration systems, said that there was the possibility of cyber attacks. It also included an affidavit from Professor Halderman with the University of Michigan that went into the potential vulnerability of electronic voting systems. It mentioned the hack that took place in the two states, I think. I'm not even gonna get into those states, but we know who they were. And so there were certainly the possibility, and that the only way to verify the integrity of the election was through a full hand count. In Wisconsin, it's up to the county board to canvass. We have 72 counties in our state, and it's up to each one of those governing entities to determine what method that they choose to count the ballots, and I'll talk a bit more about that later on. Because the Stein campaign only gathered 30,000 votes, and we had 3 million total where President-elect Trump had 1.4 million and candidate Clinton was close to that number with 22,000 less, the Stein campaign was required to pay for the full cost of the recount. And this is the first time that we ever had to get into a situation where a candidate actually had to pay for those costs.

We had to develop a process with the County Board of Canvassers to essentially determine what that estimate would be in a very short time frame. We sent out that email the day after Thanksgiving asking for a deadline on that Monday to tell them to tell us what those costs would likely be, gather that, and give a bill to the Stein campaign. That came out to $3.5 million. And we received confirmation on the 29th of November that that information was deposited. So, green light, here we go, we are gonna do a recount. So the next day, we held a teleconference with all of our 72 county clerks to go through the recount process, the timing, potential litigation, what the candidate representatives could do. Essentially try to get everybody on the same page. Because although we had 72 different entities doing the recount, we wanted to ensure that the process was as uniform as possible, and certainly conform to state requirements.

On December 1st, we started the recount, and we knew at the time it was gonna have to be done in an incredibly short timeframe. We did have some experience doing a statewide recount in 2011 for the Supreme Court contest. There was a recount that we conducted, and it took about a month and a half to get through it, and that was with about 1.5 million ballots. So we had double the number of ballots, with 3 million cast in the presidential, and we had less than two weeks to do so.

We had to change how the recount took place. Before most of the actual counting was done by the county official, we recommended bringing in the local election official, the municipal clerks and the poll workers that actually counted the votes, to have them assist. Because really, essentially what they were doing was facilitating at the county, and directing the municipalities to go and count their ballots. And actually it turned out to be a really good training opportunity for the municipalities and the poll workers to see what they do has an impact on the actual outcome, and that if they screw something up, it is gonna be found.

We really focused on communication. That's the theme of why we were successful in Wisconsin, and that's the theme of what you see with pretty much any election official regardless of what the area of interest is. But what we wanted to make sure is that the public knew what we were doing and where that information was to be found, and whether there were any changes.

So we mandated a process. Every night, the county had to submit to us the number of reporting units that they collected, which is essentially a fancy word for precincts for other states. And they needed to include what the modified totals were, and if the cumulative total was more than ten for that precinct, they had to provide an explanation. And that explanation was posted on our website. And it's really just to get that information out there, to show not only where the progress was but also if there are any errors to explain why those errors took place. On a rolling basis, we updated our website with minutes from each of the 72 counties and we gave them a percentage of the number of precincts that were recounted and how many were remaining. There are about 3600 precincts that were reporting for Wisconsin that had to get recounted and we really wanted to make sure that the public knew where we were. And so we really focused not only with election officials on communication, but certainly with the public. We used various social media like Facebook and Twitter to let people know, and then working with the various media entities in Wisconsin. We wanted to make sure that everybody knew where we were and it really helped for the most part to a lot of the skepticism, the concerns with fraud, regularities each side accusing the other of wrongdoing. And by putting this out on a constant basis, we really found that you know that. Those discussions were lessened at least somewhat. We internally, we met twice a day as a team, because we were dealing with 72 different entities. If there were any issues that were coming up that we could then communicate that out to the team. So we had these brief and twice daily and sometimes, they weren't very brief, cuz there were a lot of complexities and dealing with some of the last minute changes with the litigation and some new legislation that was paying past that you wanted to make sure that our election officials had consistent information. I like this the slide, so I have to give credit to one of my colleagues Christopher Duffy and you help me put this together. And when he put the slide, he must obviously be a Beatles fan, because you can see all the various references. I mean, what it really came down to is a ton of work as to be expected. We really wanted to make sure. Because if our counties were working late hours of their working on the weekend and late hours through the weekend as well, in early morning hours as well that they had that resource to contact us and they certainly did. We've always had multiple staff the could were on call essentially and they could call us with any questions.

We also had litigation that came up during the recount. The first one was a request from the Stein campaign to mandate that all county board of canvassers recounted their ballots by hand instead of potentially retabulating those ballots through electronic voting equipment. Wisconsin has predominantly optical scan voting systems. We also have touch screen voting system the purchased around 2006 and with HAVA funds and that's mainly for accessibility, but those do require voter verified paper audit trail and that's the official record. And so, those ballots cast on touch screens are always gonna be hand counted and that was actually one of the types of systems that the Stein campaign identified as being most vulnerable or susceptible to attack.

The court denied the Stein campaigns request to mandate a hand recount, although the majority of county boards and canvassers nonetheless decided to do a hand recount regardless. 51 counties recounted all ballots by hand, 9 counties used optical scan voting equipment and then 12 counties used a combination, our the most populous counties did seem to use optical scan voting equipment to tabulate ballots.

There is a mandated requirement that all ballots before it is tabulated through voting equipment has to be visually inspected to see if there is an irregularity until, so can the representative to make a challenge. And so, every ballot was visually verified, and that's why we even pointed out a hand recount may not actually take as long as you may think, because you're looking at them anyways, then just put them in a stack and then you can count those up after the fact. But regardless, there was a mix and that's what's provided instead statute.

There was another court case and this what took a different direction and was really looking at whether there was, and I'm not an attorney. So, forgive me. But essentially, an equal protection violation established under Bush v Gore which was an interesting argument. It really went into whether the separate counties in the way that they cast their ballots or recounted their ballots was different enough that it violated the equal protection clause and the court case also went into that they didn't think that there was anyway that we could get the recount completed by December 12th right before or essentially the 13th, the day before the safe harbor date. Because we also in the at the staff level said, this is going to be really tough for us to do. I mean, we said, it was gonna be a challenge. Because we said, as a challenge and said that there was a potential on likelihood that it. It may not happen. Essentially, the judge denied the temporary restraining order and the recount moved forward.

So the recount findings, we had 3 million votes that got recounted. And after all was said and done, President Trump ended up gaining 131 votes. Each candidate gained about 800 votes were totaled and the Stein campaign gained 66 votes. Our counties did overestimate a bit for the estimated cost. They said, when we actually accumulated what the actual costs were was closer to 2 million. So, we returned 1.5 million to the Stein campaign. Now when you look, you can say, 844 at least we got a lot of calls were 844 votes. That's a lot of votes and I think it really after to look at the percentage of the comparison, if we're looking at 3 million ballots counted when we actually, the State Journal in Wisconsin did a really nice breakdown analyzing the data and they found over 9000 votes weren't properly counted originally. And so, those were added in and then approximately another 2,000 were improperly counted where they shouldn't have been. Those 2,000 were mainly absentee ballots where they either weren't properly witnessed or something like that. So, the 11,000 change represented about a point 0.3% rate out of the 3 million votes cast. We found that over half of those to discrepancies with counting write in ballots and that is really attributed to a new state law that mandates that in order to count a write in, the candidate has to be registered in advance. And as election officials any time the legislature makes a change to the law, it takes a while for election officials to comprehend. And certainly, they make they make errors and we found that the vast majority of the errors that took place in the election were attributed to either voters or election officials. So if you look at that 0.3%, it's probably half of that if you factor out the write-ins when there was approximately 6,000 votes that change just because of write-ins along. Lastly, the error rate looked at the different methodology is for how the ballots recounted in a found that there was a higher error rate with ballots are counted by hand versus ballots that were counted by voting equipment. It would be interesting to break it down the next level of whether If you take out those right ends. Whether that number two in the hand count in the voting equipment recount would be closer, because when you're looking at ballots by hand I think it's easier to attribute those right ends because voting equipment doesn't count right and those are always counted by humans by poll workers. And so it's possible that that error rate for voting equipment be in the lower was because those write ins weren't properly addressed, that's all speculation on my part.

The one thing that's really interesting is and this just shows that there was no biases that the error rate between Trump and Clinton was roughly the same.

So unfortunately the recount isn't technically over and by that, I mean, that the counting of the votes is certainly done. That is completely over. The elections been certified. That's done.

There was a request by the Stein campaign and there's a newer provision Wisconsin statute. It's been there for less than ten years and this is the first time it has ever been utilized, which allows a recount petitioner to gain access to the software components. And I thought this would be an interesting point to bring out as part of the TGDC discussions. Because the Stein campaign identified those eight individuals to gain full access to the source code of the voting equipment. Wisconsin predominantly is an ES&S and Dominion state and it's split, depending on what county or municipality you may be in. And to try to facilitate this process has been challenging. Because essentially, you are balancing the public right for transparency and open inspection. While safeguarding the manufacturer's right to protect the proprietary interest. Right now, where we are in the process, is trying to work out the confidentiality agreement. And the manufacturers both for Dominion and ES&S has provided a template and now that's in the hands of the Stein campaign and their attorneys to facilitate gaining access. This is a interesting situation and I'm certain that it's going to continue. And I think there's also a good chance that the court system could get involved at some point. So that is the Wisconsin recount and I'll pause there and I think Greg you're up and then we can do questions afterwards. Thank you.

Matt Masterson -- Thank you Ross, I appreciate it. And sure it'll measure up next, I'll say Ross I am a lawyer and I will apologize for it. So normally that's the way it goes. With that Greg Ridlemoser for a local election officials perspective on the presidential election.

#### Greg Riddlemoser

Greg Riddlemoser -- Matt, thank you. I did not bring any slides today because I hesitate. Although I know this is gonna close caption and transcript and I always hesitate to put stuff out there in the general public, but I'm gonna say a few things this-

Matt Masterson -- You're on the record, my friend.

Greg Riddlemoser -- That's right I'm gonna say a few things this morning that I hope our humorous to a point, but I wanna circle back to the VVSG because I think that's why we're here. But would be to always keep in mind as we're working on the TGDC and VVSG and things like that, to keep the voter in mind and if the job of a local election official is to facilitate the franchise of eligible voters and that's all we are to do then, okay.

But the problem is there are 160 million election officials in America. Every registered voter thinks they know how the system works, and they don't. And everybody wants to be an expert on this, and an expert on that to include every member of the General Assembly of the various 50 states. Every state election director. Every secretary of state. Every local electoral board member and local election officials and there's 10,000 of us as you well know. But my point in all of that is that you cannot have elections your way. This is not every man gets to decide how their vote will be handled or whatever. Every state has their rules.

Every local election official's job is to implement those rules but we still deal with the general public. And as we're dealing with the general public in our ballot design, in our election night reporting, in everything that we do. We have to deal with the fact that they are consumers of a process and they often don't like anything about that process and they want to tell you how to do it better or right or whatever. There are lots of moving parts including the United States Postal Service but as Lori said why in the world would you have a ballot by mail and return it after election day? Because that's the way they wanted to do it I guess. But there are folks that wanna vote on their phone, they're folks who wanna do this and folks who wanna do that. So 160 million voters out there each one of them thinking that they can have it their way causes us lots of problems. Lori might do a presser in Olympia. It's rebroadcast out of Spokane and because Spokane covers Northern Idaho and Eastern Montana. The folks in northern Idaho and eastern Montana want to do it the way Lori does it because they saw it on the news and it's not the way it works.

So we're dealing with at the local level lines and loiter time in the precinct and election day frankly is where planning and preparation run smack in the face of the general public. And we do the best that we can to get them in and get them out and all of my previous speakers today have talked about confidence in the system and there is nothing more important, but we certainly can't forget the individual voter as we go through this. So as we're writing specifications and we're thinking about VVSG next generation and those kind of things we've got to think about the local election official and the local voter because of the loiter time in the precinct and ballot complexity and different things like that you can't have a two page double sided 17 inch ballot. You'll just have lines that never end. You know, it's to me it's impossible to think about some of those kind of things.

But our biggest problem I think is that frankly nobody knows what we do. I guarantee of that Ross and Bob and Lori and Linda did nothing on election day but explain over and over and over again the painful irregularities of how things work in their state. And it's amazing to me how everybody just wants to consume the election the way they want to. And we're in country frankly that has a short attention span. And I think it's our job to keep this stuff top of mind as we're working through the next generation of things because the next presidential election is nigh on four years away and it is no longer top of mind and it ought to be. And we can keep it there as best we can.

But you wanna talk about the error gap, the error gap that exists is in the civics knowledge of the general public in that there's 160 million of us that are all error gaped between the other 159 million. And frankly we just we just want things the way we want them and it causes great complexities I think at the local level. So my only thought on this is that it worked well because there's a lot of people that work very hard at this. And we don't stop and capture all the disparate voices out there, whether it's a cacophony or a whisper. There are lots of folks out there that wanna influence these systems and frankly it's just too hard to do, because we really don't have 160 million that all get to weigh in on this. So as we're writing the specifications are things like that, we're certainly thinking about the vendors. We're thinking about the VSTLs. We're thinking about all of those things.

But as we do all of that, I would encourage just to remember that there's a voter in that loop. There's a local election administrator in that loop who's trying to make it work. Trying to get an 80% voter turnout through the precincts without creating lines in the 13 hours that were given us by whatever your state constitution is for election day. So, that's my purpose on this committee is to try to keep the local administrator and the local voter at top of mind.

So just to give you a really bizarre example, if we were to say that you know the font on a ballot needs to be 22-point for everything that's on the ballot and the oval needs to be as big as your thumbnail. We would still have lots of problems with votes cast and recounting and all of those kind of things, because that doesn't make it particularly any easier for the voter. It may make it easier for the visually disabled, or what have you, but to go to a multi-page ballot and different things like that.

So as we're going through these things, we've got to remember that all of these things actually work in really good harmony. I think America does this very well. I think the VSTLs and the multiple vendors, and all the folks that we have in the enterprise, and the election administrators, and are gifted. And as we work together, this stuff is working. We can't possibly have a outreach campaign that will convince 160 million people that we're doing it right, because they're all entitled to their own opinion, but what we can do as best we can through the EAC and other organizations to leverage best practices and things like that. I always learn a lot every time I come in these meetings. The folks that sit across this table are nothing, but expert and we have lots of other organizations out there. Every state probably has an association of election administrators. We know there's Naz at NASED and some of those, and everybody's working hard. And so just in closing the local election folks did a good job in the selection without a doubt fascinating to me that we're as disparate as we are and we still manage to make it to the finish line for every single election, but I'd encourage people to keep this stuff top of mind. Don't fall into the problems of the short attention span that is the presidential election cycle and let's see how much we can get done in the next two years, so that we're well ahead of the next spike if you will. So, thank you for your time.

Matt Masterson -- Thank you, Greg and I'll echo one of your sentiments and that is one of the ways to keep it top in mind is that while folks are apparently still talking about the election, there's a way to get involved via the other public working groups. Anyone can get involved. So if this interests you, if this is something you're concerned about the public working groups are available to any of you to help shape the next set of voting system standards. So with that, I'm gonna to open it up for questions. I have approximately 220 of them. So I'll give it to you guys first before I get into any of mine, cuz it's your all's committee. So questions for the election officials, I wanna thank you all really great stuff to really tee up this conversation as we head into discussing the standard. So thank you, Mark?

#### Questions for EOs

Marc Guthrie -- Thanks Mike, I just had a question of Natasha on the issue of the double poles, was that a particular machine or was that an issue that was sort of cross the board with a number of machines?

[UNKNOWN-SPEAKER] -- Yeah.

Natasha Walker -- It was a particular machine in Baltimore City and what happened was yes, NASED sent out a second unit and they ended up, I believe they ended up using both, but they put the one that had the double poles. They stacked in a batches of 50, made sure they were 50. Ran them through, made sure the machine counted 50. And that is how they resolved it, but it was a particular machine.

Matt Masterson -- Let me just quickly add to that too. That one of the great things that Maryland did in exploring this and using the results of their their audit was talk to us about how to improve our testing, and standards, and that's how the feedback loop needs to work right. Actual on the ground experience with the equipment makes all of us better as we learn from that. And so I appreciate the work you all did working with us to understand the challenges, because that's something we test for. We test for double polls that way. We wanted to understand the causes as much as Marilyn did, I think and the second thing and we're gonna McDermott is. As you think about your questions as you explored in Mark's question was a perfect example that think about how it could help influence our conversation here in writing the standards. So with that, McDermott.

McDermot Coutts -- My question is for Ross. What is the purpose or what is trying to be gained by getting the source code reviewed? Because according to your slide, you had 51 counties that were hand counted. So, the technology has been completely removed from that equation.

Ross Hein -- Yes, thank you, McDermott.

[UNKNOWN-SPEAKER] -- [LAUGH]

Ross Hein -- The simple answer is that it's required by state law, I think it was passed at the time in 2005 where there was concerns regarding vulnerability of electronic voting equipment and the recount process in Wisconsin is the way for candidates is to verify the accuracy of voting equipment. And at the time that that statute was written, there was the mandate that counties had to retabulate ballots using electronic voting equipment. That was changed, probably about two three years ago where they were given the option to do either a hand count or a voting equipment recount. And so I think at the time when that statue was written, the only way to verify the vote count was through voting equipment and the thought was well, if the equipment potentially was manipulated that you wouldn't be able to verify. So, I know what you mean it. We saw over 55% of the ballots were recounted by hand and you saw to that the difference, and I'm getting a little revert here. The difference was pretty minimal between a hand count and a voting equipment count, so it will be interesting certainly to see how this shakes out.

McDermot Coutts -- Because obviously, as we will find out, part of the VVSG is a source code review. So, the code is looked at by people other than the engineers of the vendor. And now granted that it's primarily focused on making sure that the source code is maintainable, if in case the vendor disappears for whatever reason, but I think we need to think about what other assurances can we provide in that direction just to short circuit some of this extra cost and time.

Matt Masterson -- Yeah, and I'd add to the list of things to talk about or think about the program requires software validation tools. So that it's not just what was certified, how do I validate what's fielded is in fact, what was certified? And so thinking about how best to do that whether or not it's appropriate in the VVSG or programmatically and how to explore that, I think's an important question.

Ross Hein -- Can I just add on to that just briefly commissioner, just trying to figure out the logistics of even giving access to that source code. So you can maintain and maintain control and that it potentially can't be use for purposes that aren't authorized by the vendor is been incredibly challenging, and we are state in Wisconsin that does

Ross Hein -- All voting systems have been federally certified. And so they have been through that source code review, I think it's really for the candidates. I don't know certainly not just peace of mind.

Matt Masterson -- But Lori, did you have?

Lori Augino -- It's top of mind as we continue to have these discussions about what issues like this double poll that you said, you found. Making sure that were, although it may not be part of the VVSG the process that we're here to accomplish. Today, we do talk about vulnerabilities that we've found and how we're going to address them through the next three VVSG, but let's catalog those. Because as elections administrators, we have solutions. You cannot 100% rely on the technology without having these really good policies and procedures in place to balance that. And so the batching that you talked about is a perfect example of having small batches and ensuring those checks and balances along the way, because you may think you've solved these double pulls or whatever the challenge of the day is, but you can't rely on that 100%. And so making sure that we're cataloging those kinds of issues and then talking about what are the policies and procedures, best practices, if you will that are in place to augment the use of the technology that we have. I think will be powerful for us. We've learned these lessons on the local level and at the state level, and we've got to keep sharing that.

Matt Masterson -- Yeah, I'd add to that as part of the EAC program, the quality monitoring program. We post all fielded EAC certified system anomalies are posted to our website. And so that should inform our VVSG development process, as well as the interpretations that result from some of those to improve our testing. So all of that's a feedback loop that has to feed into the standard, so we're better at the end of the day which I think's important.

Greg Riddlemoser -- Great. We know that one of the VVSG major muscle movements is audit ability and there's some things I heard today that I'm really pleased with and I'd like to see, I don't think they'll fit into the VVSG per se, but they ought to be captured in the best practices and twofold. One, I'd like to see a web page, if you will that shows the state by state rules for recount and I think you can do it in one paragraph per state that Virginia, for instance, it's a certain percent before. It's possible, you pay for it like you do in Wisconsin, what have you. But in Virginia, we have to program the recount machines, specifically to reject over votes, under votes and write ins. And so then the dot counter is only counting dots and then all the other ballots are hand inspected and added together and all that kind of stuff, but I think it's important for the general public to know that recount rules are different than they are on election day and that there will always be a delta always. And I think we assume that you count 10,000 votes, you're gonna get the same answer every time. And on the machine level, you will. But if you're segregating a certain portion, those ballots the hand count and that will always be different and I think we could have a general description of recounts and how the rules are different, so the totals are different. But more importantly than that, why the 50 states are different and how they do it and the other thing I think that's very interesting and I don't know how we do the outreach on it. But frankly, I'm pleased to see Linda's work proving something that we know he intrinsically to be true, but academicians hate us we say it is. That you cannot predict what the general public is gonna do and one of the things that comes up all the time and it irks me every time that it does is that if you have a certain amount of over votes or under votes, you have a machine problem. That is not true. The general public will color the dots or not color the dots, however they see fit on election day and over votes and under votes is not a machine problem. So those kind of things that get out there and they're repeated over, and over, and over again by scientists and academicians who think they know the sociology of the American electorate. They're just wrong and I think it's up to US election professionals, and Linda's work proved that beyond a shadow of a doubt. Again, you cannot predict what the general public's gonna do on election day. So I wanna build on that with one of my questions and it goes to Natasha, and Linda. And that is I know on top of having a robust post-election audit, you all have robust auditing of your processes across the state. There's an audit process and what I'm interested in is understanding how the functionality within the systems, the data produced within the various systems that may or may not fall under the VVSG can help feed into a larger process audit that helps improve the process not just a post-election which I think supported, but the full process. And so if you could talk a little bit about how you took the results of the post-election audit to improve on ballot design or poll worker training, because that is a real benefit to the entire process in that way.

Natasha Walker -- We're actually right now starting that process. So, we met with former Secretary of State John Willis and he's very interested in this type of audit. He wants to sit with me and that's part of the next phase is looking at some of these ballots understanding how. For example, he said, in Baltimore City, they've never had a paper voting system. Why do they have all of these over votes as a result of filling in the oval? These are voters it was a vote for five they filled in all the candidates, filled in the first oval. Why is that? So we need to focus our voter education efforts in Baltimore City where they never had a paper system and maybe at the polling place having a sample not with candidates on the ballot right then, but having a sample and explaining to each voter. Pay attention to vote for. Filling in this oval for write in is going to cause an over vote. So, we're just now starting. We obviously, because of the issues that we discovered, our certification got pushed back til, I think mid-December. So and then of course, the holidays. And now, we're starting that process. So, we're gonna dive in and really figure out how we can improve voter outreach efforts. Ballot design for me is very important, cuz I lay out the ballots and I was very interested to see that these people were over voting as a result of filling in the oval. How can we improve the instructions? And we do work a lot with usability expert. I believe this from the University of Baltimore and she comes in, and reviews everything. So, we are trying. We need to get her in and kind of review some of this stuff, as well. We just were in the initial stages of that.

Matt Masterson -- What are the artifacts, reports, data are you going to use from the audit to help inform that? Because those were things that within the standard regarding the voting system, we need to make sure exist for you to be able to use.

Natasha Walker -- Well, the oval visualization tool which I showed you where you can see how the voters put checkbox or checks or X's or in the contest visualization, they were drawing ovals or writing in a name under the contest or even cases where they filled in the oval next to Hillary Clinton and also wrote her name in, that forced over votes. So those things, I would like to see in an actual voting system where you can filter down to that level. Right now, we don't have that ability in the software that we have. We can look at each individual ballot and we can filter to a degree. But seeing all these ovals side by side and really interpreting, well, you can't really interpret it or interpret why a voter made that decision to vote that way. But if you see it happening frequently, you know something's wrong and you can kind of get to that point and that's what we need to see in the voting system software. And that's why this audit was was really beneficial cuz it pulls up in one minute and less than one minute, one second. It's just populates and we want to be able to do that with all 24 counties and the size of the databases that we have and then in the amount of images, is that what you're-

Matt Masterson -- Yeah, that's perfect. I mean, just to understand whether it's an improvement on logging, whether it's an improvement on what images or artifacts are available. Understanding what you need functionally you from the systems to be able to conduct your work and improve on the process that's perfect.

[UNKNOWN-SPEAKER] -- Right.

Matt Masterson -- I mean, it's obvious and it was obvious in Lori's presentation, in Bob's and Ross', the common data format speaks to all of this, right? You want the ability to look at side by side. We got to have the common data format, right and so, John, I hope is working right now to get that done. It will be done by the end of the meeting, is my understanding. [LAUGH]

Natasha Walker -- I'd like to see the other thing too. The other issue is because we have 24 jurisdictions and each one of those databases so far the largest, one of our second largest county, their database, their database ended up being close to 100 gigabytes of data. Their ballot images for something like 60 or 70 gigabytes just for the PDFs of their ballot images. So for us, I was and this is obviously a dream because I know security is huge but it'd be nice if there is a way for each one of those local boards to upload those ballot images directly to the cloud on some sort of but then it's connected to the Internet and then you have bigger problems. But to have, instead of having to send us a CD of their database with the backup images that might take 10 hours to export. It'd be nice, throw those images up to the cloud and give us the capability to sort and look through those images like we did and I know that's probably far fetched and not coming anytime soon but it's just the size of the data. It's so large with these ballot images but.

Matt Masterson -- David, did you get that? [LAUGH]

[UNKNOWN-SPEAKER] -- [LAUGH]

[UNKNOWN-SPEAKER] -- Lori.

Lori Augino -- Are your ballot images public record?

Natasha Walker -- I believe so, yeah.

Lori Augino -- So someone could ask for them and get a copy of the actual images?

Natasha Walker -- Mm-hm.

Matt Masterson -- Other questions or thoughts supported by the conversation?

McDermot Coutts -- Just kind of a word of caution as we move forward. We cannot look to technology to provide the answers for our security issues because at the end of the day the technology is not going to fix security. All it's doing is moving it around your chain of process. And what we've got to focus on is moving the security to a part, point in the process where we can control it and that's the function of the technology and security. So, just throwing that out there.

Matt Masterson -- A discussion that we may be having and David's section but I'd like to at least put a placeholder on which something Bob raised is the notion of access control and where appropriate, what access controls to use whether a multi-factor or dual factor authentication is appropriate for your office workers, poll workers, that gets a little scarier, right? Training on that, what's that look like? How's that work? But, I'm sure it's something, I know it's something you all have talked about in your working group. But it's something we all need to be considering and talking about as we look at how that gets applied. Because there are so many different users to apply it to. I'll keep going. I have one for Bob and that is and it's something we look at when we do manufacturing audit reviews as part of the EAC program but, can you speak to why the ISO 9001 certification was important to you? What's that bring to the state of New Jersey that you think's important so others can understand?

Bob Giles -- Well I guess said it's a quality management standard so if I'm going to have a vendor producing seals that I'm going to use, we require certain things. Yeah, they obviously, they'll notify us if anybody request the seal similar to ours and I know they have at least gone through the process of getting certified. So their management and administrative end of it is at least up to that standard so it was important to just. And again, some of it's public perception that who's making your seal, just some guy in his garage or somebody you can trust and adding that extra level of an ISO 9001 certification helps. And again, it was more to that to say we're not just getting some fly by night. And I think that was part of why I was talking about expanding that out to the voting machine vendors cuz we saw after HAVA, we had voting machine vendors just coming out of the woodwork making voting machines. And this time around we got questioned a lot about, who is making our voting machines? So, I think those kind of standards to say, well, now we know and now we have a standard to apply to.

Ross Hein -- I have a comment or question for Lori regarding horror, your security, creating that website to try to address security concerns. One of the things that I think we've seen for the first time and it's become much more prevalent is how to deal with information that gets out into the public whether through Facebook or Instagram or in various types of media entities where it's blatantly false. Their works, like concerns about potential hacking, or where there is ballots that are found in a warehouse that are pre-marked for a particular candidate, and when you posted that information on your website, did it get into some of those allegations? And did it help create higher levels of trust with your processes?

Lori Augino -- It was tricky, actually, to identify what can we say, what should we not say. Because you don't want to say too much and give away the keys to the safe while you also need to instill confidence so that was about balance. And, I think we took several days to craft what we can say publicly and what we need to hold close because we need to ensure that our systems are actually secure. But I mean, we were like I said, literally, I was on the phone nonstop all day and I was one of three that were responding to media inquiries so, there were misnomers out there for sure that we were combating. We were pretty proactive in combating anything that we heard that wasn't accurate and we would call directly and send emails and then follow up. But we've tried to maintain consistency. So, these facts that we did put together in terms of what we do for our system security. I provided those to my local election officials so they had the same talking points, kinda coached them on how to respond because they were overwhelmed too but they're very much appreciated the fact that I was available to talk, Secretary Wyman was available to talk. David Ammons, our communications director was available to talk to the media. So, that did help shelter some of them from responding so they could actually get to the get down to the work. But helping to ensure that across Washington, we were providing consistent messaging and then combating fake news when we heard, it was kind of our strategy. I'm happy to share a copy of what we did post with you if you wanna take it back. But I would say again it was just constant communication, a lot of talking to a lot of people and then following up in writing.

Matt Masterson -- I think you'd be hard pressed to find a state or local election official. So at this point that doesn't at least have the two minute elevator speech on election security for their jurisdiction. I mean, it it became a necessity and that's part of I mean I think this is now we're getting Masterson bingo but this part of election official is an IT manager right? If you're an IT manager you understand your systems and are able to explain them in an understandable manner, to those media and voters that deserve that information. And so, I think that's all part of it. And election officials to their credit, embraced the conversation, they didn't shy away from it, but they said sure come see it. Come watch it, we have you can come watch pre-election testing, you can come interact with the system in a variety of ways and that's a real credit to the profession for embracing that conversation in that way, like you all did. I think it was great. One thought, I had one more on that. On your point about the recount reports. It seems to me that as we look at data, logs information. You shouldn't have needed to create spreadsheets for your locals to create reports into right, that's something that that our systems through a data format ding, should be able to do right? You all shouldn't have been asked to do that in that way. And so just another flag for us to get that done.

Greg Riddlemoser -- One of the things that I've found frustrating, and I know the state level folks do too, is when folks are fishing based on and we'll call it fake news because that is Gucci these days. In my locality we have a PIO and I don't let him talk to the press on Election Day, because as I said earlier I'm the only one who really understands what's happening. And so the person who doesn't deal with elections ought not be talking to the press because there's nothing worse confidence level wise than getting stuff out there. Now how this affects the VVSG and what we do is that we have that product the VSTLs testing is that product, the EAC certifies against that product and then the state certify against that product. So we have certified election equipment. And we have somebody call a fairly large but local locality like myself from a major national network. And they're asking questions like what kind of equipment do you use? How many folks in your state use that same equipment? And where they're really going is question number three. We've gotten reports that one of your precincts that equipment has failed. And so they're trying to indict the entire system. So if the person answering the phone and talking to the press doesn't know how to handle the press. Doesn't understand how the election equipment really works and stuff like that. You can't possibly put out those fires. And that fire can become a wildfire. When I say that I use equipment X. uses that equipment and something like that. And then get around to answering their third question which is what started the fire? So you've got to be able to think about those things, know where they're going and it all has to do with facilitating the franchise of the eligible voter while maintaining confidence in the system. And I had that exact thing, and I was able to tell the reporter from a major three letter network that called me that had the local election official used the one page start up guide they wouldn't have had a problem. So yes the equipment was not functioning at 6 AM when the polls opened But we turned it off turned it back on again and it worked as advertised and they didn't write the story and it died. And they even pulled it down off of their social media site. So we just have to be prepared to do those kind of things and it just concerns me that on Election Day everybody's an expert when there are actually very few of them.

Matt Masterson -- David.

DW-- Dave Wagner. It was great to see this report from Maryland about the results of the audit and that it's, I'm with you. It's so fun to look at the different kinds of marks that are out there.

[UNKNOWN-SPEAKER] -- [LAUGH]

David Wagner -- And I think what you found matches pretty closely to what we saw when we did some similar experiments in California, with some prototype research software we built to try to do similar kind of analysis. And so, Lori since you asked for failure modes, I think they got a good, there's a good overlap with what we saw so that should give some confidence about failure modes. One or two of the other ones that we saw. One is the potential for bleed through from the reverse side of the ballot, I'm sure that's one of the election officials are well aware of. Another one that we saw interesting category of marks. That I'm sure election officials here are seeing a lot are well aware of. Are things like voters making an X. But they just barely managed to miss the oval or they only barely go through it. So there's only a very light mark through the oval. We saw cases where people marked and then they cross out and they say no and they circle and they, you know. A very common case we saw where people wrote into the write in but fill in the bubble next to the write in. I'm sure that I'm telling you things that is election officials, you are very well aware but the data puts it in front your face in a very vivid way. So that was great. I had a question for you to want to comment about the experience in Maryland. I'm curious about how the timing worked and how this worked logistically, so I understand that Maryland has a very tight timeline. Do you wanna comment anything about at what point this was done. Was it before or after certification, how long it took to scan all the ballots, from all the jurisdictions. I can imagine that must have been quite a project. And were you happy with how this fit into the timeline?

Linda Lamone -- Well counties don't certify until the second Friday after the election. So they have if possible and then they can even be later than that. I think the way it happened was they uploaded their ballot images onto a hard drive, external hard drive and then shipped it directly to Clear Ballot and that didn't take very long but that first shipment was only early voting and Election Day voting. So there was once they got the provisional and absentees canvas then they sent another group of images up to Clear Ballot. Natasha can speak to the top amount of time it took for Clear Ballot to get their reports back to us. I don't remember what it was.

Natasha Walker -- It was less than a day. So Prince George's County, our second largest jurisdiction, sent their images by that Friday and I believe Clear Ballot turned around reports to us with that initial result report. So we didn't send them any election result that initial report was early Saturday morning I believe it was uploaded. It's very, very quick.

Linda Lamone -- And one of the controls was that we did not give them the election tally until after they had done their analysis so that they the comparison of the numbers didn't occur until after they had done their reports. So that was a double check.

Ross Hein -- Ross, I'm just building off of David's comment or question I should say. Do you have a comparison between so background Wisconsin does full hand count audits and we select Particular precincts that do a full hand audit and they have to do two independent cons to verify that they didn't screw up their current job of a comparison between using a technological solution. Like clear Bella versus a traditional.

Natasha Walker -- Yes, I have it with me. But basically in this report it was written by someone that worked closely with Nicky but there were three different groupings we did two counties. The audit method, the time that was included in this independent audit Included the time it took the counties to press the Export button, and they continue to count until the X part was done. So it's kind of a misrepresentation of how much effort it took the local board. Because it was really majority of that time was the process, the time it took to export the images to the hard drive. But I can certainly show you some of the statistics I don't know offhand but I have them.

Matt Masterson -- Yeah and for our purposes I think it's important that this is critically important to understand the different ways we need to support the different kinds of what's right. So that we if the system needs to be audible, that means it needs to be audible by you. Not just this kind of out there concept. And so, we need to understand the various types of functionality necessary as we look at the auditability of the system and what that means.

Natasha Walker -- And that's a very good point and you know the one thing-

[UNKNOWN-SPEAKER] -- Thank you. You can stop there. [LAUGH] No.

Natasha Walker -- [LAUGH] The one thing that we struggled with was, the other two audits, the ballot level audit, applying risk, limiting principles and the fixed percentage audit was very difficult for me to explain without action especially the ballot level audit, and I know Dr. Philip Starks tools and I did try them out before coming here. But we have to have the local boards also be able to explain to somebody how they got to that end point. And why they believe that their results are accurate after this audit. And it just was easier for them to understand the independent automated software audit and to be able to explain well this is our voting system, this is the independent audit software result, and this is the conclusion as opposed to. Well, there is some sort of mathematical thing happening over here. We just know it's right, like it was very difficult. They only do this stuff every two years. And they don't remember a lot of these things. No offence I forget too but with another thing that's important to remember.

Matt Masterson -- Yeah and I think that speaks to you know it as we look at the principles. One of the principles we've talked about is alter billet we're going to talk about it later today runs through the entire system. The need for it but usability also runs through the entire system the need for. That auditing to be usable by the election officials by the voters by the public to understand it in that way and that has to be present throughout the system, that's one of the principles that has to be present throughout the system and that's why we have it. I think structured that way so that that exists all the way through. So with that that actually you don't know it but you segment segues me into closing this out and going in that is I wanna challenge as we head into the afternoon, kinda seen what's coming on the agenda and Lori you teed it up with one of your slides. I wanna challenge us not to think about balance of security, and accessibility or security and usability inaccessibility. Because the reality is, as we've structured the principles, both need to be present. And so, we have to challenge ourselves on how that happens and what that looks like because both security and accessibility have to be present. And what does that look like? So that's our challenge as we head into discussions about each one of these items. So thank you, thank you, the election officials, for sharing your views, I found this incredibly valuable I hope others did as well. And I'd ask just that your slides if we don't already have them we can have them so we could post in publicly. As well as on the working groups because I think they'd inform the working groups really well as well. So we're gonna take a 15 minute break, Greg, so 11 o'clock, 11 o'clock back here. Thank you.

### 10:45 – 11:00 AM: Break

## TGDC Day 1 Part 2

### 11:00 – 11:45 AM: Working Group and Constituency Group Activities since the September TGDC Meeting

#### Interoperability – John Wack

Matt Masterson -- Again we decided to put John Wack before lunch for very obvious reasons.

[UNKNOWN-SPEAKER] -- [LAUGH]

Matt Masterson -- Cuz he's talking about common data format something I love, but also something that's a bit akin to watching paint dry But it, but he knows I love it. He knows I love it. It's the most important work I think going on in voting technology and I've said that many times, it's critical. So we're going to turn it over to John to walk through the work, that the inner operability working groups done. John, let me say I'm on the mailing list for the working group. This is one of the most active working groups and the amount of work that's gotten done in this working group since the last meeting is pretty impressive. And so great work by you and the rest of the members of the working group it's awesome stuff.

John Wack -- Thank you. So I've been thinking of Beatles songs that apply to the common data format works. So man, I changed my mind the answer your question about when the common data format work will be done, is yesterday.

[UNKNOWN-SPEAKER] -- [LAUGH] Nice.

John Wack -- I think of the long and winding road because there is just so much involved. And depending on some of the people she came in through the bathroom window sometimes with some of the discussions that go on. But first of all, thank you very much for the opportunity to speak and the opportunity as an engineer to work in elections. It's been a very interesting thing. I am going to give you an update of the interoperability work, leave some time for questions, but I certainly don't intend to keep you from lunch. As Matt kind of implied this is not the sexiest if there's any sexy work in voting, I don't think it's interoperability in common data format.

Matt Masterson -- Don't sell yourself short, John.

John Wack -- [LAUGH] Okay so we were dealing with obviously, interoperability and that goes into it a bunch of different branches. I'll get into some of that and try to have some useful commentary. We are more active, maybe than the other working groups, mainly because we used to exist in the IEE area and we already had some people. At that particular point in time, there weren't any other IEE working groups for security or human factors and we got a lot of those people. But now there are working groups for those areas. So we're starting to lose some people to the some of those groups. Would welcome more input from election officials. So my own personal feeling about the work is that it's being done for election officials. It's being done for election officials to be able to put devices together in a more flexible way, to have more choice, to be able to buy the latest accessible voting device and plug it into your existing voting system. Usability weighs heavily with all this work and so it's important to look at usability. So that we're doing things that make it easy for people. So we really need participation from election officials. Election officials, especially who have somewhat of a technical background. But we need election officials to come in and say this process as we're doing it right now is difficult. And when we propose things or they propose things we can work in directions to ease the pain somewhat. We have six different subgroups going on and I'll talk about all those. Okay, so we were asked to put together high level principles and guidelines. And as I understand it there will be lower level requirements that will more or less be pointed to by the guidelines. I could have, frankly, I could have just had one high level principle of voting systems or voting devices shall be or should be interoperable. That would have given me only a few requirements to deal with, and the other people that I work with probably wouldn't have been happy about that. So I decided to broaden it more into these sorts of principles regarding what interoperability achieves. We, as a group, looked at LA County's VSAP principles, which I thought were well thought out and said a lot of things. So we picked three voting system must provide for transparency, and you can see all these things that we want to take a look at. For example, the second bullet, voting system data must be easily accessed via imports and exports. There have been problems in the past where it's been difficult to export different types of reports. Talking with or writing with David Wagner more recently. Looking at event logs how to come up with a format that enables easy aggregation of event logs from different systems. And then possibly requirements to make it easy to aggregate. Data used in critical device operations. So cast vote records, for example, they must have data within that allows a jurisdiction to do a ballot level audit if that's what they want to do. To be able to link the cast vote record with a paper record or a scanned image of a paper record. So that's transparency. Scalable this gets into the more of the usability area. But we have to ensure that the CDFs are broad in the sense that they contain all the data that we could possibly be dealing with. There are pros and cons to this. We end up having specifications that are very flexible where almost everything is optional and I wish we could require things. We do get into some discussions where people do want to require things. We want this particular element required and a lot of times we have to say we can't we're not dictating how elections are to run we're dealing with the data. The third one is really more the meat and potatoes components of the voting system must be interoperable. So in an interoperable format, of course, and where there isn't an interoperable format an industry standard format. Industry standard I know can be defined in a number of ways but an obvious example would be bar codes or QR codes. We would always wanna use industry standard codes. The last, well the third the bullet, components of voting systems must interoperate without the need to replace the entire system. We can't get into, I'll talk about this in a slide down the road, but we can't get into specific design requirements mandating interoperability in specific areas. Because then we would be designing the voting system and that wouldn't be a good idea. So this is kind of a should sort of guideline here. I think as we're writing low level requirements we need to keep these in line and make sure we're working in that direction to the extent that we can. So the idea again is if you want to swap out your accessible device and put a new one in there may be some work you have to do but it shouldn't be a lot of work. I know that's not a black and white requirement and we'll do better to specify it. So what are the relevant sections of the VVSGs I put that plural because in some areas the 2007 TGC recommendations broke out some of the requirements that are still in 1.1. And in a number of areas the requirements are very similar. So we're looking at both documents. So we're looking at the functional requirements especially election programming. What data does the voting system need to take in and process. And get out in reports so especially for election programming there are various reports that would be useful to have pre-election that would help down the road in auditing and obviously election results reporting. The ones that overlap with security event logs being one cast vote records, there will be some hardware related requirements. We'll be looking at industry standard formats or ensuring that common hardware interfaces are being used. And of course interoperability specifying that certain CDFs certain Common Data Format specifications shall be used. So the initial gap analysis so we haven't gotten into, well actually no we have gotten into looking at requirements. But we haven't been writing any we've just been adding a feel for what needs to change. And when I mention this Beatles song The Long and Winding Road to some extent I feel that we're doing things bottom up instead of top down. We wrote this event logging format I think over two years ago and you know we're dealing with an XML specification and sort of going back up into the requirements areas opposed to the other way. But in defining a common data format, you have to understand so much about how devices operate and again, how elections are run that it seems that you go back and forth back and forth. So there will be event log updates for security to support things like hashes of event logs. People are interested in a common lexicon for the more common event IDs what I mean there is that If there is an event such as initiation of voter session. It would always be event 63. I'm just you know inventing a number but people involved in auditing feel that that would be a real boon. CVR cast but record updates for adjudication audit related elements we're still working on that. I'll talk about that a little bit. I identified some reports that ought to be available pre-election there will be some updates to the election results reporting specification that we have out already. There aren't any requirements in the VVSG right now for common data format so obviously we'll need to put new ones in. Okay, how much interoperability to require? This is one of the questions for the TGDC and so, the first bullet again is what I said earlier. We want it easier to achieve. We want to make it easier for election officials to ask for this, when they do. But at the same time we don't want to mandate something that constrains innovation. Some jurisdictions may want a unified voting system. What I hear is you know election officials want somebody to blame. So if it's a unified voting system they have someone to blame. If it's composed of various products different devices and the jurisdiction effectively has to integrate it. That can go against things. So we feel that the C.D.F. work the way it's going right now is striking the right balance. So it's taking into account boundaries between functional areas. And working to make them interoperable but at the same time not redefining what those boundaries ought to be between existing devices. So I'll talk a little bit more about that but at the end of the presentation, I do have some scoping issues and questions and I'll get back to that. The specifications that we're working on some more actively than others I've got four up here cast but records is very busy right now. It has become complicated mainly due to things that people interested in auditing want to put in a cast vote record. Also so that it supports rank choice voting. Which I think the 2007 TGDC recommendations have requirements for supporting RCV. I think 1.1 does. I may be wrong about that. So that's a different sort of cast vote record looking thing. I talked about the election event logging spec. Election results reporting. Let's see Ohio used it, and I think there was some use of it in LA County, North Carolina, and there may have been some other areas and states. And some lessons learned primarily that you run the risk of coming up with a very, very large results file. And dealing with Google who has been using it they would like to restructure it in some way. So that you end up with a smaller results file that where candidate names are contest names need to appear it points back to a pre-election file for all that information. So and then we were working on voter registration primarily online voter registration sort of morphed into voter registration data in general. And again Ohio where Matt used to work and a nod to John who used to work for a man who's an election official in the secretary of state's office. So he is starting to implement this particular format, the draft format. In Ohio he's felt fairly good about it thus far. This is an area where we're getting into postal addresses and that's a big area. We have been working with a specification managed by the Census Department, it needs some work but this is an area where I feel somewhat nervous. And we need to talk more with voter registration database manufacturers and more election officials in general. And then, a couple of other things, it doesn't currently have support for the FPCA form, and we have come up with some support for ERIC interchanges. These need to be merged in. So this is just a picture here of the devices that we're dealing with right now, and I'll note down at the bottom. The formats are dealing with adjudication tabulation audit. So we ain't really dealing with those devices directly but we're certainly dealing with the CDF that goes into it. So what I'd like to do here is give you brief updates on the two subgroups that are run by other individuals, so the voting process modeling update is being run by Kenneth Bennett of LA County. And what they've been doing is in a UML format, which looks very much like a flow chart, they've been identifying voting processes. And I'm just kind of curious, how many people here, if you could raise your hand, have heard or read the book by Joseph Harris from 1934, Election Administration in the US? Anybody, well, other people in the audience have. But it comes across that that is the last, the most recent document that really goes into how elections are run and it's still very relevant today. So what Kenneth is doing may be the update to that document. They have gotten into. Quite a bit of detail and one of the most useful things about it and I'll attempt to show it here, this is not a very complicated diagram, but going into the cast vote record specification I thought well this will be easy. A cast vote record comes out of a scanner and it goes into a tabulation or audit process. But drilling down, drilling down finding out that optical scanners from the vendors do in some cases a significant amount of post processing people from the audit community have some input in there and also adjudication processes. So all these things being drilled down further and further. Show us that between these functional areas, the functional areas may not be specific devices but functional areas that may be done by the same device, you get to understand better what the boundaries are, where the opportunities for interoperability are, here we decided, maybe I decided as some people are saying but I feel as a group, we decided that we need a format that takes into account what current manufactures do when it comes to post processing but that could be removed. The jurisdiction could get a commercial off the shelf scanner and our format would work fine. There would have to be some sort of a post-processing module at some point down the road in the same with adjudication. So hopefully that's somewhat clear. The other group is voting methods models this is really voting variations their goal is to by the time of the draft BVSG, to have mathematical specifications for the common voting variations. I believe they've spent the majority of their time on rank choice voting because it's harder and newer and done in a number of different ways I think in some states, and I'm not sure where exactly, so I won't mention the states. But I think that the rules for rank choice voting might actually be in legislation. And that's probably not a good idea, to put it in legislation because then it's not going to be very flexible. So the idea here is to have separate specifications for that. These people are working very hard. They're not getting paid to do this work. They all have day jobs, but they have come up with a lot of material. So I find the discussions very interesting, I also find the discussions on Kenneth's group very educational, very interesting. Kenneth's discussions come across at noon on Eastern Time. And so, even if you're just eating your lunch in your office it's a great thing to listen in on, as long as you put your phone on mute so we don't hear a lot of crunching noise which happens quite a bit of the time. So what's next? Okay, I talked about updates that need to occur through election results reporting. So like they have a meeting relatively soon in 2017 to get the you know the big parties together to work on that. We have these other three specifications that don't need much more work primarily they need documentation and then I failed to mention this earlier but I will now, one of the big things about creating a common data format is how will it be tested. How will people understand it, there's just so much you can do in documentation, so there are there have to be worked examples developed as well and that's a fair amount of work but we do need to develop work examples for all of these formats. New specifications which knock on wood shouldn't be too difficult but they always are for candidate exports from candidate registration databases and then a pre-election report itemizing contest, and candidates, and ballot measures for each ballot style, in each jurisdiction. Which would be useful in post-election audits. We kind of, sort of felt the glossary area. Is more hours than other areas. So there's a lot of glossary updates and we have to continue with this requirements gap analysis. So second to last slide decisions for the TGDC is our approach the interoperability, a good one. There are some people who think no, we ought to be making it tougher, that there ought to be specific interoperability in areas. Of course, the scoping issues affect us if E-pollbooks are within scope. That puts more emphasis on developing a report for that. And so I'll end with those questions, but first of all, I just like to say that a number of you looking out in the audience have worked in these groups and extremely grateful, the vendor support has been wonderful. There's, I'll just call him out from the ESNS monitors most of these groups has I don't know how many years of election experience he has but he just knows it all, and he talks about it in a vendor independent way. I never hear him pushing things in one particular direction because he works for a specific vendor. Auditing community has been very involved, ranked choice voting people very involved. They really wanna see rank choice voting get a proper say. Again election officials I know election officials have a lot of stuff going on at the same time when you have somebody like John July or Sarah Whip, other names, it is just so valuable to have this real experience on the call. So that is always Very welcome, and of course I was reaching out to Natasha earlier, and she'll hear more from me. So with that, do you have any questions? How are we doing on time? I certainly don't mind ending early but I see that we've got a little over 15 minutes before lunch.

Matt Masterson -- So we have about 15 minutes for questions. Or comments to discuss John's thoughts or decisions. So if anyone has anything.

Bob Giles -- Bob Giles. You talked about how much of a hammer you should use to put these into effect. Where you guys at with that? Because I think that's a big issue, how voluntary is it going to be?

John Wack -- Where are we with like how far down do we go to specifying interoperability between devices, is that kind of what?

Bob Giles -- I guess that and then, yeah, you were saying how strict some people want it to be versus being more loose. I'm just kind of wondering where you are with that based on that comment?

Matt Masterson -- Yeah, can you explain that a little bit? I mean, it's one thing to have a common data format, right? But what level of, what, specificity are we talking, I guess? Is that the struggle, is level of specificity or is it trying to say that a system must do this in order to create this data format which will seem different?

JW-- Yeah, sometimes you do get that. People do want to sort of mandate system behavior. In the cast vote record area, I think one thread of the conversation has been to have a number of separate common data formats. One between a scanner and a post-processing module. Another one between a post-processing module and potentially tabulation or adjudication.

Matt Masterson -- Doesn't that take the common out of the common data format?

John Wack -- That sort of gets more into your viewpoint on how devices ought to be created and work together. I can see their point in sometimes the common data formats get bigger. But I do think that there are many pros and cons to having a unified voting system. But I don't think that our requirements ought to get in the way of a jurisdiction wanting that, and being able to achieve it and still have common data formats. So, I'm not sure where the line to walk exactly is, it's more like a line in the sand that you can deviate a little bit from here and there. I'm trying to think of another useful example. So one area where I've heard that people would actually like a lot more interoperability is ballot styles. So people would like an interoperable ballot style, something produced from an EMS, that could be ingested by any ballot marking device and things of that sort. That is a real technical challenge. And we're trying to see if maybe that could be partially met by having the ballot style be in more of an industry standard format that could be ingested mostly. But there would still be, perhaps, contest rules and things of that sort that would need to go into whatever module is going to display it. So there's an example of trying to working in both areas. So, you would like this done soon and obviously so would I. [LAUGH] I think an interoperable ballot style is going to be very difficult to achieve. I don't think we can do it in the time frame we have allotted. But I would certainly like to be able to work towards it down the road, and finally get there.

Lori Augino -- So let me ask similar question, maybe a different way. If I start requiring that through common data format, through RFPs, either on my modernization effort, which is everything but tabulation or on tabulation, am I going to have any responses?

John Wack -- Well, there'll probably be more manufacturers showing up for the phone calls. I think in some areas, I mean I'm a NIST researcher, who am I? But I think in some areas like election results reporting relatively soon in cast vote records you could do that. And the vendor, the manufacturer interactions been really good we wouldn't be where we are without that. Some other areas not so sure just yet. The common lexicon. There are a couple of, for event logs, for example. We haven't really dealt with the manufacturers too much on that issue. A lot of auditing people would like that. Does that really make sense to tell a manufacturer in your software design, you must use these particular numbers? I'm not really sure yet. I'm waffling a little bit.

Bob Giles -- I kind of look at it, in a prior life, I sat on the planning board in my town. And the goal was ultimately to have sidewalks throughout the town. So we'd get a new application in an old neighborhood and we'd say, you have to put a sidewalk in. And they're like, but I'm the only house on the street with a sidewalk in. And said, well eventually as the houses renovate they will all have sidewalks in. So I don't know if we're at that point where the first person in says, why do I have to put in the new sidewalk and nobody else does?

John Wack -- Well, the election results reporting spec has been implemented by states, who grow your own systems. No manufacturers at this particular point. I think they're waiting for things to be finalized more. But I know speaking possibly for the EAC they would like to see them required in the VVSG. So it's sort of like, you know, if you build, it they will come as long as it's built well. That's my opinion.

McDermot Coutts -- And to kind of answer your question there. We really can't as manufacturers, do it right now because it's not entirely defined yet. And cuz we can't make changes once it's certified. So if we start moving against a spec that's not 100% yet, if it changes, we're stuck with a old version in a certified code. And that's a problem.

Bob Giles -- And I guess that's part of the discussion we need to have is, are we going to have that defined in the VVSG? Or it's not there yet, and we're going to miss that opportunity this time?

Mary Brady -- I think that's exactly right. That's part of the feedback we're looking for is there's some formats that are defined to very low levels. But the VVSG itself doesn't necessarily require that you use those formats that have been defined, there's others that are being defined. Some of them are inside what we would traditionally call the scope of the VVSG, some of them are outside the scope of what we traditionally call the VVSG. So what do we want to require for the VVSG versus what do we want to have available that would be useful but not necessarily required?

Matt Masterson -- Yeah. [COUGH] I'm sympathetic to McDermott's point but also at some point you as the customers have to tell the manufacturers. We'd like this, right? It may be we'd like this now, or maybe we'd like this as it comes along. But the VVSG will in part be responsive to what US election officials are saying you'd like. And so the TGDC needs to make a decision. There's ways to put it in there as a holder to say this is an expectation of the community but it's not there yet. But once it is, here's how we're gonna handle that. And that all needs to be talked about amongst this body, the public working groups. But the idea would be that you all as election officials have the option of pushing the marketplace, if it's what you want to say this is what we want. There's an expectation of ours, because my guess is McDermott and his peers will respond to that push in that way, if necessary. But it may not be now, although some of it may be. So if, I mean to give John's example I guess, if I'm an election night reporting vendor, I'm looking at this now kind of seeing it's well on its way, or it's being used in some states, in fact. And saying, okay, is this something that the community expects me to have and until it shows up in our RFP for election night reporting systems, maybe they don't incorporate it. But once it starts showing up, my guess is they start to incorporate, if that makes sense.

McDermot Coutts -- Well, to your point, I've actually been in conversation with John and we are implementing the ENR as our standard export from our tabular system. But again, it's a bit of a risk right now because it can change. And ultimately, I think what we need to look at is can we modularize that portion of the system for testing? So that we don't have to send an entire end to end system through a full federal campaign to implement a testing state. Cuz the data's all there, it's just formatting. So can we work out a way of speeding up that testing making it a modular modification?

Mary Brady -- I say hold on to that thought and bring it back up towards the end of the day when they talk about testing.

Matt Masterson -- And they answer is the new VVSG is going to require the EAC to look at their programmatic requirements. And so that's something we could discuss and look at. I'm not saying yes or no, I'm just saying that's part, as the standard evolves and develops, so does the program. What, yeah.

[UNKNOWN-SPEAKER] -- [LAUGH]

Matt Masterson -- Good try. I do have a question that goes into this. And that is, several states, including and I think both of your states, are looking at the voter reg spec to at least inform the RFP. And voter reg is not part of the VVSG. And so the reason I assume that you all have undertaken at least looking at voter reg, is because so much of that data feeds in to the actual voting system. So how are you prioritizing that work based on VVSG? What's in, what's out? And making the call knowing the voter reg systems aren't included in certification.

John Wack -- We were moving along pretty well with it and then election preparations started. And that pretty much occupied everybody. In the meantime, sometimes you get a feel for the sort of people who are involved in how can you make the best use of them? And I had this belief that the cast vote record spec would be quick. Of course, it's a lot more complicated. Everything is always a lot more complicated. After that's put away, the voter registration spec needs to be finalized. The fact that Ohio is willing to move forward on it is a big deal. If a state is willing to implement it, we would really like to have a good spec out there. It is close to being pretty well complete except for the FTC-.

[UNKNOWN-SPEAKER] -- It being?

JW-- That particular voter registration spec is pretty close to being done. There are always state specific variations on the forms and on some of the data. And we're looking for interoperable ways to allow someone to extend the standard but not break interoperability. But that's a big thing. And one of the reasons it's a big thing is because that's an easy area to achieve some interoperability between voter registration systems and the EMS. It's just an easy thing to do, or easier to achieve interoperability there than within the voting system so another big reason for doing it. That does bring up one question I have which is common IDs for geography and they could be common IDs for contests. Where voter registration databases may use a state specific numbering scheme for districts or things of that sort. And that issue comes up over and over again, and it's not specifically a common data format issue because we have a field for an identifier. And we've made sure that it accommodates I think, the one standard I know of out there which is Open Civic Data Identifier Scheme. More work needs to go on in that area. And I do think, I mean just from an engineer perspective, if people were using common identifiers, even just for the top level races, then databases would be easier to merge. Results would be easier to report, elections would be easier to analyze, eElection officials would have an easier day. But it's not really a common data format issue, I've just kind of wondered. I hear it from people that it's a big issue, I'm wondering what the TGBC thinks. Silence, [LAUGH].

Bob Giles -- Far as identifiers, have you worked with Pew and their VIP tool? I mean that's a great example of them going out around the country and trying to get all this data and bring in and I don't know if you.

John Wack -- So we were gratified that the new version of the BIP actually uses pretty much the same NIST 1500 100 format. And yeah they have been dealing more with OCDIDs. And so that's been very helpful. But again, it's sort of like a separate standards effort. It's not really common data format issue. And I have just wondered if working in that area be of real value, or is that something that's slowly taken care of itself.? No, well we can, yes.

Geoff Hale -- I personally think that it is incredibly important to get the beginning, the pre-election to the post election and have everything all at least be able to talk. I know it's a challenge to try to create with a standard. To try to create uniformity has its pros and cons, as you clearly said, but as much as we possibly can to have those keys be the same so that at minimum they can talk to each other. I think election officials are going to be on board 100%.

Matt Masterson -- Okay thank you. Any other-

[UNKNOWN-SPEAKER] -- I got one other one.

[UNKNOWN-SPEAKER] -- Sure.

Matt Masterson -- Throughout your discussions, regardless of which format we're talking about, are you ensuring or is it part of the discussion that the EAC election day survey or the eaves data be part of what's collected as much as possible? So that election officials could export that data with ease as we've talked about.

John Wack -- Yeah to the extent that I understand it, yes that comes up quite a bit. So especially in election results reporting we had some people involved who understood quite well. So one of the interesting things about accommodative format with election results reporting is not only does it establish a common data format, but you have to also think about a common meaning for the things that go into that and defining things in a common way. My understanding with the eaves in the past has been that various jurisdictions will define things in different ways, or one manufacturer's EMS would define something differently than others. So, when it comes to the documentation, we're trying to merge more towards a common meeting. And that seems to be a good thing regarding eves. In the voter registration area, we will again be circling back and talking about eves so that's a good question. Thank you.

Matt Masterson -- Any other?

Matt Masterson -- Well I have 11:45 on the dot.

Matt Masterson -- Perfect. Okay John thank you.

John Wack -- Thank you.

Matt Masterson -- And thank you to your working group for their work. All kinds of restaurants out and about for you to pick up lunch, coffee, whatever you need for the afternoon. So we'll adjourn until 1 PM.

### 11:45 – 1:00 PM: Lunch

## TGDC Day 1 Part 3

### 1:00 – 1:45 PM: Working Group and Constituency Group Activities since the September TGDC

### Cybersecurity – Joshua Franklin

Joshua Franklin -- Security engineer at NIST. I've worked in elections for about 13 years off and on. Spoiler alert I am getting old. So I guess it's time for me to make some marginal remarks here. So I am the agency lead of the cybersecurity working group. And I am, basically, going to be presenting what the working group has done today. I will provide an overview of the principles and guidelines. We will then talk about some important discussion areas. And then we will talk about some of the TDGCs previous homework items for us. And then we'll discuss some scoping issues and the current status of the VVSG 1.1 gap analysis. Cool, so a little bit about our working group composition. It was about 100 people on the actual mailing list, but any given call had probably about 25 people on it. It was primarily academics, scientists, engineers, many previous TGDC appointees. We all had about five election officials, I would say actively participating. We would love to get some more election officials. And we had about five folks who were technical from the manufacturers participating also and they were extremely helpful. We had a number of election integrity advocates, and NIST and EAC staff. So here they are in all of their glory, the cybersecurity principles. Yeah, we do have more principles than some of the other working groups, which is perfectly fine, I think. So we're going to start walking down a couple of them. So the first one is the auditability principle. Auditability was, without a doubt, the single most important principle that the group decided on. I'd like to point out that the principal description references Dr Wagner's and Scott's [LAUGH], yeah work on evidence based elections and, technically, this is a new principle for the VVSG. There's not really a direct mapping between audibility and the VVSG 1.1. So we had two end up mapping it to some of the 2007 requirements. Yeah so I will leave Dr Wagner to speak about auditability in depth in a few minutes. Ballot secrecy, this was a fairly important concept also to the cybersecurity working group. The group felt that it was extremely important for ballot secrecy to be maintained throughout the voting process. And so that definitely includes the post-election auditing process. And this is one of the principles that we got the most feedback on from the public I would say. Access control, there's not much to say here other than basically the voting system needs to support a wide variety of access control mechanisms. And we definitely thought it was important to ensure that the principle of least privilege is enforced. Physical security, this principle was basically focused on tamper detection and tamper prevention. This was interestingly here the working group felt it was extremely important to include ballots and ballot boxes as part of voting system hardware. Yeah, Data protection, this was a fairly robust principle that has a lot behind it to unpack. You know, basically preventing unauthorized access or manipulation of configuration data, cast vote records, transmitted data, audit records. This is an interesting guideline here, all cryptographic algorithms are public well vetted and standardized. We can definitely see that basically causing some issues in the future if we have any systems trying to come through with domain specific crypto basically end to end voting systems. And here are the final guideline here voting systems protect the Integrity, authenticity and confidentiality of sensitive data transmitted over all networks. This was a guideline that was that was placed in here and ripped from a communications security principle that we ended up not using. Software integrity, this is not software security. Something like double freeze, and buffer under runs. This is more about ensuring that only verified software is actually installed on the voting system itself. The first guideline basically ensures that digitally signed software is only installed on the voting system.. And this one's a little bit interesting because it is more of a design requirement instead of a performance requirement. Here, we have basically specified the individual mechanism that will be used. Originally, we did have a white listing guideline here, but the group felt that it was important to specify the individual mechanism. The detection and monitoring. Now if malicious code does get onto a voting system or in. In light of a successful attack, this principle is meant to basically help mitigate the extent of the damage that it can have on the actual voting system. The first guideline here is a is a logging requirement. And I know that's John Wax territory here, the group felt it was extremely important to place this guideline here. And then make sure that all logs are basically stored in a format that is suitable for automated processing. Which is pretty interesting. And then finally, I wanna point out here that we have here, if the voting system contains networking capabilities, it employs modern defenses are against network based attacks. And that is the only guideline we have that is an if requirement. But the group felt that it was pretty important to phrase it in that manner. So other takeaways. We had a lot of discussion on auditability. What was really needed from an auditability perspective, how to achieve that. We definitely haven't come to a consensus yet in that area. There were a number of other principles that ended up not making it in. Vulnerability management, software freshness, basically ensuring that any software that is being used on the voting system is actively maintained. Software transparency, that any software on the voting system is made publicly available. Timeliness of software updates and risk management. We also originally had a software quality principle but that was removed and then sent on to a different working group. Cool. So, status of previous work items. The TGC at the last meeting, basically, provided three or four slides that were what we want to see in the coming months. The VVSG cybersecurity working group only started working basically early December. And we were really focusing on creating principles and guidelines. So here are some of the other areas in our current status. I have reformatted these to be a little bit more succinct and so sorry about that. Focus on areas clearly in scope as a starting point. We have definitely done that. General security recommendations for ballot delivery and marking ballot on demand, results reporting, and auditing. I would say we are slowly working on some of that, but it's really not been the focus of this working group at this time. Begin conversations between some of the other working groups on auditable systems and accessibility. We really haven't started that either. Discussions on risks and benefits on electronic return. We haven't started that either. In terms of scope and gap analysis, here are some items that we basically need to get answers on before we can write requirements. Some points of the scope will definitely affect other areas of security. For instance, if we don't have a robust auditing requirement, then we will really have to turn up the dials in other areas on what's needed for security. We have wireless, that definitely includes inside the polling place. WiFi, outside of the polling place cellular, electronic poll books, VR systems, ballot printing, and remote blank ballot delivery, and ballot marking. We basically need the terminations on scope before we can move forward and make it actually write requirements. So VVSG 1.1 gap analysis, our group actually hasn't technically started this yet. But NIST and EAC staff have basically been working with some test labs and some voting system manufacturers to basically have one on one meetings and get their thoughts on basically all things cyber and the VVSG. I think it's been a pretty solid process so far. We would definitely encourage any other manufacturer or vistal who hasn't worked with us yet. Please reach out, we really want your input. We are definitely gonna take it under consideration. We are hoping to eventually take all of the VVSG gap analysis input from VSTLs, manufacturers, election integrity advocates, the public, NIST, EAC, everyone. And put it all into one single document that is going to represent the gap analysis for our working group. But that is an ongoing area of work. I really, really, want to say a special thanks to the VVSG Cybersecurity Working Group members for their contributions of time and expertise. They have been wonderful to work with. Tumultuous at times, I will admit. But that's definitely what makes it interesting. So thank you very much. Any questions?

Matt Masterson -- Let me ask. Is it better to wait for questions until after David goes? Or are they too different ones? I'm open to-

Joshua Franklin -- That seems perfectly reasonable. Yeah.

[UNKNOWN-SPEAKER] -- Okay, go ahead. [LAUGH]

[UNKNOWN-SPEAKER] -- Sounds great. Get some back up.

Matt Masterson -- You have a seat at that chair right there just so you're ready once David's done.

[UNKNOWN-SPEAKER] -- [LAUGH]

Matt Masterson -- They're not letting you get away that easy.

Joshua Franklin -- They are not. They are not. I have to go to the restroom. No, I'm joking.

[UNKNOWN-SPEAKER] -- [LAUGH]

Matt Masterson -- Dr. Wagner, the floor is yours.

Matt Masterson -- Josh says he's getting older. I've got news for you, I'm already there.

[UNKNOWN-SPEAKER] -- [LAUGH]

### Auditability – David Wagner

David Wagner -- Okay, so what I thought I would brief you on is specifically about the audibility parts of this. We've spent probably the majority of our time talking about auditability. And the members of the working group wanted me to come to you and stress to you that the number one most important thing we could do for cyber security, would be to ensure that the voting systems are auditable. So you have in your packet the proposed principles, high level principles, that came out of the group you can look at those. Here's the ones on auditability and I thought I would talk you through this cuz there's some real decisions in here. So the probably the biggest one is this first requirement here. An undetected error or fault in the voting system software is not capable of causing an undetectable change in election results. This has been Gone under the name software independence has been suggested. And what this is basically about is the goal is that if there is a problem, you should be able to detect it. So you can think of this as this is what Lori so eloquently explained about here's how we can explain to the public about how we know that the systems weren't hacked because we have the ability to detect. We have the ability to audit. So that is a principle and a requirement that has real bite. So let me talk you through what the arguments for that are. I think they serve several values that we have in elections. One is transparency, so the public can have confidence. One is continuous quality improvement, so we've heard earlier this morning about some of the lessons learned from other auditing. And then, the one that, of course, is a near and dear to many of the people in our cyber security working group, is the cyber security benefits that. This is a very powerful deterrent to attack, if an attacker knows they're gonna be detected, any attack can be rolled back then there's a lot less incentive to try to attack the system. And we don't have to worry about building an electronic defense that's perfect because realistic probably nothing is perfect because we know that we have this ultimate backstop, so the concepts here, one that I've advocated is one that I called evidence based security. Where this is a little bit of a shift in a focus, compared to the way we thought in the past. Maybe the way that I was thinking, in part of the previous efforts for the 2.0 which is reshift in our focus instead of trying to measure, test more and more thoroughly more and more testing in the lab. Instead, shift the focus to measuring the actual performance in the field,so use the audits as a way to measure how well it's performing in the field. And the benefit there is, well, potentially we could trim some requirements because we have ability to measure how it's performing in the field. And this is a way that we can spare ourselves from avalanche and overload of adding on extra requirements that would be needed if we didn't have a way to measure. I would also say that from the security perspective, one of the other I think arguments auditability is we look through what would it take. If we didn't have this kind of auditing requirement to assure security against the kinds of threats we've been hearing about over the past year and that looks really hard and really expensive and looks like a losing battle. So the message from the working group members were this is the number one most important and effective thing we can do for cyber security. But let's talk through the implications of this. So one of the implications of adopting this is that effectively means that the way we know how to build voting systems today that have to involve some kinda voter verified paper records. We don't know how to achieve this without paper. So if you wanna kinda reduce it to that, this does become a paper plant. Why not all-electronic because in an all electronics system it's too hard to have confidence that the electronic records can't be manipulated. In the event of a security breach attacker could plausibly modify all the electronic records after the fact in a way that makes them internally self-consistent. And so, just doesn't seem like it leaves us much opportunity to detect. So the benefit of the paper, it's not that we're somehow attached to paper per say but the benefit of the paper from the security perspective is, once it's printed it can't, no security, no digital shenanigans, will cause it to retroactively change what's all ready on that piece of paper. And it's something that it's an artifact that a person could look at like a member of the public can look at during a publicly observed auditability process. So we spent a lot of time trying to think how could we achieve this without effectively ending up with paper and we kept coming back to it realistically. So this is the number one, I would say like ask or recommendation from the people and the working group to the TGDC was they recommended it. That the next version of the standard should adopt this as a requirement. And that's something that you all will then need to think about, and I wanna ask you to think about and to share with us your thoughts. And this will have a big influence on our work as we go forward. The second thing that some of the working group members, a number of the working group members, asked me to highlights in this presentation to you is about efficiency. And the background here is that if audits are really clunky or expensive or complicated or difficult for election officials to perform then they're probably not gonna get done. And so, they'd really like to see the equipment be made in a way so that it's feasible and efficient and cost effective to conduct the audits. It's not burdensome it doesn't cost a lot huge amount or take huge amount of effort. So there are has been some recent research on new techniques to make audits more efficient. You've heard of this risk limiting audit concept, ballot level audit or small batch audits where selecting individual ballots statistical random sample and the way the statistics work out, is that you can build audits that are a lot more effective, and that don't involve looking at too many ballots. If you're have the ability to randomly sample individual ballots and compare what's on that piece of paper to the electronic record to check the match and the exact number depends on the margin of how close the election is the margin of victory. But typical numbers you could expect that with examining a few hundred ballots, you can get a high level statistical confidence that the electronic and the paper records are all. So there are some members of our community who feel strongly that the next standard should require that all voting systems support methods that make audits efficient. For instance, maybe some of these newer methods. There's some real debate on this, and it's not unanimous view among the working group. And that would have some real implications. For instance, I'm not sure about how many deployed systems currently support this kinda thing right now. So this would be a more aggressive requirements, but I just wanted to brief you on that since we had quite a few discussions and there's a range of views, there are definitely a significant number of folks in the audibility and security community who believe strongly that this ought to be required in the next version or standards. I don't want to get too caught up on that. The issue that I would find most helpful to have the most discussion around is the auditability, this software independence requirement. That effectively ends up requiring voter verified paper records. And I would love to know where the TGDC stands on that. If we're going to adopt that, then that makes our life simpler in cybersecurity in a lot of ways. There's a bunch of places where we can say, look, you might want to have this good security feature, but we have the audit available as a backstop. Conversely, if we don't have that, then we're gonna have to think really hard about how do we build, what are all the requirements we need to make sure that electronic systems can't be hacked? So that's where we stand. I wanted to open this up now for discussion, commentary, of course questions would be-

Matt Masterson -- So, yeah, let's start with questions, keeping in mind there's room for discussion not only today but tomorrow as well. As we look at the implications of the question posed to understanding that we may not get a full answer, but at least we can tease out a lot of both the questions and concerns, I think. So I'm opening it up the floor. Lori first, and then you can go ahead.

Lori Augino -- Thank you, so we heard a little bit this morning about the technology that was used in Maryland for conducting one kind of an audit. I'm wondering if you talked about using technology to solve some of those auditing challenges, or maybe was there a preference to how we, as election officials, would go about performing those audits?

David Wagner -- Yeah, so there's been discussion about it, and I've also talked separately to some of the folks on the working group about that. What I've heard from many members of the auditing community is that they think that it's important that the audit look at the physical artifacts, the paper ballots. That an all electronic audit, I think of this as like a Mark quality audit that helps us a identify problems, is helpful, but to get the full assurance it needs to also be connected to the paper ballots. And the argument that I hear repeated over and over again is that if you have the voting system with a scan of the records and then a second system with a scan of the records. Ultimately you're starting from electronic scan of the records, and how do we know whether that matches the paper ballots? So my view is, this is a good step forward. But I think that you'll find that, at least for many of the folks who are pushing for these kind of audits, they wouldn't be fully satisfied with something that didn't involve inspecting the paper, yeah.

Matt McCullough -- So well over the past few hours this is going, I was hoping that this committee would try to go outside the box. It seems like we're reverting back to paper is the best option here because it's easier to track. But my question is votes, because there is a so does someone pass down the piece of paper from our space? My point is that there's an opportunity, what Matt mentioned previously. That there needs to be a great marriage between accessibility and service security and so forth, but the more we all these presentations, it just seems like paper is the best course of action. So that's a disappointment from the community because that means that we're not progressing in such a way that, we're told that technology can free us from a rotating capabilities. Yet every scope presentation that you've given to us says paper is the best option. So therefore, describing a percentage of population that will continuously be locked out. Because paper is not an option to them, so granted, you're giving them the electronic ballot. But why can't we go that next step and have it returning electronically in a very secure manner? And so, that's where I want this community to move forward. But, based on what I'm hearing, I think we're reverting back to what we know already works. So I don't necessarily have a question, well, my question is, can we proceed going beyond to what we already know and challenge ourselves to see what's the possibility in terms of making everything more accessible and server secured, too? Thank you.

Greg Riddlemoser -- Josh, David, clearly there's a difference between did the dot counters count the dots and was there an interdiction at any point during the process? Can you talk about that a little bit? Because an audit obviously is if the dot counter counted the dots and you run the ballots through again and the dot counters counted the same dots again and it reported what it reported, but there are other things, Manufacturer based programming of software and firmware. Contractor programming of software, and then local election office programming. There are several places where interdiction could occur. I don't believe that it does, but If the auditability standard, if you will, is did the dot counter count the dots, and that's easy to verify, but how does one verify there was no interdiction at any point during the process? Whether it's at the vendor level, the contractor level, or the local election officer level.

Diane Golden -- Yes so I guess my response to that would be that I actually don't think that audit can prove that is somehow trying to prove something impossible. It can't prove that there was no hacking, what can prove is that it call the right winner, that the outcome was called correctly, that the correct candidate was selected. So that's really what the audits are about, trying to verify.

[UNKNOWN-SPEAKER] -- I'm not a lawyer but I was the leading witness. And my point is [LAUGH] that when we think about the 10,000 of us that run elections, if you will, nationwide, is that there is some value of the distributed, or the dispersion, or the whatever you want to think about it.

Greg Riddlemoser -- That even if we had single vendor ops over the entire country, you still have the local election administrators. And when we think about contradiction, that's a two prong attack, if you will. They have to have the ability and they have to have the desire. And although one may have the desire to interdict an election, the ability to interdict 10,000 different election offices is practically, you can't even picture a world where that's possible. So do you go after the large localities New York, LA Travis, Texas, those kind of things, you certainly would leave the little ones alone but it's one of those things that in the cyber attack, cyber security world. When we build a system that's interdiction secure, it doesn't matter if you have 1,500 voters or 1.5 million voters. If your system is secure, it's secure and the ability for somebody to interdict those has a lot to do with their desire and they're not gonna go after the little ones. But if the system is safe for the little guy and it's safe for the big guy, then we've done what we can and I think that the VVSG certainly has a role in that.

[UNKNOWN-SPEAKER] -- Go for it.

Diane Golden -- [LAUGH] That was waiting for me. Boy, I wish I had a solution and I will tell you, Josh. So I pulled out before I came today, an email from 2005 after Jim Dixon and I met with the original Automark people with Vogue. That was before they were bought out by ES&S. I mean, this is the original and I am not kidding you, I could read every point in this email and we have exactly the same situation and problems today. That's exactly I see hands going up in the air. That's the frustration. I understand what you're saying, but I can't, we do have the technology to convert paperback into accessible media. It's cumbersome. It's complex. Nobody wants to do it. It's a pain in the butt. And because of that, nobody is doing it, because it jams. [LAUGH] There's not the political will or the fiscal capability to pay for it, cuz it's expensive. So, we just keep coming to the same loggerhead. And I honestly, we've been talking in the usability group and accessibility group and we'll talk more remote ballot markers. They don't provide any more accessibility than it quote, unquote, the accessible machines, the good ones at the polling place, cuz you've still the whole tail end. And once it prints the paper, you're out of access again. But at least you get the advantage of remote and you eliminate transportation barriers, which are a huge problem for people with disabilities. So I mean, you kinda gain even though you didn't gain any real accessibility on the paper and you at least gain the accessibility of remote, so that they don't face transportation problems. I mean, we're taking incremental steps and the end goal is still apparently out of reach [LAUGH] practically. I said to somebody, unless the federal government steps up and decides to pay for a hands free paper handling unit that every vendor can just use and they'll manufacture it, they take care of it, a public or whatever. I don't care. That might solve that problem. But for each vendor to invest in that and then try to cobble it together to meet all the nuances of different state jurisdictions about their ballot boxes etc., etc., there's not enough market share. There's not enough political pressure. We're not gonna, I just don't see the situation changing and I have been around almost 40 years now. Next year, I will have been working 40 years in the disability world. I am really practical at this point. I mean, yeah, [LAUGH] we're really not making much progress on this issue so.

Matt Masterson -- Well, so let me ask both of you. There has been efforts to make progress whether or not they work or, not I guess we can discuss. But for instance, Los Angeles counties effort. They've involved accessibility experts and professional security experts professionals. I don't know where folks are on their solution whether or not it fulfills. Does what it's supposed to do, but is that a model that can be used to help inform what we're talking about here? Is that a model that can be used that can be leveraged to take us in combination with common data format where maybe you wouldn't have to have vendor one vendor coming up with a solution or all of them coming up with it, but maybe there's a combination of functionality that exists there to solve this challenge in a mutually agreeable way based on one of the already existing research out there like what Los Angeles County has done in combination with the work we're doing on common data format.

Diane Golden -- Yeah, and for me, I mean, LA County has done yeoman's job of trying to pull this together, but they're in the process of doing bid specs for the manufacturer of the actual creation of what they've envisioned. And I mean, think it remains to be seen if it's viable financially and the first time it's deployed out of those automatic and there's even been discussion about those on every system within a polling place, the automatic paper handling mechanism. And I think it's potentially, yeah and til it actually gets out there unused and you see what it costs and what it takes to maintain it. Is that a viable option for everybody else who's doing? I'm guessing, it's gonna be a pretty costly, I don't know. So, all of that remains to be seen.

Matt Masterson -- But I think perspective on time helps here too. What we're talking about here for these guidelines, don't need to be deployed tomorrow or. Or even when they're done, they're not expected to be deployed tomorrow. And so, there's an expectation of advancement by folks like LA County and others to help inform what we're talking about. We will know a lot more, even in the next few months that may help us and form that discussion.

Brian Hancock -- Yeah, and one thought that I had and this is sort of a backward perspective. But part of the reason we've been sort of treading water all of this time, I think is quite frankly, because there has not been a clear paper mandate for lack of a better word and we went through the rush whole thing about federal on and on and on. And when it came down to it, putting a mandate for paper in HAVA with what we put in on the disability side for mandatory accessibility, people just backed up and said okay never mind, because it kinda saw the writing on the walls. I honestly think if you guys push this and paper is mandatory, you are gonna up the ante significantly on those paper accessibility requirements that have been in the VVSG and just quite frankly ignored. So I mean, it's one of those if you do this, it is gonna fuel, it is gonna provide the absolute perfect storm for you guys to get sued when you have paper right now. It's kind of, it was your decision to do paper. It wasn't a mandate. So there's kind of this namby, pamby stuff going around. And boy, if you put one in And the other, they're hooked together, and they're both federal mandates you've probably set yourself up for, then you best get them in place, or it will, you know, yeah. So part of me thinks that may be the way to go, because the train's already there, everybody's moving. Anybody who wasn't using paper practically is, now. So there's a bit of logic to saying, fine, if it's mandatory, then you've upped the ante on it has to be accessible. You can't deploy inaccessible paper any longer.

Matt Masterson -- Brian, and then Greg.

Brian Hancock -- Yeah, Brian Hancock. So, just from a logical standpoint, why would election officials wanna use the federal standards if they think they're going to get sued by using those. Greg?

Greg Riddlemoser -- A question, I guess, for Diane and Matt. Virginia passed a law last General Assembly, our General Assembly is currently In session, but last General Assembly they passed a law. By 2019, Virginia will be 100% paper. Now, it also requires one ADA-compliant, ballot-marking device per precinct, which, whether it's AutoMARK or ExpressVote, or what some of the other vendors may have, I'm not up on that. But the idea where they mark the ballot, and then it's scanned, and there's a paper trail, like every other thing. So, I'm a little bit unplussed every time I hear the community, and by that I mean the ADA community, talk about we can't get there from here, when there are products out there. So what am I missing?

[UNKNOWN-SPEAKER] -- So-

Matt Masterson -- How much time do you have for Dianne? You should sit next to Diane at dinner, is what I would-

[UNKNOWN-SPEAKER] -- [LAUGH]

Diane Golden -- Just briefly, the problem is on the verification in the casting end. The marking of the ballot is, I mean, doing an electronic interface to mark the ballot is a piece of cake, and everybody can do that pretty easily. The problem is, once it's printed, the only way to verify what's printed is for that print to be scanned back in, and that means either using a QR code or OCR. Or if you have write-in, a combination thereof, blah blah blah, redisplayed, then that paper ballot has to be somehow cast without paper handling and that's another, so it's the verification and casting part that is the problem. That, like I said, there are ways to do it. They're just not very elegant, and they haven't been deployed widely, and anyway, on and on and on, so.

Matt Masterson -- So you all have gotten away a little easy.

Matt Masterson -- So I'm going to push, McDermott.

Matt Masterson -- Go.

McDermot Coutts -- All right. Something that's been, that I've heard a lot about recently and I was wondering if it's come up in your discussions, is have you been able to get a significant and measurable benefit out of implementing FIPS versus other cryptographic solutions?

Joshua Franklin -- Yeah, so that, I'm gonna grab the mic here. [LAUGH] As David slowly looks towards me [LAUGH].

Matt Masterson -- You like that?

Joshua Franklin -- Yeah [LAUGH]. So that really hasn't quite come up yet, and I think it's a very fair question that we actually do need to have a pretty real discussion about, within our working group. Yeah, as it reads right now, the guideline says, basically, public well-vetted and standardized algorithms.

David Wagner -- And that doesn't mean FIPS necessarily, so. Let me try it this way. Do you have feedback for us-

[UNKNOWN-SPEAKER] -- [LAUGH]

David Wagner -- About what you'd like to see? So I sense there's something behind that, and would you like to?

McDermot Coutts -- Actually what I'm looking for now is more data points. And if there is truly a measurable benefit that can be proven, then I've got no problem saying okay, let's move forward with that. But I would like to see that information.

David Wagner -- Did you have a candidate alternative you would like to compare against?

McDermot Coutts -- No.

[UNKNOWN-SPEAKER] -- Okay.

Matt Masterson -- So I have a couple of things, if I may, it may lead to other questions. You mentioned if you're not given the feedback at some point, and I wouldn't anticipate it today, about where to take the auditability, whether or not to verify that that it leads to other larger decisions, can you give example, what kind of principles, guidelines would need to be considered? I know it's probably more than what you know right now. If that auditability is lessened then from what you've recommended. Just to understand the impact, essentially.

Joshua Franklin -- Yeah, so there would, yeah, I would say we would need to take the whole principles and guidelines back to the working group. It's not that we don't have a strong foundation. But there is definitely other, there are definitely other discussions that need to be had, if auditability isn't on the table, yeah.

Lori Augino -- Can I ask a question? Are there some folks on the work group that think that it might be possible to find secure, auditable solutions that don't have paper?

Lori Augino -- Were there are any members of your committee that felt that?

Lori Augino -- Do you remember anyone saying that?

David Wagner -- I do not.

David Wagner -- Yeah, I don't remember anyone articulating that position. I wouldn't swear there's no one who feels that way, because I don't know for sure whether they would've spoken up.

David Wagner -- I've heard some folks talk about possible solutions, and so I'm curious if there's a way that those folks know what they're actually talking about?

[UNKNOWN-SPEAKER] -- [LAUGH]

Lori Augino -- I think that they might. They seem to be experts. That maybe we can try to plug them into the work that you're doing?

David Wagner -- Sounds great.

Lori Augino -- To see if there's maybe something that we haven't thought of yet. I mean, let's not give up. Are there some potential solutions that we might be able to pilot on a small level, to just see? Josh Benaloh testified recently, in Washington State, about an electronic return solution that was pondered legislatively here that would allow for e-mail return. And he said he couldn't support something like that, because of the inherent risk in an e-mail solution, if that were opened up to every voter across Washington. Probably not all that accessible either, but I remember him saying that he believed that there could be some solutions, and I think he's been someone who's kicked around at some of our NIST activities in the past. So, might be someone to reach out to, to see.

David Wagner -- Okay, so that was really helpful. I have a suspicion that now I maybe have a sense what you might be referring to. So there's a community of cryptographers who work on what's known as cryptographic end-to-end auditable voting systems. Or open-audit voting systems. And there's a lot of work in the research community on this. And there's also some practical work. Probably the most prominent recently has been the STAR-Vote Project from, I guess, Travis County, Texas?

[UNKNOWN-SPEAKER] -- Yeah.

David Wagner -- Which includes both these cryptographic mechanisms and The paper, paper as well. I've talked to a lot of the folks in that community and my guess, what I would hear from many of them, is that in the long run they have hopes that the cryptographic solutions could provide the audibility on their own, without the paper. But it seems that they feel that in the nearer term the way to move forward towards those is these kinds of Stargel-like systems that involve both the paper and the cryptography. And one of the reasons that I that I hear probably not all of them, but that's a common sentiment I hear from them. And I think one of the reasons behind that is, If you want to talk about having to be a mathematician to understand something my. [LAUGH] My just get ready you're gonna love it. So if we deployed one of the systems with the cryptography, and it was all resting on the mathematics on the cryptography. We might, yeah, I could believe we could get to a point where, the experts who know the mathematics and the cryptography really well are able to say, this is solid. I think the biggest open question there is actually not so much a technical one, but a public confidence one of, how do you explain to a member of the public or anyone who doesn't have a PhD in this mathematical cryptography area. That's kind of an open one that's, maybe that's acceptable, maybe we're comfortable resting on expert opinion. If we really got all the experts together from all the different sides and everyone agreed or maybe not, but that's a big challenge there I think.

Lori Augino -- And if I may that goes back to my point that I made this morning is in the pressure cooker environment that we were in 2016, in terms of the hit to public confidence that our that our system was taking pretty much on a daily basis every step of the way. That solution to audits, human beings looking at a piece of paper, while being observed by members of the public who could come and watch, to ensure that those systems are tallying the results accurately according to how that voter marked that ballot. Was incredibly easy to explain. So and this is the same question I think we have been struggling with since we started meeting is how it is that balance between access and security. And how do we make sure that those intersect as much as we possibly can.

Diane Golden -- I'm just going to throw out one discussion item that just has been rolling around in my world for a while since this issue's been in place for such a long time. Which is that whole idea of solutions that compromise privacy, in terms of people with disabilities. And if you think about the whole concept of verified paper ballots, people with disabilities kind of don't have that quite frankly, they can't verify the ballot half the time [LAUGH] anyway now. So losing and for so many of them, they're not marking privately, necessarily, anyway. Because again, if they're doing it at home, even if they're doing their own and spitting it out. Somebody else is probably putting it in an envelope for them and mailing it. So, [SOUND] there went your privacy again. And it's almost as if, I mean, I don't know if there's a way to look at solutions that are out of the box and maybe there isn't necessarily quote, unquote, complete privacy. But if you're having to have your spouse, I can't tell you the number of people that I talk to say, the last person in the world that I want to know how I voted is my damn spouse. Anybody else could know about I don't care, but I don't want them to know that I didn't vote the way they thought I was going to kind of thing. And I understand that. So I mean, it's kind of like is there not a way to deal with this? And so the person with a disability can't verify nor handle the paperwork. And if they delegate that to someone else anyway, then doesn't that sort of solve the issue? And isn't there something we can think about? Now I know the challenge is going to be if there are alternatives available for people with disabilities to do things remotely, then how do you limit it to people with disabilities? Because everybody wants the convenience of the remote, and I understand the logistics of the issue, but it's kind of like it appears as if we've been able to make some allowances for overseas voters, etc. It's like we need to take a step back and think about some of those things, same compromises for people with disabilities. And, I don't know, I mean, I know they'll be challenges but still and all, it would better progress than what we haven't been able to accomplish in the last decade apparently. So I don't know, just, Food for thought.

Matt McCullough -- So I was thinking about that, well my primary concern is a person in New Mexico, in rural New Mexico right near the most of the polling places in New Mexico, rural New Mexico is not fully accessible. And so that's a deterrent for a citizen from voting. But we'll keep policies of people buying through Amazon online, it's a a secure system. We have these credit cards with the chips that supposedly prevent fraud or something, but I don't know what exactly this chip does. But if you find the technology that New Jersey does, with the numbers and have a person use a chip that would solely be recognizable to that one person and that chip, per se, would be on their ID going forward. So why can't we find the courage security fears that are surrounded by us on a daily basis is finally to merge different technologies. Those security technologies to work in our favor instead of keep talking about paper. There's opportunities that we can realize, I don't think we're connecting the dots as well as we should at this point. Just on a and this is a really important subject and I agree with everything that's been said, just to shift gears, Josh, earlier you talked about physical security, I brought that up this morning.

[UNKNOWN-SPEAKER] -- Yes sir.

Bob Giles -- We touched briefly on that, but then you said you weren't gonna do a risk assessment, a vulnerability assessment, that was going to be out of scope. And I guess my question is have you guys talked about how to protect the physical hardware of the equipment and what goes out in the field? Have you guys kind of thought of ways to address you talked about protecting the ports. And stuff like that on the machine, but Pete could expand on that a little bit.

Joshua Franklin -- Sure, yes. So we had a physical security principle - tamper-detection. So you know things such as seals and then tamper prevention. Things such as you know locks or definitely included within that. Defining the actual procedures that election officials would use to protect the physical security of the voting system is probably out of scope for voting system standards. We definitely had a number of folks on the calls that wanted to talk about those areas. They also wanted to talk about auditing procedures as well. We sort of kick that down the road a little bit and said, right now we are trying to get principles and guidelines developed. And so that is definitely something that the working group could look at later. I will say that the EAC has a pretty solid section on physical security within their election management guidelines. That can definitely be helpful to election officials. And if you have specific areas of physical security that you'd like us to discuss, just let us know, that would be great input.

[UNKNOWN-SPEAKER] -- Okay, great.

[UNKNOWN-SPEAKER] -- Yeah.

Matt Masterson -- Question for, I guess the working group, we're gonna ask you to represent the working group. Was there a recognition within the working group of the very real impact particularly on accessibility, but also on election functionality that this paper requirement would have? So was that part of the conversation or was it only this would be really nice, we want this auditability? Was there I guess that was there empathy towards the argument that's taking place here or was it only this is important to us the security people?

WG -- Yeah. The accessibility one is a really tough one. And this is a challenge to navigate. And I'm completely with Diane, yeah.

McDermot Coutts -- Well, in the paper has other issues and if you're dealing with, from a purely mechanical standpoint, if it moves paper it will jam.

[UNKNOWN-SPEAKER] -- [LAUGH]

McDermot Coutts -- Somewhere along the line. It's axiomatic. And then the other thing is that when you're dealing with a paper record you don't, especially when you're dealing with ballot marking devices, you're going from digital to analog, back to digital again. And so, you've created this lost in translation issue. So from that perspective, paper is not the greatest solution there. So just kind of throwing that out there, it's not just accessibility. So I'm sorry, I'm going back to the question. So I know you recognize it cuz you've been here for a decade having these discussions. Was there a recognition within the group of the challenges that this presents?

Matt Masterson -- I mean we definitely talked about the need for more research in this area for how to make auditability more accessible. But I don't know that it was the defining aspect when we were bringing up this concept.

Matt Masterson -- Part of what strikes me, which may be unfair so I'd love push back, is that there's a recognition this way of the desire for security. And I don't know if the recognition's going back the other way. And I'm throwing this out there for you all to think about and then come back tomorrow. But perhaps I think this was part of last meeting, but a proposed path forward is to bridge that conversation. I don't buy that we're that far off. I don't buy it. Because there are election officials out there right now solving these problems or at least coming close, right? Pushing what we knew before. This isn't the same conversation we had in 2007. It's not. Because lots of things have changed since 2007. We're nine years beyond that, nine years beyond that. And so, I actually believe that the gap is much closer than it used to be. And I actually believe that the conversation is much different than it was. Cuz I sat at this table back then, first as a staffer and then as a member. And I think that there's been a lot of research, as you all of said, on your side. And there's been a lot of research and development on this side. And I think I really believe maybe naively, I'm an optimist that we're not that far off through a combination of already existing technologies to bridge this gap, to solve it. But I think the conversation has to happen between the two groups. And so my proposed path to consider for you all to consider tomorrow or whatever is to now, let's bridge that gap and have that conversation. And I'm not blowing smoke here. I believe we have the right people in this room to have that conversation right now. The temperament is different in this room than it used to be, as well. And that is perhaps more critical than even how we've changed technologically. And so something for you to all think about that we can bring back tomorrow as a proposed path to bring together a group of the working groups. Together to tackle what we know is out there, what research exists out there. To perhaps understanding this is the most important thing to your working group and understanding this is accessibility has to be there as well. That's why I say it's not a tradeoff. Both have to be there, that's the way we bridge that gap. And I think we're close. I think there are people out there already tackling this that have valuable input and it's up to us to find and bring to the table and solve this problem. So that that's my proposed quasi-path forward for what that's worth.

BH-- And the only thing I would add to that, Commissioner is, and I think you were alluding to it, it has to be in person. I think, telephone calls are too impersonal you're not looking the other person in the eye. It's too easy to sit back when you're on the phone and you be on your computer just spew something into the speaker microphone. It's really important that everybody gets in the same room to talk about this. That's my thought.

Matt Masterson -- And obviously it's our job to facilitate that. That's our job to help find a way to do that.

Lori Augino -- Then as TGDC members I would challenge us to continue to remember as easy as it might be to lock ourselves into talking about the technology and the solutions that are available today as we're considering standards. Maybe not do that. So that we're not boxing ourselves in for years to come. And ensuring that we have standards that will evolve as technology evolves.

Matt Masterson -- So the other part of that is, and again, this is for tomorrow to confirm. We need to give you instruction because you want to move forward, right? With the other areas not related to this. And what I think I heard you saying is, it's hard for us to move forward without an understanding of at least kind of where this is. Right? Is that correct?

[UNKNOWN-SPEAKER] -- Yeah.

[UNKNOWN-SPEAKER] -- Go ahead.

[UNKNOWN-SPEAKER] -- No, please.

[UNKNOWN-SPEAKER] -- [LAUGH]

[UNKNOWN-SPEAKER] -- No, I mean David.

[UNKNOWN-SPEAKER] -- I love yes is an answer.

Joshua Franklin -- I mean right, you know right here. I mean these are basically you know the options, where we're at right now. Sorry, well I mean we could basically mandate some type of auditing. We could just say well systems who say that they want to do audits, shall have these certain properties. Or we could just say auditing isn't necessarily a main principle for voting systems. I mean.

[UNKNOWN-SPEAKER] -- Come on.

[UNKNOWN-SPEAKER] -- Well-

[UNKNOWN-SPEAKER] -- Commissioner, yeah, I-

[UNKNOWN-SPEAKER] -- Yeah, I find that unlikely, yeah.

David Wagner -- Yeah, yeah I give a similar answer. It's not that we're stuck in the water, but that I'd hate to say and I don't expect a decision at this meeting. But it's just that I would hate to see us spend six months go, and then say that was a waste of your time. Go back and redo from the start. So that's then.

[UNKNOWN-SPEAKER] -- Yep.

[UNKNOWN-SPEAKER] -- Yep.

Matt McCullough -- Well, I was gonna say, so all the team should definitely be part of the conversation, because it prevents fraud. Going into that, the fact that this very conversation of fraud was captured in today's Washington Post. This is the reason why we exist in the first place. Here's a committee that's so important. And so my point is that if we can move beyond to what we already know, and challenge ourselves to think of the possibilities by agreeing to link to the possibilities going forward. Going back to what other people have said. As long as we show progress, I'm happy. Just, some of the presentations, I think, are becoming a lot more reliant, or dependent on using people as a way to audit the processes. And I do have concerns about that, thank you.

Bob Giles -- I guess part of it too is everyone is discussion is the risk, and the reward, is what we're trying to balance here, and I don't know if there's the hard answer, it has to have papers to tap the audit and, but I mean, there's already jurisdictions that are doing electronic returns. So, it's something that's not happening. So I don't know if it becomes an option within the standards to say, if you are gonna go down this path, we should have a standard for it as best we can, or if you're gonna develop this, there should be something. And I don't know if you guys can can approach it that way to say, look, this is what we have right now. We think papers the way to go for this aspect of it. But if you wanna go down this road and you wanna develop this technology, there should be something. We shouldn't just say, well we don't think it's 100%, so we're not gonna create a standard to it. So, I think, that's kind of my percentage. It should be an option that should be open for discussion, and then you're gonna have jurisdictions that are going to wanna do it, and they're going to take the lead in that. And they're gonna look to the VVSG for some kind of answer, and, I think, that may be a way to address it.

Diane Golden -- Yeah, and just listening to this conversation, and I know for many of you who've been around a while, this is understood. But the issue is not even so much of a paper ballot. It's the voter verified paper ballot. I mean, even electronic systems usually produce a paper record someplace in the system. I mean good, bad or indifferent, I mean, so it's not that, it's really not the issue of paper, no paper. It's paper is the determinative vote record, and the voter themselves is expected to verify that printed ballot, that's the accessibility problem. So, I mean we had discussions, again, ten years ago about, does everybody have to verify? Isn't there some way to let people choose, and people with disabilities can opt out kind of thing? And that was really controversial for a whole lot of reasons. I mean we went through all of these options of trying to figure out, and California's solution with the QR code was next in the beginning, because that was not verifying the printed human readable. No, can't verify the QR code content, and so that wouldn't satisfy software independence, so that was out of the water. So we've been through so many of the potential solutions, trying to deal with the fact that it's not just a paper record, it's a voter verified. Which means motor skills and vision skills, that's the only way you verify human readable. Print kind of thing, yourself without technology. So, I mean, yeah, if people can be flexible about some of these other things that so far in the past we're just not negotiable. And privacy, I mean, if people are willing to give up some privacy, and for a lot of people with disabilities they have to anyway. So that's really not an issue, not a big deal. So anyway, I mean, yeah, if people are willing to compromise a little, we might be able to find something.

Matt Masterson -- The private ballots are much, I mean, that's law in many places, so. And as well as there's varying laws on whether that paper record is in fact the ballot of record, right? That's not consistent across the states either, so let's understand, this may be, may or may not be a lot of a goal, but for some states that's not even the law. So, it just is what it is.

Greg Riddlemoser -- But there is a non sequitur here that we keep tripping over. And that is even if you had an end to end, bring your own technology solution for the community that requires that, there is still no ability for the local election officials, state election officials, or whatever, to verify that. And here's what I mean, if there's an end to end bring your own technology, and Matt chooses to vote the way he chooses to vote, he calls me later and says hey Greg, was my vote counted? The intent, was my intent captured? Did the person I voted for for Senate and House of Delegates, and the president United States, did that get counted?. There is no possible way to answer that question, because of secrecy, and privacy and all those other kinda things. And we get those calls all the time, whether it's from an ADA client, or a person who walked in, and colored the dots on Election Day. They ask all the time was my intent captured, did my vote count, and the answer has always got to be yes, of course it was. But when we're talking about how do we verify an audit, and do all this kind of stuff, I still can't tell David how he voted, and I can't tell Joshua how he voted, and I can't tell Matt how he voted, and I can't tell Ross how he voted. So we have to be very careful when those are the non sequitur conversations that we're trying to have we cannot sculpt a scientific paradigm, which is what we're doing through the VVSG. With specifications that election equipment manufacturers are gonna build to. I still cannot answer Matt's question when he calls me, was my vote captured? And the answer's yes.

Matt Masterson -- Any other comments on this? Thoughts. Is a biggie, right? Has been for a while. We're gonna fix it. We'll figure this out. I really believe that. We've come a long way since some of us were in the same rooms having the same discussions. And I have additional questions that we can get to some other time, but thank you! I think you're gonna get, hopefully tomorrow, some more instructions on a path forward for your working group with some of this, maybe not this specifically. Thanks. Next up I think is Sharon.

[UNKNOWN-SPEAKER] -- And to the rescue. Sorry.

[UNKNOWN-SPEAKER] -- Chair, to give the counterpoint now.

[UNKNOWN-SPEAKER] -- [LAUGH]

Matt Masterson -- Sharon will talk about the work done on human factors. Sharon, let me again say, as I've told you before, your working group continues to lead the day on where we are and how much progress has been made. So kudos to you for the incredible work you and your working group have done. Thank you.

### Human Factors – Sharon Laskowski, Diane Golden

Sharon Laskowski --So first I want to thank Shanee Dawkins. She is in the back there and the NIST team for her big contributions to this work. And also the public working group has been just tremendous and providing lots of really good human factors expertise and experience with human factors in voting. Okay, that's all right, there we go.

[UNKNOWN-SPEAKER] -- You have to skip one.

Sharon Laskowski -- I've skipped one, there we go. Status, so we've been holding biweekly telecom's with the group since May. We've completed a gap analysis. So this means we went in depth to after we mapped our DDSG 1.1. Usability accessibility requirements to our new principal and guideline structure which we talked about last TDGC meeting. We did it in depth gap analysis to see what can stay, what needs to be updated, what's new, what can go. We've got a skeleton of the core requirements and that's in your packet and we actually did some. And that skeleton has abbreviated requirements. We didn't do in depth of word smithing, we're looking at content. We're looking at sort of the concept level. And then we've actually did draft core requirements for our principle 3 guideline 3.1 which was perceivable. We've got drafts of five white papers on key issues. I'm gonna talk about those, we've got two more in progress which I'll also talked about. And we received some comments on some remote ballot marking guidance. So that we have put together. And I am going to revisit the accessibility of paper later in the talk. [LAUGH] First a few definitions. Our principles are high level system design goals, guidelines are broad system design details for election officials. Requirements are the technical details for design and development of the voting system. Core requirements, which is what we focused on, are those requirements that apply to any interactive system or election function. That we talk about in the VVSG. And so I'm going to focus on those, the technology or systems specific requirements are extensions that apply to specific lectures systems or types of devices. Say, small screens, or something that has gone away was VVPAT, we had requirements which were very system specific. But, again, right now our focus is core because that's the most part, the largest set of requirements. I also want to bring up the definition of universal design because I wanna talk about that later. That's the design of products in environments to be usable by all people to the greatest extent possible without the need for adaptation or specialized design. And as Matt pointed out state of the art now is a lot different than when we first did requirements in 2004 and 5 in 2007 and then updated them. And so there's all been a lot of innovation and a lot of things we can rely on for where we can take these requirements for the next generation of voting systems. So here's our sort of determinations of how we see VVSG 2.0. Again, I said our initial focus is on the core requirements for election system, electronic systems in the polling place. All electronic systems must meet the accessibility requirements, if you recall, in 1.0, 1.1 we made this distinction between electronic systems that weren't accessible and those that are. This day and age all electronic systems have to have a universal design. And we think the requirements have to have universal design addressing the largest range of voters possible, balanced with minimizing voter interface complexity. If you got too many options in the polling place, voters are just gonna get confused so you don't help them. And we've looked into what is the accessible process for voter verifiable paper records. And that we've made no attempt to write design requirements for paper ballot layouts. We did in the past, but a few leaked in about size of font on paper, etc. We're focused on the electronic systems here. Okay, White Papers, I'm gonna go over them very briefly. Except for the last one I think we'll have a longer discussion. Text size, contrast, ballot navigation from the review screen, scrolling, assistive technology in the polling place designed for select and deselect in a contest and the voter verifiable paper records and accessibility. We picked these because those were the ones which we felt needed some updating based on what we see in the research and prototypes and some deployment that we are now seeing. Okay, so, text size, the challenges here is, the text size, to make it easy for voters to see the ballot. People have a lot of different vision requirements. And we want to ensure the size is not so large that you distort your ballot layout. So we're recommending here is a small, medium and large font. Something like being able to select the font, here you see medium selected. And so we plan on having three text sizes specified, if you don't have a continuous zoom in your system. And what I've done is write out the details of the sizes here. But I don't want to dwell on them and spend a lot of time focusing on that, but they're in the white papers. We also require sans serif font. There's research that says that's a good idea. It was a should in the earlier standard. I keep skipping here, okay. Okay, I don't know what, all right. I wanna start with this one and then bring up my diagram. So the current VVSG 1.1 says minimum contrast ratio of 10:1. That's a little stricter than the web content accessibility guidelines because it's very focused on ballot. But we know some voters need lower contrast, some people are sensitive to bright colors like the light backgrounds. So we're recommending in the white paper three other options, high contrast on white, high contrast on black, and a low contrast option. So what that sort of looks like is this middle, middle top line is a 10:1 contrast. And we're gonna give a little more specific design guidance on that. A second grouping is high contrast black on a white background. Then you've got high contrast text colors on a black background. And the contrast ratios about 20 to 1 there and low contrast combinations that are effective for these populations. Okay, for ballot navigation what confuses voters is when you go to the review screen and then you see something you want to change and you bounce back. And so typically, you see next buttons, this is an example from the anywhere ballot, per contest navigation. And if you bounce back into a contest from the review screen you want a button that says something like return to review and cast your ballot. There's no VVSG 1.1 requirement for that now. We know it's confusing. We've seen from the best practices out and back to the review screen works most effectively. And that hopefully is clearer for voters who are low literacy or not that familiar with, Technology. And also works pretty well for audio ballot or larger text. Scrolling, so VVSG 1.1 had a requirement about having an alternative to scrolling, it was pretty confusing in its interpretation and how it was worded. So we wanna word it better, but just looking at the scrolling in anywhere ballot example. We know there's lots of contests are long, they don't fit on a single screen. VVSG 1.1 says scrolling can't be the only option and there's no common convention across different interfaces. So even experienced users get computer users get confused sometimes about scrolling. So the recommendation here is you have a contest on a single page, and you have navigation within that page, with strong cues for either page. Here we see back and next at the bottom. And other cues that you can scroll like touch to see more names and only part of a choice showing to indicate scrolling. So you can directly perceive the controls and you don't rely just on the scroll bars. Not much new, but we think we have some better advice for developers. Okay, we also did a white paper on assistive technology in the polling place, asking the more generic question about how might new and emerging assistive technologies be used in the polling place? And what would be available five to ten years? So the paper explores looking at the use of technology for people to find their way into the polling place from the streets to the entrance, navigating within the polling place, identifying themselves at the registration desk. Receiving a ballot or authorization to vote, marking, verifying, casting their ballot. And we don't have any specific recommendation in the polling place because there's a lot of security issues with using and also design issues with using your assistive technology. But there's a lot of technology that's been developed the past ten years that can help the voter in general, navigating the whole process of coming in to vote and voting. So that was a more generic kind of paper, nothing's specifically for the electronic system itself because we want again to minimize complexity of that system. But there's still a lot you can do to help folks make their way around the polling place. In December, we held a, with the help of Center for Civic Design a design studio in Boston with 16 top user experience designers to look at different options for design for how voters can explicitly select and deselect choices in a digital ballot. We're still working on the paper, but the idea is that voting systems should not make selections or changes to selections except under direct control of the voter. So if you've got a long contest even in a vote for one, if you choose another, should it deselect automatically? That's not under the control of voter. Voter might not use it. And should use some kind of other selectee selection, if it's a vote for no more than n in a contest. And again, long contests, small screens. So basically we ask these designers to think about the interactions, look to alternatives to scrolling or paging, using audio interface motion. In terms of how you might implement, what are some ideas for implementing? Selection, de-selection under direct control of the voter. Okay, now, I wanna talk about voter verifiable paper records and accessibility. So here's the challenges, right? Accessible voting so the system is now typically enough some kind of electronic ballot marker. And the paper records in optical scan ballot or maybe some other type of list of voter selections. At the surface verification handling of the paper records are not accessible. However, we look at VVSG 1.1. So this is something to consider. We do have two requirements that says that the voting system shall allow the voter to verify that record using the same access features used by the voter to vote the ballot. If you've got a list of choices it's represented as QR code or OCR you can do that fairly easily. The second requirement that's already in VVSG 1.1 is that the voting system shall provide features that enable voters who lack fine motor control or the use their hands to submit their ballots privately and independently without manually handling the ballot. Again we do see some examples of automatically depositing this ballot into the ballot box. And I, but I'd like to think in the next five to ten years we'll have some other less expensive kinds of solutions to this. Now, if the voting system can accommodate the accessibility of the paper record Then other requirements we have about paper can be removed, like paper ballots font sizes, magnification of the paper ballot, things like that. However, there's several aspects that are critical to having, this really be a good universal solution for accessibility, right. We want there to be enough accessible voting stations in the polling place with like in a perfect world you'd like an ageing population to have access to these ballot markers that produces a lot of voter error. They got to be easy to set up and use. You want to encourage voters to use them. And as Diane and others have pointed out in this discussion, there's cost involved. So we're hoping technology will go down in costs, we get some innovative solutions maybe five to ten years that it'll be better but a broader issue is accommodating more voters with disabilities that's really what we're talking, about here, right broad broad. So with the universal design in the polling place, you can broaden the range of the voters. And Diane you pointed out a little bit about this, sometimes it's difficult to go to the polling place or you've got your assistive technology all set up at home. So the use of remote ballot marking can help a whole segment of the population, Again. So I think what we need to do is look to be sure that there's x, overall but there's are different channels to accommodate voters if a voter is not accommodated in the polling place is there another channel for which we can accommodate them. So I think that's key, I'm a computer scientist, so I'm always optimistic that technology is improving. We've seen tremendous improvements that we can accommodate more voters with disabilities and we can deal with the paper. And I just wanna also point out that we do have a remote marking guidance paper and we've got comments from the cyber security working group. So we're busy updating that. Okay, my next slide is going to talk about our core requirements skeleton, and what that is. So that's kind of an update on what's next. Maybe I should pause here for questions about this particular hot button of paper and accessibility. Are we all discussed out from the earlier session? [LAUGH]

[UNKNOWN-SPEAKER] -- Diane?

Diane Golden -- Yeah, I was just gonna add, the other issue that has come up over and over again in our discussions is, and this may be a scoping issue or it may just, I don't know what it is, actually. But the whole premise behind Hava, with the one accessible machine for polling place, is just really an outdated concept and is wreaking havoc. Because it sets us up particularly with the move back to paper to everybody else hand marking a paper ballot and the one machine in the corner or the nobody knows, it's such a bad idea for so many reasons. And what that's done to us in terms of the the VVSG's standards is so what we're crafting this universally just designed accessible machine. But in order for that to actually function appropriately, we need a requirement for x number of those per polling place. Just like you have x number, it would be like saying under the ADA and the ADEG at Walmart, one accessible parking space is fine. Well, that's not gonna work. The way the ADEG is set up and is that, okay, if you have 250 parking places, x number of them have to be accessible. If you have a restroom in airport, it's not one accessible stall if there is 45 stalls in there. There's a ratio and that's just a accepted concept in the disability world is if, whatever it is that the public is using, if it's used by a whole lot of people, then there's more accessible things there, because you're gonna need more of them to accommodate. And for some reason, we haven't gotten there in the voting world. We're still at one per polling place regardless of how big the polling place is, which really doesn't make any sense. And it just contributes to the one machine in the corner that nobody uses because, yeah, you get where I'm going, which then sets us up for trying to figure out, okay, so for most people are hand marking paper ballots, and we've got to build in all kinds of standards for paper, which was not easy to do in terms of accessibility, so I don't know, I don't know if that's really a scoping issue or if we have any option or-

Matt Masterson -- That is a legislative issue that I can provide very little help for you on. That's what Hava sets, right? And unless Hava is changed to say otherwise and quite frankly that the testing of the site, we can't certify that more than one systems to put there's no way that's not something you could test or certify, right?

Diane Golden -- Yeah, and what I guess what I'm getting at is eventually that will probably be the legal challenge. As things keep getting consolidated more and more and there's fewer you know local polling places. It's just and it'll be an ADA issue because it'll be an equal access issue. And it's very comparable to all those other examples. Like parking places, and accessible restrooms, and all of that, if there's only one and you can't get to it because, I mean, yeah. And I just, but unfortunately it hinges on us in writing these standards, because if you can't make an assumption that there's enough of those then. You're forced into trying to figure out how to put the square peg in the round hole with making a piece of paper in large print which is really not, anyway.

Matt Masterson -- Mark and then Greg.

Marc Guthrie -- Thanks, Sharon, on your slide where you talk about contrast. Other people who have a reason to prefer low contrast and the reason I ask that is that over the years I've been through a number of marketing trainings worthy of talked about. The fact that people generally don't read in reverse, that the most contrast is the best way for people to read. And personally, I have a little bit of a low vision issue, and the more contrast the better, and so I just I wanna hear your thoughts on that,

Sharon Laskowski -- Well, that's why we have a higher contrast ratio than what WCAG recommends, because yes, you're right. Most people benefit from a higher contrast and we don't have control of the lighting conditions in the polling place, etc. But there is a small segment of the population with specific kind of vision issues where the brightness hurts their eyes. So we're recommending for Different contrast options.

Diane Golden -- Yeah, I can add, it's become more and more an issue with concussion protocols and TBI kinds of folks in light sensitivity issues. So it's just one of those in my world, again that's the problem with these things. What you really wanna do is build in all kinds of user choices because no matter what you do, even that large Brendon gonna be large enough for some people. Folks that have only little tiny central vision even the smallest size is probably gonna be tough for them to get that little tiny. Central vision which is all they have or worse yet they only have perfect for all you know some vision and they're trying to use a little dime, so yeah it's, adjustability would be great, but then you run into your own set of problems.

Sharon Laskowski -- So we're trying to minimize complexity, so we're trying to get the sweet spot of just enough options to include a lot of people [LAUGH] but not so many as to confuse everyone.

Diane Golden -- Which is again, why I keep saying [INAUDIBLE] is it would just be so nice if people could get an electronic ballot, use their own AT, because it's all set up and ready to go. I mean for every person who needs a yellow highlighting on top of a large print, I mean they've got their own AT set up to do that. And you can't replicate that in a, publicly used voting system and get it right.

Greg Riddlemoser -- Well, absent the BYOT, the bring your own technology, which I'm a big fan of for the overseas voters or the disabled voters. Folks that have whatever they have and know how to use it well. Sharon does universal design in any way shape or form contemplate and I'll come back and ask the question here in a second. Because I believe the market place will rise up and do whatever we ask them to do and here's what I mean. I envision a world where there's, because Diana Matt and other people are very interested in, if here's only one handicap disabled assessable system in the corner and the election officials don't know how to use it, etc., that's a problem. Not in my locality but I understand at nationwide it's definitely a factor but if I had a cul-de-sac of machines that were ballot marking devices, that had the menu of how would you like the ballot presented to you as screen one. One of the things that the vendors do not do is, full face ballot. I would love a cul-de-sac of 10 or 12 ballot marking devices per precinct. I would never have to print ballots I could use whatever, and a voter can walk in, select the interface that works best for them including full face ballot design. It presents to them the ballot in a giant PDF and they literally, president, governor, lieutenant governor, House of Delegates, dog-catcher, sheriff on a full face ballot, print ballot and put it in the machine. Now, where somebody else may pick about design that is one single race per screen in the contrast, in the font size that they like, and all of those kinda things. Does your concept of universal design go that far?

Sharon Laskowski -- Okay, so first of all, you have to have a large enough screen to display a full face balance. So that's kind of an issue. We also looked at sort of low literacy. So you're saying this is how. So the question is Is that full face ballot, can those people not use the other style of ballot.

Greg Riddlemoser -- No, no, no. No, what I'm saying is, if you had, even on a 15 inch type of screen, even in an 8 or 9 point font, somebody that is can deal with that, whether they brought their readers or whatever, go [SOUND] print. Full face bound design does not take a 60 inch monitor. It does if you're trying to incorporate. Everything has to be 20.5, things like that. I'm just talking about in a a la carte, how would you like your ballot presented to you design does full face value presentation even a small screen-

Bob Giles -- Real quick actually there are two vendors developing that. We're working with them in New Jersey. So there are two vendors developing a full face machine like you're talking about just so you're aware so. Well, yeah, I think you're right because the market will rise up if that's an option,if we allow that as folks who are consumers whether we're buying 100 systems or 1,500 systems the market will do whatever we want them to do as election officials.

[UNKNOWN-SPEAKER] -- But think-

Sharon Laskowski -- I would hate to have fewer universal designed, in lieu of having full face ballot. Cuz you still need the other side.

Greg Riddlemoser -- You're missing my point. In a properly designed system, it's an a la carte. So I actually have more, to meet Diane's criteria, I have more fully capable systems for whatever your needs may be instead of one in the corner that nobody seems to know how to use, my entire voting system for that entire precinct is a la carte

[UNKNOWN-SPEAKER] -- So that would be another choice you could have. It's a user voter interface, so it's only software, so in that sense. But, however, it is a different design as opposed to stepping through each contest. So that's added cost. But it's software so you can certainly add that as an option.

Bob Giles -- Even mind you be voting like you're from New Jersey. I just throw that out there without we get like our full face machine but are you talking about one machine that has the capability of doing all those things presenting it in a scrolling Pat manner a full face mask and opposed to multiple missed. If I'm understanding correct what he's saying is, you come to the voting booth and you can select full face or I could scan my phone and it could present that way. Or it could, whatever the choice may be. And that would be the universal design. [COUGH]

Matt Masterson -- I actually have a question for David that I'd like you to reflect on if that's possible. And that is, in your world asking for audit ability, would the decision to provide that audit ability allow then, for security, what, allowances such as the full use of someone's assistive technology either in the polling place or otherwise. Because there's that paper record. So there's security concerns around someone bringing their own 18 interfacing with the system at least that I've heard, would the mail ability of inaudible record mitigate the worry about the use of that AT such that someone could use their own assistive technology.

David Wagner -- Dave Wagner, thanks that's a fun question to think about. So I'll only speak off the cuff without really having thought about this is the best way to talk I find.

[UNKNOWN-SPEAKER] -- [LAUGH]

David Wagner -- You notice [LAUGH], my guess is that ought to be achievable. My first guess would be that probably it's achievable either way. That maybe this security issues are less of a concern if you have the audit ability. But I don't know maybe I'm being overly optimistic, I understand the security concerns but it seems like they ought to be mitigations, they ought to be ways to deal with that. So if security has prevented providing that functionality, let's revisit because I feel like we ought to be able to

[UNKNOWN-SPEAKER] -- Not be the one saying, no to that.

Diane Golden -- Yeah, it hasn't been that much of an issue. And in fact, 1.1 does have something about universal input jack size thing, but that's an old standard now which doesn't work as everything's USB. So that doesn't really work anymore, but I will tell you, I was just at ATIA and all of the, it's mostly input. Alternative output doesn't seem to be a huge deal whether it's coming out head phones or I don't know and people have talked about refreshable brail. Well, that's and what output. Anyway, it's more the switch input. And honestly, switches now are going to wearables. They're little remote dots, so that whatever motor control somebody has it's all that's probably a much bigger issue, because it's a little dongle kind of USB thing that's hooked to the little dot on whatever. Yeah, and that's why I'm saying it. That kind of thing is so much easier. Electronic ballot to the person, letting them use their own computer in their own AT, because they've got that all set up and calibrated and trying to do that in a polling place is not-

Sharon Laskowski -- And there's some major interoperability problems with what version of your screen reader or your braille reader that's gonna hook up with the machine in the polling place that, that's a huge issue.

Lori Augino -- I mean, there's interoperability issues even with trying to ensure that the electronic ballot delivery tools that we have created are usable for someone at home and the amount of work that our team has had to do to become experts. I mean, literally sitting with headphones in and then engaging our Washington talking book in braille library also, so that we can employ the use of internal experts to help us before we're even go into testing mode has been a challenge. But I think that touches on the fact that a lot of our conversation has centered around,going to a polling place to interact with technology and that's something that really doesn't happen in my State. And, yeah I know. So, somebody was waiting for me to talk about vote by mail. You're all waiting.

[UNKNOWN-SPEAKER] -- [LAUGH]

[UNKNOWN-SPEAKER] -- Who won the bet?

[UNKNOWN-SPEAKER] -- [LAUGH]

Lori Augino -- But it's more than just the three states that are voting entirely by mail. There are a whole host of states that are finding themselves, California being one of them too. Where although they're looking at technology that would be used in a polling location, a lot of states are looking at 50% of their population, they're vote by mail, they just don't know it yet. And so, I think as we have folks that are increasingly using remote ballot marking options whether it is through the mail or through an electronic delivery tool. I mean, that's what folks are doing, because they want the convenience.

Sharon Laskowski -- Yeah, and I would just add to that what you guys have been through in terms of web access issues, etc. I mean, if I can guarantee anything for all public people here is that you've better get your IT people into accessibility. Because eventually, you're gonna get hit whether it's your DMV. Everything in state government is online, just like everything at the federal level is more and more electronic and all of those things you're dealing with, making ballots accessible. I mean, other people in state government are gonna have to do, making other things accessible that people do online. So it permeates, it's a learning curve that you're gonna deal with some day anyway and getting ahead of it. Now, you're probably just gonna help other people in state government catch up. And I mean, I think that's the one inevitable thing is that. More and more will be done digitally online, so to the extent. Yeah, we can capitalize on things already happening.

[UNKNOWN-SPEAKER] -- Go ahead.

Sharon Laskowski -- I've got two more slides to wrap-up. I mentioned the core requirements skeleton, I believe you have a table of these. For each principle and guideline, we've got a list of abbreviated requirements that have an identifier. They're marked as to whether there are an accessibility legal requirement, either through ADA Voting Rights Act, or CAG or HAVA. And the VVSG 1.1 references, if any and the updates and considerations based on the gap analysis that we spent many weeks on with the public working group. So by tagging it with the legal requirements, it should be easy to pull out legal requirements and separate document, which is a request we've had many, many times. And we've noted some possible technology specific requirements and we've also got some draft requirements strictly for principle 3 guideline, 3.1 perceivable. So, next step is to actually do a full draft of the human factors requirements. We've got a few open issues to resolve. Updating the wheelchair reachability which was harmonized with the ADA reachability requirements. Updates and screen hardware requirements. Those were based on just making sure people put a current kind of a screen up. We had some old CRTs and other things, and some of the old voting machines. So I need a better update and look, just continue to work with the human factors public working group. So I invite any of you are interested in providing input to please join, and call us, or read the emails and the documents, and we'll work with them to resolve some of our open issues, collaborate with the other working group such as cybersecurity as needed. And another topic is we have a couple people in the working group who have volunteered to look at a lot of old guides we have for user testing and how to develop the usability test reports. That is the testing with users to help the vendors and the test labs and those all need to be revised, but people seem to find them helpful and we thought that would be a good thing. First, a volunteers to work on and develop some technology specific requirements and I've already said the thank you when I started the conversation. Any other questions?

[UNKNOWN-SPEAKER] -- One quick thing, Sharon. Did you take into account when you're talking about the select, deselect that there are actually some states who legislate the way that's supposed to work that most notably Pennsylvania?

Sharon Laskowski -- Yeah, we didn't get that far. We didn't wanna constrain our designers. We wanted to then to just sort of look at new ways to design the screens this. These wouldn't be put into requirements. They would be put out as guidance to developers, but very good point. [LAUGH] Thank you.

Matt Masterson -- Sharon, great work.

Sharon Laskowski -- Thank you.

Matt Masterson -- Appreciate it. Break time. We will come back at 3:10, I know that's random, 3:10. Set your clocks 3:10 to resume with, I think, Ben, making his TGDC debut. We look forward to it.

[UNKNOWN-SPEAKER] -- [LAUGH]

[UNKNOWN-SPEAKER] -- 3:10.

[UNKNOWN-SPEAKER] -- [LAUGH]

Matt Masterson -- There's no hazing here, Ben.

[UNKNOWN-SPEAKER] -- Yeah, a lot of love. Yeah, it's good.

Matt Masterson -- It's on the record.

[UNKNOWN-SPEAKER] -- I know, right.

### 2:30 – 2:45 PM: Break

## TGDC Day 1 Part 4

### 2:45 – 3:15 PM: General Principles for VVSG 2.0 – Benjamin Long

Matt Masterson -- Next up is Ben Long of NIST who got assigned, the enviable task of the miscellaneous the rest of the VVSG as it were. He's the Paul Harvey of VVSG. So Ben the floor is yours for your maiden voyage in front of the TDGC.

Benjamin Long -- Maiden voyage, here we go. Thank you Matt. So as Matt said, you guys have been hearing about principles for many of the more familiar areas today. These correspond to the existing working groups. You've already heard from security and human factors and interoperability so. So this was an attempt to, so our current standard right now as VVSG 1.1. It's on the books. And as you see in the column left here, functional requirements, hardware, software, telecommunications, quality assurance, and In configuration management. This is the else clause this is the miscellaneous. And since we've been talking principles the idea, the the assumption behind this was that there were principles here too and that there was. There is kind of an inherent value in finding these principles, if you look, they kind of are self explanatory. Principle one, correct implementation, principle two, high quality construction and three, ease of evaluation. And if you think through the lifecycle of the process that we go through, number one, we're talking about no matter what happens we have to have a correct process. It doesn't matter how we make it. Number two, that's how we make it, it's got to be high quality. And number three, when we evaluate it, it's got to be easy to tell what's right and what's wrong. And so, in each of these we just kind of dig through a little bit, but that's the basic idea. That you'll find this in every area. And so when you see these cross cuts underneath each guideline here functionality, software, hardware, telecom. You might occasionally see things from the other working groups over time we haven't gotten there yet. Pop up too but these are things we see all across the board. So correct implementation completely and accurately support the election process. That's got to happen no matter what. First guideline is you've got to be able to address the entire election process. With your functionality, the entire process and voting variations. Software and hardware. You've got to support the integrity in the maintainability of the processes and the data. Telecom, it's got to be reliable and you have to accurately transfer that information. And so that never goes away. This has to happen under realistic operating conditions. So this means that we build it for the life it's going to live, right? So you're expected workloads so all operations you expect the workload, I'm engineering this and testing it according to realistic election definitions, and I'm testing it under realistic environment conditions. What temperature is it stored in? What's the humidity like there? Does it gets shaken up when it's transported or when it's put on site and when you're transmitting results remotely, that's got to remain correct too. The process has to be correct across the entire system lifecycle. So however we go about specifying building and evaluating this thing, those processes always have to be correct. No matter what we shift in or out. No matter how we shift up the software, the hardware, that process has to be correct. And you have to be able to track it. High quality construction, this has got a lot more meat in it. Cuz that's pretty much how we build it. So we wanna use trustworthy materials and methods to maximize quality. We can see this cross-cut at every level. We see it appear in different groups. In the standard it appears basically in different areas, where we invoke existing standards for example, standards of quality in selecting software, the languages that we use, the coding standards. The tools, the compilers, the hardware right now we rely on things like military standard specifications for humidity and temperature. Telecom standardize protocols and so forth. Q-A, C-M this is mentioned before I A-C 1,000. So the standard right now kind of relies on these other, good practice is good materials. Guideline to organize the elements and logic of this system meaningfully so again at the functionality level. All of these ilities that we talk about security accuracy, usability, accessibility, interoperability, audit ability, those have to be supported no matter what. Software, you want to organize your design meaningfully. So we have the standard right now, it's there are many different approaches to design and so the guidance that is in the standard the principles that it's based on they are fairly stable. And so they talk about organizing the logic so it's meaningful to those who are reviewing it who are evaluating it,who are changing it. That it's modular so if you have different components that can be swapped in and out over time then that makes sense and it's easy to do. And that it's robust to change so that if you need to swap something out and put something else in the whole thing doesn't break. Hardware in telecom, so anything you do over hardware or Telecom whether you're transmitting results or data. Or you're actually performing the tabulations that is supporting the logic above it with fidelity QA/CM. So quality assurance throughout. If I'm developing software every time I make a change a significant change I should be able to tell you the evolution of that change, through the pathway of making it and evaluating it. And in some cases the pathway of deploying it as well maintaining the baseline. So a high quality construction, it can handle errors actively, appropriately, and it can recover from failure gracefully. Right, and so software, for example, we're checking for known errors. We have standard software detection correction. And so a lot of your algorithms and stuff your techniques for detecting errors and correcting them. Whether you're using different codes or different techniques that goes, in there you're avoiding single points of failure. So you can't bring down the entire operation just because one thing fails, that it can actually keep going and let you know if something went wrong without the election failing. Same thing with hardware, and with Telecom. So these are crosscutting themes that we just keep seeing and it makes sense to To see these patterns every time you drill down. You wanna perform accurately and reliably in your intended environments. And so this is more general, but it's an echo from one of the ones before. So your environment, right, those are the elements that challenge you, that threaten you, that you have to respond to software. This might find a home in things like responding to well known security vulnerabilities, well known errors say bugs things like that. So that there's a certain due diligence it happens when you make a system and you say we know about these things and we're going to be able to handle these without feeling badly. With hardware reliable performance and when we say pervasive, accuracy, integrity, durability, and so forth, what we're talking about is. So let's say you make it a system and it has various hardware components, things like this. So you're looking to make sure that the failures in any piece don't cause a failure of the whole. Telecom itself at the base of it even though it's transmitting things over distance. It's hardware, as well, so it should comply with all the criteria for accuracy, durability, and so forth there. So it kinda makes sense. High-quality construction, the last theme or guideline we had here was we wanna support auxiliary aims and processes. So our high level target is our processes. They always succeed, we support them in everything we make. But we have other things that we've been talking about a lot, auditability, testability, things like that, that they are cross-cutting things, they reinforce one another too. And you need a system to support that to get where we wanna go. And so we wanna support our auxiliary functions for operations for transparency that's needed to get there. That require software that has both the necessary software for this and the necessary data and that trickles down through hardware and telecom and so forth. And then, of course, we need a way to track that uniquely to make sure that we know what version we have, that it's the right version, it's compatible and works right and all of that. So this is the last one, right? We start with correct process. We've made it with high quality and now we want to test it. We want to evaluate, can we tell the difference between something that's put together correctly or not? And so this has to be, we have to build in a way that this is clear to every tester, to every evaluator. And so everyone who's testing, they should be able to clearly identify all the essential elements of an implement system. So if we make the VVSG20, just like we have a previous one, and we specify different elements that should be there, when either tester or any tester goes, we say element one, element two, element three, this is what's in my spec, my standard, my paper, I should be able to find it right here. Here, I should be able to identify that uniquely. I should be able to do that no matter if it's software or hardware telecom, there shouldn't be a place where I can't tease out what's in the standard with what I see. That's what makes testing work. And we should be able to uniquely identify the processes and functions. We should be able to trace that with quality processes. And so once you can see the elements and map them from the standard to what's in there, the other part of making it easy to evaluate is that you can tell the difference between things that are well put together and things that aren't. And so that something that needs to be thought about as well over time, at all levels. So this was kind of the general thinking in trying to reduce the essence of the standard into some meaningful principles. And so there is kind of initial thematic gap analysis done on this as a basis of this kind of thinking, and sort of thinking about, okay, what's been changing in the space that supports all these ideas, right. So software over time we've had expansion, right, technology is not slowed down, it's not stopped there's new languages in execution environments all the time. The basis really existing review right now, we've got style. How did you make it. How did you make your comments. How did you structure your code? And the substance, what's the logic it's actually trying to do? Our goal is to make sure that logic is right. That process is right, right? So, we wanna make sure we have the appropriate coverage. No matter what software we use. No matter what components or cuts we use that's just do we buy it, do we building it, right? And do we have an appropriate way to verify that? So we can go through the code manually. Over time people might say, hey are there promising avenues for helping to automatically or semi-automatically start to identify some well-known bugs, say in software? So these are some of the challenges and the issues. These are some of the questions I'm sort of bringing to you as things do we thought about over time in the hardware space, right? So, right now the past VVSGs have relied on say mil specs. Military standards for hardware testing of humidity, temperature, these environments. So, it was very stringent, right? And when we went with that initially, a lot of the hardware was proprietary, right? Today we got a lot of cuts. You're getting stuff off the shelf. Those things might not match up. You might actually have some military specs. It might rule out, some cuts it might actually fit the field. So we might need to revisit how well our dependencies are. Even on existing hardware specs and things like that, as we move forward to say, what is the reality of what we're dealing with? And how well does this fit? So in addition to those things, we have new form factors and configurations things. We're getting smaller devices, larger devices, right? And new forms of communication, are we allowing different kinds of Bluetooth? Are we exploring different ways that these things might possibly exchange information? And so those things come into a conversation of, what is desired? What makes sense for what it is that we're trying to do? And so using that hardware and that software, we wanna meaningfully verify reliable accurate realistic election workloads. So again, we're saying, what's a realistic election workload. Right now in a standard, part of the way that that is measured is folks they build the model of a medium sized election, right. And they say it's gonna take this many devices of this type running this many ballots through and this is how this is what we call an election for the purposes of testing as we move forward we might say, does that model work? How else will be look at it? Do we need to tweak it? Acceptable ranges, we already talked about that for cuts. Best approaches for meaningfully testing cuts configuration so. You say, hey, I'm just gonna pull a bunch of things off the shelf. I'll fit them together and I'll build a voting system on that. Well, with COTS, which is basically off-the-shelf software, hardware, you might not always get to see inside the black box. And so, what you can see is more just at the interface, just what goes in and what comes out. So, that changes what a tester can see, that changes our visibility into what it's doing. Some things need to be thought about. New forms of interconnection, we address that, too. Quality assurance and configuration management. Right now, we rely pretty much on tried and true ISO9001 kind of quality standards. And so, again, this has been a point that's been raised. And we say, okay, is this a good fit for where we're going? Just something on the table. The technical data package. This is one way that folks who are evaluating systems today, they get lots of documents, all the designs, all the specs, everything that was made from the manufacture. Here's how I made it, here's my design. And then the tester says, right, I'm gonna walk through this design and I'm gonna use this is a basis for my testing. Will this make sense in the future, especially if we're dealing with ever changing growing systems? There might be a trade off in the complexity of testing. So we want to look at that. And then in testing, again. So, we need to always strive for greater coverage and consistency when we're saying how stringently, how far down the rabbit hole can we go to verify. So we want to basically meaningfully interpret observable evidence that we can say, yes, this is in the spec, this is how I can see that it's correct or not. This is how I see it on the system, in the data. And so, these considerations ,McDermott, you guys, Jack, you guys are all gonna be thinking about this. So we'll need to talk about this over time. But this is what I've got, this is sort of my thematic cut. It's just an initial cut, but it's meant to kind of jumpstart a conversation. So, thank you, that's it.

Matt Masterson -- Thank you, Ben. Questions for Ben or comments? Nice ones. One question for you is the idea to take this primarily to the testing group for, you've been asked to basically do this without the support of a working group unlike the security folks or the human, is the idea to utilize the testing group as sort of your go to?

Benjamin Long -- I think for some of it, yes. But some of it may not be appropriate for the testing group, and some of it may not have a home in one of the technical working groups. So we'll have to take another look at it.

Matt Masterson -- And it could go up to the pre-election elections-

[UNKNOWN-SPEAKER] -- The election groups?

[UNKNOWN-SPEAKER] -- Yeah, the election groups, as well.

Greg Riddlemoser -- Ben, this isn't on you, but it can be if you want to jump on this grenade. But my question is about inter-generational. And here's what I mean. The equipment manufacturers build and test a piece of equipment that gets EAC certified and then state certified. And then there's the next piece that they're working on. And sometimes there are some iterative changes that are resubmitted for certification both at the state and federal level. And sometimes there are not. And my question really is more for the folks sitting across the table from me. But the prudent man approach, do the four states that you represent require the local election administrators to purchase hardware and software and maintenance agreements and preventive maintenance agreements, and if not, why not? And the reason being is that we go through this huge deal of making the equipment the way we make it and do the things that it does. And auditing and all those things that the states are responsible for, whether it's spot checking or what have you. But do we make the localities take good care of their equipment? In HVAC facilities, properly secured with alarm systems and all that kind of stuff, that's nice. And those are some of the things that Bob talked about a little bit, but what do we do as far as the requirements? I don't think there is a federal requirement, and if I'm wrong please tell me, for localities to do the hardware and software maintenance agreements and preventive maintenance agreements, just as the prudent man. Now, granted, it drives a bill at the at the local level to take care of your equipment. But as far as I'm concerned, there is nothing that you couldn't handle that question if a reporter came up to you and said when's the last time you had preventive maintenance done by the factory guys on your stuff, and you said, well, we've never done that. Those are the kind of things that are important to the integrity of the system. So, given the four of you across the table, and I don't mean to put you on the spot, but it happens to be one of my things. Because in Virginia, it's not a requirement. I think the larger localities do it, as a matter of fact. The smaller localities don't do it because they say they can't afford it. But from the state level, what is it that you guys direct downward?

Bob Giles -- Well, in New Jersey, like I talked about earlier, it's not a requirement to purchase a maintenance agreement. We certify the equipment that can be purchased in New Jersey, and then the counties purchase what's certified by the state. But what we do have as part of our pre-election testing protocol, which is statewide, is that they do have to conduct either maintenance diagnostic testing or preventative maintenance on their equipment twice a year. So we usually do it one before the primary cycle and one before the general election cycle. And that is a requirement. So, as to how they address that with the particular vendors, that's up to them. But as far as I know, everybody has some type of a maintenance contract. It would be foolish not to have that with.

Lori Augino -- In Washington, there's no legal mandate for our locals to have a maintenance contract with their technology provider. We do, I don't know of a single county that doesn't have that. And it's up to the county to, we in New Jersey, in Washington we certify the voting equipment to be used in the counties and then the counties can select from those certified technology providers to make their choices. We also conduct county election reviews, every county is reviewed once every five years at a minimum. And during those election procedure reviews, that's something that we're looking at, is kind of the procedures that they use to secure and maintain their equipment. So, if we find anything that needs to be addressed, then we would take that up through the county election review process. We also have pre-testing and post-testing every election. So if there were any issues they would show themselves during that pre- and post-testing in each election, I think.

Linda Lamone -- In Maryland, it's a statewide contract with a single vendor that I sign. And it has Maintenance requirements in there and from the vendor and then the locals were required to do pre and post maintenance. And we also have a very rigorous warehouse and other requirements.

Ross Hein -- This is Ross and Linda I'm very jealous because in Wisconsin we do it the exact opposite.

[UNKNOWN-SPEAKER] -- [LAUGH]

Ross Hein -- Being the most, one of the most decentralized states it's up to the municipalities To purchase equipment that's approved by the state and Fed and certified by the EAC. But anecdotally, I know that all have appropriate maintenance agreements as Bob and Linda said, it just make sense, but it's not mandated.

Matt Masterson -- All right, Well thank you very much.

Matt Masterson -- Any other questions, comments for Ben? Ben, is a good first crack, right, to get us started on this.

Matt Masterson -- It will be, I assume, just based on your comments, you're exploring where there are existing Standards requirements in other areas to be able to use this to inform your work.

Benjamin Long -- Correct. And by having themes not just in terms of sort of covering this space but it also has an integrating factor with the other groups which is very nice.

Matt Masterson -- Awesome. Good job.

Benjamin Long -- Thank you.

Matt Masterson -- You're next, Sir. So next up we're going to have McDermott And Jack Cobb is making his way up there McDermott is from Unisyn Voting Solutions and Jack Cobb is from Proven B Labs one of our credit tests laboratories and we wanted to give McDermott and Jack an opportunity to talk about House systems are actually tested when they go to the laboratory. So we talked about the standards a lot and I think it's important to talk about how they're actually applied so that we can all understand how the testing takes place in the real world. Some of the challenges, both from a manufacturing and lab perspective. And some of the improvements that have been made over the years based on what we've learned. Luckily, Jack's been doing this almost as long as Bob. So he's got plenty of input on this.

### 3:15 – 4:00 PM: Testing in the Real World: Voting System Test Lab and Manufacturer – McDermot Coutts

McDermot Coutts -- And I want everybody to notice that I did put the slides in high contrast, so they're easy to read. This is not a indication of a lack of artistic skill on my part. [LAUGH]

[UNKNOWN-SPEAKER] -- If you have any graphics in there, I'll let you know if they're accessible or not. I'll go look for you.

[UNKNOWN-SPEAKER] -- There are none.

[UNKNOWN-SPEAKER] -- Okay. Good, good man. No tables, no charts?

McDermot Coutts -- So unfortunately the entertainment is all here, unfortunately. And I realize that I'm actually tied to the podium, which is a bit of a challenge for me. So anyway, testing in the real world, voting system manufacture and test lab or what are we trying to accomplish with the TGDC. Basically at the end of the day we are trying to come up with a document that I can create or create a system that meets and he can test. That's it,it's relatively simple so. However I can't figure out the technology.

[UNKNOWN-SPEAKER] -- [LAUGH]

[UNKNOWN-SPEAKER] -- It's that simple.

McDermot Coutts -- Yeah all right so what is the VVSG?Yes. It is the VSTL tested by a process for compliance testing. So, does the system meet the VVSG? Yes or no? It's a binary answer. Does the system do what the manufacturer says it does? Yes or no. Basically, I write a document, I say this is what my system does. And Jack says, okay, I'm going to test that. Does it do it? Yes or no. What it is not. It is not quality assurance. I would also add that it is not a design document. It is not telling us how to make the system it is just telling us that baseline set of needs as to what it must do in order to function in the real world baseline. Okay, so what is the process? Well first of all we design and build a system which is great. It's a lot of fun except when you start running into things that don't quite match up with your design. So what do we do? After we've built the system, we create an application with the with the EAC and we say is this a new system or is it a modification of an existing system? Up until now, it was always a modification. Except for in recent times.

[UNKNOWN-SPEAKER] -- It can't always be a modification. Because you have to have the new system first, right?

#### Jack Cobb

Jack Cobb -- Well, there's at least one, yes, initially. But once you get past that first one, then it's generally a modification. Except now, if you add a new voter facing system. Or then it becomes a new system once again. So you've created the system, you've got your application, you put together your technical data package, this is a list of all the documents. This is your users guys, your security document, your QA document, basically how did you test the system? You put together your source code. This is a big deal. Right now my latest version of the system has a million lines. Of that 750,000 of them are comments. Mostly this is to make sure that the system is maintainable moving forward. So there is a process for checking the source code. But that actually takes more time than actually writing the sort the source code sometimes. We have to have the hardware, and it has to be production level hardware. There's no prototypes. It's got to be ready to go. This is the way it's going to be in the field. And we have to perform a usability test. Which is actually one of the greatest local of our recent additions that we've had, so we put together, so this point we have to actually take the system out and test it with real voters and figure out does it work and then we make changes based on what we find out in that test. So once we've gotten all these pieces together we are now ready to start the testing. The other thing that we have to do is design is to figure out what it is it,what is it that our system does?what are we going to certify to? This is again saying what is it that our system does? And you look at this and this is this is a nice finite list, isn't it? It's easy, except for the fact that when you start looking at things like ballot rotation. There are four different versions of ballot rotation and then if you start figuring out where you need to do the rotating it starts getting more complicated than that. When you look at straight ticket there are, I think, three possibly four versions of that. So when you start doing the math, the number of paths to go through a complete voting system becomes incredibly complex and you actually cannot do a full tree analysis on a voting system because there are so many options, because every state's got their own way of doing things. And sometimes they even change those and there's a case recently where a state decided to change their straight ticket laws. Right before the election. And then we had to go through a whole bunch of hoops trying to make the system manage that. So, we had to do a federal campaign to make that work. So, basically when we get all the stuff done, I throw it over the wall to the labs and three to four months later they give me a report and we're done. No, so. [LAUGH].

Jack Cobb -- [COUGH] Okay, so once McDermott and them have all of the package to us, and we then in turn start off with the readiness review which is new. We didn't have it until the new manuals got approved.

[UNKNOWN-SPEAKER] -- You got cut off here.

[UNKNOWN-SPEAKER] -- What?

[UNKNOWN-SPEAKER] -- Part of the slide's gone.

Jack Cobb -- So the readiness review is something new that came out with the new program. And all that is, is that he has sent us a complete, not prototype, piece of hardware. We're able then to run to see if it has a mark. We look at the TDP to make sure the documents are present. They may not be correct, but they at least have them. And then we do a small source code review to make sure there's no systematic problems. Once that is completed we start kind of a parallel thing going on with three different items. One is the technical data package review which we start with the compliance. There's whole section of what each document has to have. Then we also at the same time start the source code review, which there's very descriptive requirements that the source code has to follow. And then we've gotta decide if it's manual or an automated. Like in their situation it's an automated review, so we only have to do a certain percentage of the comments. But, if we had to do a manual, it could take months, and months, and months of us going through the code. And all of this is kind of leading up to starting the test plan, to get the test plan created, to submit to the EAC for approval. And as part of getting the test plan created we also had to take in consideration the hardware side of this. Because we're gonna be sending the hardware out to another lab to do all the mill standards. So we'll have TTP going on, the source code going on, and the hardware testing all at the same time. And all of that is done at risk, if the manufacturer decides to continue. If they don't we can do source code and TDP, but we can't do hardware without an at risk letter and that's for approval from EAC. Cuz if we chose the wrong test or something, the EAC could then go back to us, and you're starting to shell out a lot of money when you go to a hardware lab. So from there we do some functional testing, and this is just the way our lab does it, every lab has it a little different. We may title them different, but this is what you're doing. You've got the code into a situation to where it's stable. So you take the code, you build it into what is a build, we call them, compliance builds. And then we load the code onto their equipment, their hardware and software, whether it's a laptop or the proprietary stuff. And then we start doing the compliance testing, and we kind of in our lab break it down into two areas. One is the physical configuration on it. And this is where we actually open up the devices, make sure the motherboards are what they say they are on the building materials, everything's photographed, we take serial numbers. We know exactly what it is we have, and then we start doing the testing on that equipment. The other part is the functional, and this is where are most of your requirements that are in the VVSG right now, at our lab anyways, this is where most of them mapped out. And we map out the functions that the manufacturers have, and map them to the actual requirement. And then we map all of that to our baseline test cases. There's one of the requirements says you've got to have red means no and green means go in the usability stuff. Well, the simple test case may be just to look at the device. Does it have red or green? But that's a checklist on all of the requirements. So, we go through all of that kind of stuff and this is where everything will be mapped. So at this point, once you get out of the compliance testing and you've got the function configuration on it done and the physical done, you're now on a device that is pretty certain to be compliant to the VVSG. There are still some requirements things we have to check off. Volume testing, stress testing, security penetration. But you meet the majority of the functional requirements, the usability requirements, and things of that nature. So once we've got that all done, we start with security testing, some penetration testing under security. Phipps testing under security is in there now, access controls in there physical controls in there. Making sure their documentation actually states how you lock the devices down, where you put seals, those kinds of things. And then we've got the volume and stress testing, and limits testing, and those things all kind of go on at the same time. And under here actually there's another little line item [COUGH] that talks about performance based testing. Which is how we get all of the limits and volume and stress, and all of those things done, is basically by putting the system together and performing it. And after that you have system integration testing. And system integration testing is where we put it all together and run actual elections. We have election definitions and we run those through everything. So, oops, I went the wrong direction. Let's go this way. Now, after we're done with all of this and everything has been completed, we write a national test report and submit it to the EAC. They review it to approve it, usually, that's an iterative process. We do a final trusted bill and then we run that through, what we call, a smoke test just to make sure we built it correctly. And at that point, they get a scope of certification submitted to the EAC, and the EAC accepts it. And from that point I'm done. The lab part is completely done, I go on to the next test campaign, and McDermott still has some stuff to do.

Jack Cobb -- Yeah, so after we get done with the federal level we then now need to go back to the states. And every single state's got their own way of testing their voting systems. I've had some states that have a campaign that is the equivalent of the federal campaign. And some states that say you've got your EAC, come on in. But we can't sell until we finish that, and ultimately this is a business. However, it's actually never that easy, ever. So, what are some of the things that happened? Well, sometimes I looked at the standard and I read the standards, and something was so absolutely crystal clear. I said, well that's how that needs to be implemented. Well, then I get to the lab and Jack says I'm gonna test it this way. That's not how you test it, that's not how it works. Well, so suddenly we've got a conflict. So then we have to go to the EAC. And the EAC then says, when we get a request for interpretation, or a fine. And, at that point the EAC says, well this is what we meant. And sometimes it's easy, and sometimes it's not. Sometimes it requires an architectural change to the system, which is a challenge when you've already gone through all development, all QA. And you're ready to certify a system and suddenly you've got to go back around. So, the example that happened to me in the first test campaign was that one of the tests, we have one of the hardware tests, requires you to be in a radiation chamber. And you can't have a person in the chamber while the system is going in that test. It's just not good for people.

[UNKNOWN-SPEAKER] -- [LAUGH]

McDermot Coutts -- However, the system needs to be voting. Well, when I was designing the system the concept of the voting system, voting without a person attached to it made no sense whatsoever. So I didn't build anything for that, well suddenly I now have to make a change to have the system vote automatically. Well, okay back out, we stopped certification, had to go back around, do more QA. Then regression testing, making sure we didn't break anything and then restart the certification. Sometimes the RFIs have other consequences as we brought up earlier. If you need to change the font on the ballot to make it this big, well suddenly your ballots get that much bigger. Well, how many pages do you support? If you require a password policy that people have to change their passwords every three weeks. And they must be 16 digits and have a special character and your first born child. Well nobody's gonna be able to remember those passwords so suddenly you've created this problem where people are putting their passwords on sticky notes underneath their their keyboards because they can't remember what you have told them to to do. So the interpretations issues, transitions are a problem. So when we're moving from one of the things we need to keep in mind when we're putting together the requirements, is that we're going to be moving from one standard to another. One example of this that's important is commenting on the source code. If you change what's in the header, how do I transition my software from one type to another? Do I have to go through and change all 750,000 lines, or can I use the old standard or can I mix and match for a while. What is the transition, how does that work? So these are some of the things that we take take into account when we're putting together a standard. What are the changes timelines so when I was putting togethe my current system it was going to be a modification. Well half way through my development process the ruling came down that if you create a new voter facing device it becomes a new system. Okay well then I suddenly had to change gears to accommodate that so now I'm going through a whole different test campaign. And we already talked about the RFI Process. So trying to make this is quick and painless and easy as possible for people cuz I know that we want to get out. So I'm going to actually directly launch into-

[UNKNOWN-SPEAKER] -- Questions first.

[UNKNOWN-SPEAKER] -- Questions first.

Matt Masterson -- So before we go to you, is there anything you want to clarify? Okay, go for it.

Lori Augino -- So you talked about the myriad of different definitions to those, if you go back to that one slide, open primary, closed primary. How do you ensure that you've met all of the state requirements before you go in to testing because I'm assuming that if you need to make a change to any of those, then you can kind of be in the circular route of changing and going back in for testing?

McDermot Coutts -- And in some cases, what happens it becomes exactly that because in some cases the states themselves don't know what their requirements are. So we go in for a state certification and then they say but you have to do this, but where is that written? Well we have, it's on a post it note in somebody's office but it has to be that way. Or it's some of the cases we've read the requirement and we just didn't quite understand what that meant. A lot of the straight ticket rules are like that especially in the situation that I talked about earlier, so it does often become circular. Now, luckily one of the things that Jessica Myers is currently doing is putting together a list of state specific requirements. And we're very much looking forward to having that done so that when we go into a federal campaign I can also tell Jack, okay, I want to do test a, b, c and d for these states, and at that point we're done.

McDermot Coutts -- And to answer that a little further, it really depends on where they're gonna go marketing. Like if they're gonna do a certain type of rotation for say somebody in California, they know they're going that way, they'll say rotation's done this way. And then if they wanna go into Arizona, no no no, rotation's done this way and we test for each of those. Sometimes things get through but like with the straight party Pennsylvania method of voting which we now is very clear, it's not that bad, but a while back it was really tough. It's like, yeah you support straight party, but you're doing it the Pennsylvania way so do you really support straight party. I don't know, but as we're going forward it's, we kind of understand that there's different versions of it, different flavors. I mean a great on, I think, Ross, you in Wisconsin, you have some crazy stuff with open primary don't you.

[UNKNOWN-SPEAKER] -- [LAUGH]

[UNKNOWN-SPEAKER] -- Yes, I do John.

McDermot Coutts -- Yeah, so an open primary in the state of Alabama and an open primary in the state of Wisconsin are two different things, but they're both open primaries. So it's kind of more dependent on where they're wanting to go with marketing.

Matt Masterson -- Awesome, lots of hands Greg and then Diane.

Greg Riddlemoser -- I'll piggyback on Lori's question and Ross's flippant response there.

[UNKNOWN-SPEAKER] -- [LAUGH]

Greg Riddlemoser -- For, Certified systems and a good example is there were several things that come up, Virginia has a citizen legislature which is neither here nor there. But they only need six weeks out of the year and they cram a lot of election stuff through and there was a couple things came up this year. And frankly, there's no place for us to go to does it already exist. So when the general assembly says we wanna do rank order voting starting January of next year. What does that mean, can I already do that, does my vendor already support that blah blah etc. So is there a paradigm library for lack of a better word. I know what Jess is doing but, is there a place where I could look and say these five states to rank order voting. And I can call them and find out what is it exactly you guys do, so that we don't have to go through recertification because we only have six months to do so. I mean how do you guys do those kind of goofy curveballs that come out of general assemblies?

Jack Cobb -- I want to speak to that first about the rank choice voting and other things. I don't think there is a collection of who does what where and how it's you go to, I think last month I called Ryan cuz I needed to know something about California. I was like, who's doing rank choice voting out there? And he's like, it's like four or five jurisdictions or this or that and I mean, it really is kind of like a good old boys network. You need to be finding someone who can tell you or point you to the right place to figure out what's going on or call the state direction, I mean people who support it like Maine I think supports it and California. Find somebody in that state at the state level that you can contact and see if you can figure it out cuz I don't even know all the different ways vote rotation actually works. I get told the way they're holding their system to work and then I verify their system rotates that way. I don't know if it meets California, Arizona or whatever, you're gonna do rotation this way, I'll test it that way. And that's how we end up having to deal with it, but I don't know who does what where very often. I just know a few quirky things about a few quirky states, but there's still a lot more of them out there.

Matt Masterson -- So there's two places that could at least get you started, may not answer your question completely. One is NCSL on their fantastic elections webs has a lot of that. Also the EAC statutory overview as part of the election day survey has some of that information as well. And so It's incumbent on us as a clearinghouse to probably get more of that since you're asking that question but those two sources alone will cover several but probably not all of yours. But certainly rank choice voting would be covered by NCSL's research in some of the primary stuff. So there's some out there. Just a quick point on that though, too, is that part of what the manufacturers and the labs to a lesser extent have to do is figure out the states not just that have those, but that will take test reports from the labs to verify that. So there are states that will just say okay EAC accredited lab has taken that, therefore it's good by me. And there are other states say, no. You've got to test it within the confines of the state because McDermott can can then tell Jack as part of the federal test campaign, please test this functionality as well. But, if it has to be tested within the state of California for example, then it has to be tested within the state of California and it does him no good to have it tested at that level. And just imagine if there wasn't a federal certification the 50 plus different flavors of testing that McDermott would be dealing with and that. So that baseline is an important kind of determination for them in that way as well.

Matt Masterson -- We are currently doing exactly what you said for a state, for a manufacturer we're doing state specific and they want it documented that we did that state specific stuff in any EAC test campaign.

Matt Masterson -- One example I think, that Jack's intimately familiar with, is source code review. There were times that Jack would review the same source code to the same standards both for federal certification, and for state certification, and so we tried to work with some of the states that had that to say, hey just. You know that we do this already because that's so expensive and time consuming for the manufacturers. And so that's part of the give and take that we try to have to lessen the duplicative testing in that way. And it's an ongoing effort because no one wants to pay for that, the manufacturers don't and it gets passed on to the states and locals in the end.

Diane Golden -- I'm trying to figure out how to ask this tactfully, which is not necessarily a strong point.

Matt Masterson -- We don't need tact here.

[UNKNOWN-SPEAKER] -- It's strong suit.

[UNKNOWN-SPEAKER] -- I went out the window this afternoon.

Diane Golden -- [LAUGH] So the equipment that's already been certified and the difference between whatever not new piece of equipment and a new. So the user interface change apparently then that's becoming a new piece of equipment or the whatever?

Matt Masterson -- It's a new system at which means that the entire system from soup to nuts is now considered a new system and must all be retested.

Diane Golden -- Okay, so if in that retesting a standard was interpreted differently than it was the first time, the equipment went through. And yet the standard didn't change, it was the same standard that was in, that it was certified too once, but now there's been a revisioning of that standard and it's, not meeting. Is that a happening, and if so are the vendors having a bit of an issue with that? Well, it's the same standard, and I was certified before but now I'm not. And I mean, I'll be frank, the disability, the paper accessibility stuff's been in the VVSG. Automatic paper handling and yet all kinds of systems have been certified as if they do that they don't. So if all of a sudden, you're coming back and considered new and somebody reinterprets that standard and you didn't have automatic paper handling before you still don't have it. You were okay before, and now you're not. Yeah.

Diane Golden -- Is that actually happening and how are you, [LAUGH] trying to figure out how you're presenting that to people.

[UNKNOWN-SPEAKER] -- Well ultimately what we need to do is a gap analysis, if we have a change in the standards we need to do an analysis as to what do we need to change. And that has made actually my current development product cycle a whole lot longer than I, thought it was going to be. Because we're dealing with a new set of standards and it's a new system. I now have to make sure that I go back and meet all the things that changed. Now one perfect example of this that frustrated everybody for a long time was the starting volume in the in the VVSG 1.0. That standard stated that the starting volume for an audio ballot was 40 DBs.

[UNKNOWN-SPEAKER] -- It was actually 20.

[UNKNOWN-SPEAKER] -- No between 40 and 50.

McDermot Coutts -- Go ahead you're talking initial volume.

McDermot Coutts -- Initial volume between 40 and 50 which many people couldn't hear. So people were coming to a certified system and pushing the up button four or five times, before they could actually hear something. Which was very frustrating and everybody says your system is broken, and we're saying well no this is the standard, we can't change that. So in 1.1, quite clearly they change this. Now unfortunately that was that big gap where there were not enough commissioners so because it was written explicitly in the standard. We couldn't change it. We knew it was wrong, It couldn't be changed. Now when we got to the 1.1 and got that through that got changed everybody was a whole lot happier with it but what we're trying to do now with the VVSG when we're talking about the principles and guidelines and then down to the test assertions. Things like it must start at 60 to 70 DB is now written as a test assertion. Which means that it does not require us to make a change. It requires the EAC to say this is the better way to do it. Now hopefully the EAC and they do go out and solicit the opinions from a number of people who know what they're talking about in a specific area and at that point they were come back with the change but that's one of the things that our new structure is really going to help. So that we're going to be able to move through certification because this takes a whole lot of time. There's the three or four months that's like perfect world which never happens. Sometimes it takes years to get through a test campaign, and a lot of money. And people say, well, we've gotta have these tests, we've gotta test the security, we've gotta test, everything to the Nth degree. Well, when we make those requirements, that costs money. There may not be no price. It has to be secure, it has to be accessible. But it does have a cost. And unfortunately we all wind up paying for it.

Brian Hancock -- One of the things that happens is really when McDermott or any manufacturer is coming in it's the interpretations of standards that have been put in place since his original system right, I think you were.

McDermot Coutts -- Yes.

Brian Hancock -- He came in 2010 and it's now 2017 and we've had a whole lot of interpretations since that time. So he just needs to make sure, mostly, that he's meets all of those new interpretations before they come back in, so that's really the key.

Matt Masterson -- [COUGH] Two ways we've tried to combat that too, McDermott alluded to one which is the new structure the standards, right? We're trying to create frankly what election officials and others have requested which is a way to create flexibility so that we can make improvements as technology improves without having to have all of us around this table for however long. And the second way is to to create common test assertions and so that's part of the VVSG 1.1 that NIST worked on. So that they're publicly vetted test assertions so the manufacturers know exactly how their systems gonna be tested and everyone else knows because it's out there in the public so that they're to limit surprises and inconsistency in testing right. So that no matter what lab they go to, when they go, that consistency exists there, right? And so that's the two approaches to try to take that on. The other part I'll add, I guess, on the timing cost which is totally fair. But one of the big costs in testing is when the system is not ready or it fails, and you have to go back and fix the failure and then put it back, and then fix the failures and put it back. What we see if you look at our timelines, is the systems that are in there longer than nine months to a year, there's failures that have to be fixed. And there's no surprises, we all know that the standards are there. They're there for you. So that's part of this too, and I'll give credit to the manufacturers. Since we started to now, they've figured that out and have gotten much, if you look at our time in testing, it's much much much shorter in part because of that, and because of the work the lab and the manufacturers have done.

[UNKNOWN-SPEAKER] -- Yeah.

Brian Hancock -- We just got through a brand new system. The Dominion system, we just certified, I think got through in eight or nine months. Is that right?

[UNKNOWN-SPEAKER] -- Yeah.

Brian Hancock -- Something like that, yeah And we've done Maryland. We just had modification for Maryland that was like three or four weeks last year. So it just depends on the complexity particularly of the modifications. It could take a few weeks, but it could take months. So there' is just a lot of factors in play on the time.

Jack Cobb -- I'd also like to state though that this campaign also had the first determination. The determination from the EAC came out right as that test campaign was going on, so they got Dean the new system. And they weren't prepared to go in and do all the hardware and all the stuff. So I mean they did a great job on their side, just supporting that determination to be able to keep working through all of it. And they got through in nine months. You were in eight or nine, the first one, which was the first Unison one. And I think this one was right around the same time and probably the cheapest one that's ever gone through a full system for sure.

Matt Masterson -- The other part of this, just quick, is all of this information's up on our website.

[UNKNOWN-SPEAKER] -- Yeah.

Matt Masterson -- You could see how long a systems in for test, the test plan, the test reports, where a system failed in testing is included in the test report. That's all up on the website. So if an election official has questions about where a system is in testing, they can literally look it up and then call us and ask what's going on here? And that was a direct response to election officials wanting to know that. But David and then Diane, unless.

[UNKNOWN-SPEAKER] -- Did you? Go ahead, go ahead.

Diane Golden -- Well, yeah, I was just gonna say, I think the issue continues to be. And we've had this discussion before. And when you talk about accessibility things, it is really not the same as humidity testing or even using a sound pressure level meter to test decibel level. Okay, yeah, although there are some nuances to that, but if I've learned anything, it's that if you don't really do this day in and day out, those standards don't make much sense. And it's like WCAG 2.0 or the ICT accessibility standards, just handing those to some computer program, computer guy, they're not gonna mean anything without the background and the experience. And that, we've talked a lot about. We've had really good accessibility standards for a long time. And it's not necessarily moving the ball forward because we look at them one way, and everybody else looks at them a different way and then is interpreting them differently. And so, somehow we got a bridge, that gap someplace on. And I'm not sure of the solution. And it's not unique to this. It's the same, you know, people think they're WCAG 2.0 compliant and they have no idea. They're not even close. So anyway, I don't know what the solution is.

Matt Masterson -- Well, there's good news on that. The good news is none of the three laboratories would turn down help in doing it better. I think all three labs recognize that they want to get better. And there may be a better way. I know Sharon did a lot of research into core competencies essentially for human factors testers. And so maybe that's something we can work to address as we look at the new standards.

Jack Cobb -- We, just recently, in the test community we're discussing with Dominion, one of the guys that I recently hired, his mother is actually an audiologist. And she came in, and she's also has a hearing problem. So she came in and we went through the standards with her to see if there were things we could suggest to you guys that could be changed. Maybe the T-coil, now everything is digital instead of analog, things of that nature to provide you all with some data. But we will take help from anybody that will offer it. We're not experts in all these different fields that you want us, that we have to be experts in. We can't be the expert audiologist. It's not, I don't, I'm not that guy.

McDermot Coutts -- And the other thing that needs to be said is that, well, we can talk about the standards for usability and accessibility. It is incumbent upon the manufacturers to design a correct system. Bringing it into certification is not the place to find out if you're usable and accessible. It needs to be and for, st least from my perspective, it is one of the critical parts of the design of a system and it starts from day one. So ultimately all the lab is trying to determine is did we do our job? And the more important thing is that usability test and accessibility test that we do upfront and then we give to them and say this is what we did. These are the tests or the people that we talked to. This is how they were tested, this is what we saw, and then this is what we changed. We saw these things and then we changed them. And then, give a delta, and just continuing on with that process. And it needs to be an iterative process through the entire development cycle. But like I was stating earlier, the VVSG is not a design document, and we need to stop designing to the VVSG. We need to design a system that meets the VVSG. And there's a difference.

Matt Masterson -- Dave.

David Wagner -- So Jack, I've got a question for you. And thank you for coming to present to us, that was great. It's very helpful. I'm wondering, you mentioned the stages of the testing you're doing. If you can give us any views into the costs, which of those represent the largest fraction of the cost? Is there a top three? Is there any kind of sense you can give us?

Jack Cobb -- I did this for, I think Commissioner Hicks when he was at the house. But there is basically like a scale. If you're gonna say it's gonna take six to nine months, the last month is gonna be test planning and doing the trusted build stuff that we showed, the post stuff. This is gonna be the stuff you're doing in the last month. All right, so let's go to the first part which was, well, I don't know where it went. The pre, that stuff right there, that takes three months. So okay, we've got the first three months of doing that. Then, we have this gap to where we get to the report. That gap in between there is where you do, there, Functional Testing, Compliant, no. That's not it. Where'd it go? There, yeah. So, this is the actual testing. This is the three months of testing. So when I tell people, when I quote manufacturers I usually tell them it's gonna take, if you're a new system, it's gonna take us four to six months. And it's gonna cost you roughly $300,000, 250 to 300, depending on how much hardware you have, cuz hardware could be 80,000 by itself and I can't control that. So, that's what it should take you. Well, what we find out all the time is the amount of QA is directly related to how much they have to spend with us and how long it takes. Like it took six to nine months, like I said Dominion took nine months. But they had it, they were the first to get the term in your new system. And they were not thinking they were gonna have to go through I think six or seven components had to go through hardware testing. It took a month and a half just to do that. So it really, this place at the priest stuff is about three months unless you're automated and then you can shave some time off of it. Then you have what's considered dysfunctional testing which is about three months and then you have just this post stuff that takes a month. Right now a test plan, the EEC has 20 business days to review our test plans and test reports, that 20 business days is a month. And they're usually early, but even if they're early five days, that was still three weeks. And then we get to revise it and submit it back. And then they get ten business days and they almost never take that long, but that's still two more weeks. So you're looking at six weeks if everything went really, really good in the test report that it could take that long. And if there's anything major in there that we haven't included, it could take a lot longer than that if you have to go three and four and five revisions. We try to shoot for two and usually get three, if we're lucky with the last one is being moving highlights. Is than answer your question or I talk all around and not answer your question?

David Wagner -- [LAUGH] That helped, I was still curious about if you had any more breakdown about there's, you said the actual testing there's a bunch of different categories and there.

Jack Cobb -- I created something a while back that I'll definitely submit to Matt. So you guys can actually look at it on a timeline and what actually takes place and how much those [INAUDIBLE] only cost to, I'll get that for you.

Matt Masterson -- It's a great question and it's one that we struggle with and try to find ways to save time and still maintain the rigor, right? So as we look particularly at some of what Ben presented today, as well as some of the code review, are we getting the value for the time and money, right? Are we getting that? And then not to throw the same question at you over and over again, but if the system's auditable, is it necessary or can we shave that off, right? Which is a fair question, because we don't want it to take a long time or cost a lot. We wanted to do what the states and locals needed to do. And so to your question or I think comment before, not everything can fall to figure out after the election. Because that's like flying on a plane to San Francisco, landing and then saying, I'll do the inspection now or we'll do the crash analysis. It didn't work.

[UNKNOWN-SPEAKER] -- [LAUGH]

Matt Masterson -- The election officials wanna know that it works, right? So we have to do some testing but what's appropriate? And now is the time for us to weigh in on that really figure that out because we're rewriting this thing. And I think there are a lot of official, I mean one of the things Jack's pushed for a long time. And we've incorporated, I think well but could do a lot more of is a lot more automated testing. Automated code review, all of that because we can find value in that.

Jack Cobb -- Well yeah, it actually benefits the manufacturer exponentially if they would move to an automated. We just submitted to a manufacturer two different quotes. They're like we have some time before we're coming in. We're gonna give one it manual, we want you to tell us how much that's gonna be and we want one at automated. So that they can go back to their boss and justify one of them was $750,000, the other one was 280. So you're talking in 400 and some change just in the difference in automated code review versus the manual code review.

McDermot Coutts -- When we first started the source code review was probably the single most expensive thing we did. Primarily because we just have to keep coming back around do it. Just again, if you find an issue, and so you have to go back and make a change or it's something is reinterpreted well then it's gotta be resource code reviewed.

[UNKNOWN-SPEAKER] -- And again.

McDermot Coutts -- And so that I mean we were spending $50-60K on source code review, now it's $80K and we're done. So that's one of the greatest time and money saving things that we've done so far.

Matt Masterson -- Yeah, and we've talked about this and I know Brian Hancock's done a ton of work on this, but vendor certification of tests. He said, the way to deal with some of your concerns about expertise in building in accessibility usability from the get go. Is is there a way for the vendor to certify that they used experts in the development of the system to the point and testing ongoing throughout. Instead of us testing after the fact where he may have to go back and redesign, and maybe an answer may not, but it's worth. Now's the time to look at that and say, there are areas that we can do that. Is there some vendor certification that we can have done for certain areas and it's something Brian's looked at extensively.

Jack Cobb -- And one of the areas that I have really been trying to push and I don't think I'm getting very much traction on it. But we have to use an accredited third party lab to do the hardware testing. The manufacturer goes and goes pre-testing at a lab of his choice, we can't use the same one. Why are they going to do the testing and then we're gonna go right behind them and do the exact same testing and they just paid for it twice. Except this time, I'm gonna be there overseeing it, charging them to be on the ground to oversee it when somebody else is conducting the test. You have EMC, EMI guys, they're running the test. I'm sticking in a ballot five times [COUGH] for the pre, and then when they're done with whatever they do I stick in a ballot five times for the post. But I had to be there for the whole test cuz I have to oversee it, I have to be responsible for it.

Brian Hancock -- To be fair there are significant numbers of times we've ran into systems passing the manufacturer's hardware testing and then tragically failing our testing.

[UNKNOWN-SPEAKER] -- [LAUGH]

[UNKNOWN-SPEAKER] -- And I agree with you.

[UNKNOWN-SPEAKER] -- Well and let's not forget that Jack is an absolute expert at feeding those ballots.

[UNKNOWN-SPEAKER] -- Yeah.

[UNKNOWN-SPEAKER] -- Dianne?

Diane Golden -- Yeah, and this is just circling around. I mean we've had this discussion so many times before, and it would be great if we had a solution for an accessibility testing lab kind of thing. We just don't, and we need it for web access and all sorts of other things. I mean people had been crying for it for years, and just for all kinds of reasons. We don't have anybody stepping up to the plate, and apparently there's not enough business demand on the back end to really force a commercial. But the best we have are some groups that do web accessibility stuff. And they do that for a fee, and they're pretty commonly used and well respected. I just don't have any idea if they would be interested willing to get into-

McDermot Coutts -- Well we hired a group who came in and ran our accessibility test for us and provided a report.

[UNKNOWN-SPEAKER] -- [INAUDIBLE]

[UNKNOWN-SPEAKER] -- Yeah, and I mean, I'm not you, but I was impressed.

Diane Golden -- Yeah, part of the problem from my perspective is, and it's again web accessibility and is an easy use. What most folks have done is there are companies that look at it, and then what some of the federal agencies have is what they call, trusted testers. And there's a whole group of really good jaws users and really good this and that and this, and they kind of go through a protocol. Anyway, the hitch is that whole statement about trying to do accessibility testing from a usability perspective. Is that people with disabilities are so stinking diverse, that I don't care how many of them you gather up. You still don't get the full range and depending on I mean, there are lots of pitfalls. My friend Debbie Cooke in Washington just had a brilliant statement about gathering up a bunch of low vision people to do usability tests, gives you information about those low vision people and not much else. It's just really hard to extrapolate from any sampling, so that you get into more looking at standards and anyway it's complicated. It's not simple and so we've not come up with solutions, and now.

[UNKNOWN-SPEAKER] -- We need to do more thinking about it somehow.

Jack Cobb -- Well, some of the, and I realize that people tend to shy away from this, but there is no substitute for field testing. That is where it really happens and that's where we get a lot of our best feedback, but we're also trying to look at it and say, well, how many data points are we dealing with? Because as you state, everybody's got their own. I just saw great diagram that Whitney was drawing about a bell curve and trying to just meant, to keep that get that part at the end that we're trying to make that smaller where people have are assisted and trying to just make it possible for them to have assisted voting and make it make it, so that we can serve as many people as we can.

Matt Masterson -- It seems to me and I know you're gonna go into the testing group work, but it seems to me one of the things the testing group would be ideal to look at is have Jack and the other lab submit information about what testing takes the longest and why including by requirement and then allowing the testing group to dig into why it takes that long, but then are any of these areas ripe for either self-certification or automated testing. My guess is there's gonna be yes, in both areas as we look at this and then that's seems like a good area for the testing group to really look at and dig into as you explore your options. So, that's a segue into your next presentation.

### 4:00 – 4:30 PM: Testing Working Group Next Steps – McDermot Coutts

McDermot Coutts -- Yes, and for which I apologize going back to back up for everybody. [LAUGH] Any more questions? I'll be here all week.

Matt Masterson -- So thank you, Geoff. The testing group is finally, actually getting underway. Mark Skall is the NIST representative and he's done a great job so far and what we are trying to do initially is we're putting together a gap analysis on the rest of the VVSG. We're trying to solicit from the labs, from the manufacturers and anybody who's got other input as to where do we have challenges with the current VVSG and what we're gonna do is compile that into a document. Discuss it as part of the group and then bring it to the appropriate working groups to say, here we've seen a problem. The sound is 70 dBs, do we need to change that? Basically, we wanna make sure that we are not moving any requirements. That are not quite working in the current VVSG into the new one even if we look at it and we say, yes, that's actually the way it should be. That's fine, we at least want to know that we looked at it and we discussed it. Ultimately, we don't want to do a copy and paste of requirements from 1.1 to 2.0. So, that's going to be the first order of business. Now we just had another assignment from Mr. Masterson, which I'm very grateful for and then-

[UNKNOWN-SPEAKER] -- You can take it or leave it.

McDermot Coutts -- Yeah, [LAUGH] no, it develop I'll discussed it with Mr. Skall. And then ultimately, what we're going to be doing is as the requirements start coming in, as you start writing actual requirements will be looking at it from the concept of test assertions. Basically, how do you test this? Because we have to come up with a test that says, do we pass? Yes or no? Because we can't say, it needs to be accessible. Well, what does that mean? How do we test that? How do we say, it is accessible or it's not? Or do we have to determine that that one is more subjective and then we need to fall back to usability studies as part of the development process which I quite like, because it really forces the accessibility to be integrated into the full system. So as the groups come up with requirements, please let us know. We will get a representative to come and talk to your meetings and start asking the questions as to how are you going to test this? How much is it going to cost to test it? Is this where we want to spend our time, effort and money? And there is a cost, so we need to think about what is most important. What are we trying to test? What are we trying to accomplish with the requirement? So ultimately, that's what the group is going to be trying to achieve as things start getting written. So first, the gap analysis and I realize that the usability group has done a lot of that, but we have some other things that we've looked at that we'd like to bring to your attention. I will discuss directly with the chairs that and then you can bring it into your meetings as an agenda item. Or not, if you as the case maybe. Correct.

Greg Riddlemoser -- It's said that you really don't wanna cut and paste from previous versions into the next one and I appreciate that, but are you going through to the point of looking at everything and realizing that a lot of stuff has changed since the 70s and 80s in the computer business, etc., etc. And specifically, does a piece of hardware really need to be able to withstand a taser on twenty different hard points and I'm being hyperbolic on purpose and perhaps that we are no longer voting in Bob's barn in Metairie, Louisiana. So some of our temperature and humidity things are probably off the charts as well. So those are hyperbolic by example, but the idea being is that are we really testing stuff that needs to be testing without asking ourselves why do we still test that? We've always tested that but are we still testing that?

McDermot Coutts -- Yes and we are absolutely going to be bringing that up. We're gonna look at everything and we're gonna be bringing up questions like that. One near and dear to my heart is again, source code, the headers. For right now or they used to be that we had to put a full sequence, which in the header which is basically a copy of every line in the method up in the header. So that you can have in the documentation, this is what each method did. Well, with IDEs these days and Java doc, you can generate a great document and you can right-click on a method and say, okay, well, where does this go? What does it do? It's all right there and what are you trying to accomplish with the code review or with the source code comment? You are trying to make sure that the system is maintainable. Well, and maintainable by whom? I am hoping that it would be maintainable by software engineers and that's our audience, and that's what we're trying to achieve. So how much do we need to do there or can we rely on the IDE tools, assuming that people are going to be using those to view it. So, that's one of the issues. The hardware testing. Some of that hardware testing is black magic to me. I don't get it and I don't understand why if I just move this cable three inches to the left suddenly everything's fine, but there are some people who are a whole lot smarter than I am who are going to be looking at that and saying, is this required in it, cuz the voting systems don't have to be waterproof. In some cases, we might wish they were, but they don't have to be. So, do we need to test to that? So-

[UNKNOWN-SPEAKER] -- Time.

Diane Golden -- So, I'm just trying to clarify. So you're going to go through the existing VVSG, the old And identify particular standards that have been a challenge to interpret accurately or don't have metrics or require a lot of subjective rater, person rating.

[UNKNOWN-SPEAKER] -- Right.

[UNKNOWN-SPEAKER] -- Expertise, is that right?

[UNKNOWN-SPEAKER] -- More opinion.

[UNKNOWN-SPEAKER] -- Yes.

Diane Golden -- Thank you. Okay, so and send those back then to the working groups, the appropriate working group to try to dig through.

[UNKNOWN-SPEAKER] -- Right.

[UNKNOWN-SPEAKER] -- Okay.

McDermot Coutts -- And in some cases trying to figure out where a test is. Does it still need to be done? There was at one point in the VVSG, and I can't even remember which version now, there was a requirement about the refresh rate on the screens. Well it wasn't, it was hard to test. You needed an expert.

Diane Golden -- And I think that's where I was going for those that are, you can't get to a metric and so it is a bit of a rater [LAUGH], person rating. That sounds so bad. Reliability and expertise issue. So that there could be something then back in the appropriate working group about how to address that as the idea.

McDermot Coutts -- Right, and in some cases, if we're dealing with hardware, a lot of these are COTS components and they have gone through testing and they have documentation that says this is the way we do things, that's the way it works. So do we need to take that? Or do we, is there is a specific reason why we need to test it ourselves? And if there's a valid reason, by all means, let's take it.

[UNKNOWN-SPEAKER] -- Which is a probably a question for the EAC.

Diane Golden -- So if you ever, and I don't know if it's even possible, I don't know how many testing labs there were, are. I mean, have you ever looked at inter-rater reliability between and consistency between. It's the same standard. And who's applying the test assertion and making the decision, and is it consistent or is it not?

Brian Hancock -- Yeah, we've talked a number of times about instituting some proficiency testing amongst the lab. I mean that's part of 17025, which is the ISO standard for laboratories. And it's something we've been looking into. it's just really a matter of resources, getting that done. It's sort of a little bit lower priority but we have looked at it, yeah.

Matt Masterson -- Also why the publicly available test assertions are important, right, to eliminate some of that inconsistency, both within lab and across lab.

Matt Masterson -- Other questions for McDermott?

Matt Masterson -- Suggestions?

Diane Golden -- You know what'd be really helpful, I mean from our perspective. I don't know about the others cuz I don't spend a lot of my time in the other areas. But we've got a lot of standards that I mean clearly, people have been interpreting differently for a long time. And they're ones without real clear metrics and they tend to be very subjective. And it really depends on your perspective about how you're interpreting what that means. So it would be really helpful if that would be confirmed from the test labs in your perspective. So that those could be priorities for us to go back and look at. And try to figure out if there's a way to make it clearer so that it's interpreted more consistently or whatever it takes.

McDermot Coutts -- And the accessibility test assertions are currently published, so they are available.

Matt Masterson -- Yeah, the other thing I'd add is that, so you keep using the source code example, so I'll use that, too. 1.1 made significant improvements in that area in part because of the feedback we received on that. It's not perfect but it made improvements. The other is, and I understand your point about the maintainability of the code and sort of what the requirements make you do versus not. I think some of the, at least the election officials that have lost their vendor out of the marketplace, wish that the code would have been better documented. If for no other reason than they don't have anywhere to turn now. There's no one that can, unless they can find the people that made the system. They're kind of stuck and so one of the conversations, all that to say as we talk about this. One of the clearest, and this is almost impossible to test, particularly by us, but one of the clearest things that we should at least have in the back of our mind and certainly RFPS should keep in mind, is the life cycle of the voting system and the maintainability. Because if there's one lesson we've all learned, it's that you think that vendor is always gonna be there, and that vendor is not always gonna be there, right? And you hope they will, but that's a real consideration for election officials. That's a real thing particularly if we're talking about going to modular or component based systems. The maker of that component could be there one day and gone the next. And you've got that and the election official in that environment is much more of an integrator and maintainer than they ever were before. Ever. And that's a reality. David.

McDermot Coutts -- And the best, and good commenting is, again, this is best practices for us as well and for the manufacturers because, just like the vendor may not always be around, my developers are not always going to be around. There's turn over there and somebody has to be able to come in and take over for what some person doing, need to have cross training on the developers so that they can all work on all aspects of the system. So from my perspective, a solid commenting standard is paramount. It's got to be there. But what I'm trying to do is make it so that I am not wasting some very expensive time on developers to put in comments that are not useful. But they need, but if we can put a standard of useful comments then that's required, we must have it.

[UNKNOWN-SPEAKER] -- David?

David Wagner -- Dave Wagner, I think I'm just supporting what you're saying. I don't have specific experience in the election world but from other elsewhere in the software world, I would speculate or imagine that a more effective way to ensure maintainability and deal with concern about the vendor disappearing would be interoperability in data import and export. As opposed to trying to enforce maintainability through source code review by a test lab. I would worry that that would be very expensive and very subjective and that it would be very difficult to take a code base of this kind of size from an entirely different organization, pick it up, and start maintain it. At least outside the voting world, that's what I would expect. That just seems like a real challenge. And so if you have interoperability, if you have data export and import, then you have a basis to stand to work with some existing system.

[UNKNOWN-SPEAKER] -- It's a great point.

[UNKNOWN-SPEAKER] -- Yes.

McDermot Coutts -- And there was a time early on that we started getting into this sort of circular reference where we needed to update comments in a method but then we hadn't changed the history of the method to say that we added comments. And so then I added the comments, and then it just became very circular and not very useful [LAUGH].

Bob Giles -- Concerning COTS, and this is something that we're starting to see. It's relatively new. You get your product certified and then the new version, the tablet A.1 comes out. You were certified to A. So I guess the concern as a state, now they come in and say, well now we want to set up the A.1 tablet. And maybe this is somewhat to Brian, too. Does that require or you guys going to be looking for an end to end like plug it in the system, or are you going to be able to just say, okay the tablet is this component or this module of the bigger system. And I guess we're going to be looking to you guys because they're going to obviously sell two years later it's not on the marketplace any more but the county now wants to buy 100 more of them.

Brian Hancock -- Yeah, thanks Bob. The manufacturers actually come a real long way right now, McDermott knows generally speaking or someone at Unison knows when you're Cox products are gonna go end of life. You have that type of relationship with your Cox vendors, right. And usually they have a plan the cots vendors have a plan, right. If it's a a Dell laptop, they have a plan for that next iteration. Form, fit, and function is going to be generally the same and so that's usually at the minimalist change. I mean not always but usually it's something we can get in and out of that literally one day, just send notification that you're changing. Changing parts and labs do a very quick engineering analysis and get it to us and that's it. So for things like that it's pretty simple, generally.

McDermot Coutts -- Right, because we're not going to send anything out that we haven't loaded the software on and tested ourselves as part of our own quality assurance. And so that actually might be an opportunity for some self certification as well.

Matt Masterson -- Yeah, you're not. I believe you. You're not gonna send it out. The question is, and this is where the state's feedback to the testing group would be good, as more and more states and localities are looking to use COTS-based systems, right? Only COTS, COTS has always been a part of voting systems, but integrated into the larger system. We need to know from this group you're, the folks you review. What level of review you expect cuz my guess is you probably want it all locked down and other states say hey if it's COTS, it's already been tested. We feel pretty good about this. Let's just test the software on there. And so, someone needs to be exploring and this is something we've been dealing with forever, sort of what the expectation is because COTS based systems are gonna become more and more our reality. Right, and so we need to have a game plan looking at the new standards and how that's approached.

Bob Giles -- And I think that's part of where I'm coming from with that is whether you do the environmental testing or you accept what comes with the manufacturers environmental testing as an example. So those kind of things to say well now you have a new laptop or tablet whatever it may be. I may want to fully tested because if you want to plug that into my system. I'm not going to be the guy who says I accepted that without testing so I think as we move forward with the VVSG, I think we need to be clear on where cots falls into that. And how you're gonna test that and what's gonna be tested on a cots product.

Mary Brady -- I think we might wanna also go back and revisit the a EAC goals whitepaper because I seem to recall that there might have been a couple of items there that might have some bearing on where the testing groups to go. One in particular that I know we talked about for quite some time and I don't remember how it's encapsulated from a [INAUDIBLE] perspective, is the potential use of mandatory and optional features and what that would mean from a testing perspective. Another with respect to cost would be the software updates.

Matt Masterson -- And luckily Brian and Ryan will be reviewing those goals tomorrow.

[UNKNOWN-SPEAKER] -- Yes.

[UNKNOWN-SPEAKER] -- Which gets us to tomorrow. You've segued us right in there.

[UNKNOWN-SPEAKER] -- That's my job.

Matt Masterson -- Thank you. McDermott.

McDermot Coutts -- Well thank you.

### 4:30 – 5:00 PM: Wrap-up and Overview of Day #2

Matt Masterson -- Do you want to see if tomorrow or do you want me to? Okay. I mean you all, yeah. You all have an agenda so you see tomorrow we're going to talk about scoping with the very real goal of having that defined scope and we walk out of here. As Bob said we're not letting you leave the room till there's a mutual understanding about that. I actually think that discussion will go well and I think we'll get there given sort of how it's been teed up. Brian and Ryan have done a great job forcing us to think functionally instead of system specific. Which I think changes the scoping to discussion in a very positive way and so it's, I don't know I found it interesting and a good way of looking at it and I think you all will too. And then we're going to hear from Josh from NIST and from DHS on cybersecurity framework and critical infrastructure which I'll be very very interested to hear tomorrow please come with your questions. The A-C has a variety of questions already up on our website regarding critical infrastructure that we've been trying to work with the H-S to get answers to. So feel free to ask Geoff those questions. He'll be ready and we'll have that discussion tomorrow and then follow on with whatever follow up discussions we need to have to tee up each one of the working groups to move forward, over the next few months. I will say and I hope you all feel this way, there's been a ton of work done, over the last few months since last meeting. We have really good principles and guidelines in draft form, that are available within the public working groups, but also on the TGCD page to move forward with. So I'd like where we're at, we'll talk timeline tomorrow. If we're driving a hard time line people want this we need to get it done and so we'll talk about that urgency tomorrow as well. So thank you, thank you for an engaging day for tackling the tough issues as I said before. I believe very sincerely that we have the right mix of people here to tackle some of the issues that have lingered for a number of years, solve those issues, and move this industry, move this area profession forward. As far as the technology, we're there, we can get this done. And that's what we're going to do. So with that, we'll go do dinner or drinks or both likely and thank you all for your time, appreciate it.

## TGDC Day 2: February 14, 2017

### 8:30 – 8:45 PM: Day #2 Opening Remarks

Matt Masterson -- Good morning all reconvene the meeting of the technical guidelines development committee. Thank you all for coming back. That's a good sign. Today we're going to focus first on finalizing the scope and Brian Hancock and Ryan Mesias from the Election Assistance Commission are here to walk through the proposed scope and thoughts on it. This is something that we brought up at the last meeting to discuss. And I think and hope that as we walk through this, it'll make sense to you all. And we'll get that finalized and be able to move forward on the scope. Then we'll hear from Josh Franklin from NIST on Cybersecurity Framework and the Center for Excellence, I'm just gonna call it the Center for Excellence. The rest of it I'm not sure what it stands for. And then DHS and this will be DHS coming in to talk about the services and also the status and information regarding the critical infrastructure designation. So I encourage everyone if you have questions I know there are many questions out in the elections community about this designation to be prepared to ask it. This is the first opportunity to ask these questions and Geoff Hale from DHS will be here to do that. So with that I'll turn it over to Brian Hancock and Ryan Mesias to begin the scoping discussion. We have lots of time budgeted here, we don't have to use it all. If we just wanna go ahead and feel comfortable with the scope, that would be great. So, we'll figure that out.

### 8:45 – 9:45 AM: Scoping the VVSG – Brian Hancock, Ryan Macias

#### Brian Hancock

Brian Hancock -- Thank you commissioner. TGDC members good morning. We're sort of tag teaming this discussion this morning. I'm gonna do the easy part. I'm gonna talk about the background previously scoped items and kind of why we've taken the path that Ryan is gonna describe shortly. And then he's going to do the hard part. Let's see if this works from here, perfect. So, just a little bit of background on purpose so why are we gonna spend most of this morning focusing on scope? Well I think we've all talked about this in the past and those of us at EAC certainly have agreed that we need to have a much tighter scope this time that has not necessarily been the case for past VVSG efforts. And we need to be able to very clearly outline the objectives of this project and the goals that need to be met for us to say, hey, this is a good job, we did a good job this time. And so what do we think the basis of our VVSG 2.0 scope discussion is going to be? And we've looked at all of the items listed here. The EAC future working group topics, then NASAD recommendations, the project charter for VVSG 2.0, previously scoped items from the last TGDC meeting. And then finally the hard part is determining the core functions of a voting system and that's what we will get into later. So we've gone over these before, but I'm just gonna highlight a few items from the EAC future VVSG working group that really convened and producd this document in 2015. So number one, the very first item on that list and by the way several people around this table were part of that group, so you probably remember a little bit of that effort right there. So the very first item that we listed is that the purpose and scope of the VVSG must be defined and confirmed, right? And that's what we're going to be about this morning. Number six, some of the things we talked about yesterday with with John Whack the VVSG should accommodate the interoperability of election systems. And again as you'll see later number ten, the VVSG requirement should be performance based and technology neutral to the extent that we can make them such. And I think really important for everybody and this has been kind of a subtext of what we've been talking about really not only this meeting, but the last several TGDC meetings. And that is that the VVSG 2.0 should allow the maximum flexibility to incorporate new and revised requirements including, where appropriate, those from other standard setting bodies. And I think we're headed down that road, so I think that's good. Just as a reminder in December 2014, NASED sent a letter to the EAC that talked a little bit about some of these things, right? So they asked commission to approve version 1.1 of the VVSG which they promptly did. But then they said, after that the EAC should implement a more deliberate process to modernize the standards and certification process for the long term. And they talk about reimagining the VVSG and that's kind of where we are right now. And finally, it has to be clear that voting equipment approved under any set of VVSG is suitable for use in elections, all right? And so that letter was also very high in our consideration of all of this. And this own group's project charter which which we've gone over a number of times, but certainly several of the bullet points speak directly to this. Second bullet point in particular that talks about specific objective being to enable, not obstruct or impede innovation, the needed response to changing statutes rules, jurisdictional and voters' needs, right? That's been foremost in our minds and I think as you see Ryan's presentation, you'll see that plays right into that particular point right there. Again, we talk about to facilitate the interoperability of elections systems. I mean, again all the groups at least prior to this and including this group think, or at least thought at that time, that that was a very important aspect of everything that we're doing. So let's talk about the items that were previously scoped. And these items were taken directly from the last or one of the two last slide that came up at the September 2016 TGDC meeting. As you see the first bullet point talked about research on general security, U&A recommendations for a ballot delivery and ballot marking, including online but not returned. So it was very clear that at that point the TGDC was not talking about necessarily return being in scope, right? And then the second bullet point, VR and EPBs outside of ballot activation and we'll talk about that a little bit, are also out of scope very clearly with VVSG 2.0. And there was a note in this and the EAC would continue to work with the stakeholders on the security and human factors concerns around those issues. But up to this point the group has decided that those limited items at least would be out of scope for the current discussion. And so where are we? Right now we are at the point where in order to determine the full scope of this project we really need to take a very close and very hard look at what are the core functions of a voting system. And that is where Mr. Masias will come in, Ryan?

#### Ryan Macias

Ryan Macias -- All right good morning everybody. As we're waiting for the slides to get up. All right, so first and foremost is HAVA, has a definition of a voting system. So that is where we have to start with the scoping discussion. Section 301 (b)(1) defines voting system as the total combination, and I wanna highlight that and we'll get to that a little bit later, of mechanical, electromechanical, or electronic equipment (including the software, firmware and documentation required to program, control and support the equipment) that is used to define ballots. To cast and count votes. To report or display election results. And to maintain and produce any audit trail information. So keep that in mind as we are going through this entire discussion that this is the scope that HAVA lays out for us, under the definition of a voting system. So this background is a little different background than what Brian just gave, this is a background of how we got to the discussion around a functional based requirements. First there was the 2007 TGDC recommended guidelines, which never got adopted, but they took a different structure. They looked at classification structure of voting systems and broke things down a little bit differently. And so we took a look at that. Then participation in the working groups, showed a focus on process and inputs and outputs, within those processes, and a lot of that was done by the pre-election, election and post election working groups in their process model that was created. We've all seen that big beautiful chart of how things flow from start to finish within an election. And so we took a look at that. How does that flow start and how does that flow end? That segued into specific working groups, under the interoperability one that John mentioned yesterday which was the election process working group. And seeing the interactions of different portions of the election system, and how that could be tied into this functional model. And then last we looked at the VVSG 2.0 project charter that you guys developed, and specifically the objectives, and how can we meet those objectives through a functional based set of requirements? Based on that, a list of 30 questions were sent out to you guys and that list of 30 questions was really a set of methods and modes for fulfilling functions. Those were methods and modes that are currently within scope, that are currently within voting systems, they weren't necessarily the functions, they were to facilitate this discussion. And we'll get to those 30 questions in a moment. And how that ties down to the list of functions that at least we have had discussions with or from the responses, look to be the core set of functions. And so that was a feedback that we got from you guys. Now the methods and modes again were to get to that low level and led to that million dollar question. So what are those core functions, and that's what we're gonna go through now. So I can see this print is pretty tiny but what this is, is the top level. The diamonds is going to be the questions that you guys received and then tying it down to what may be the core set of functions. So the first one was data exported from GIS, VRDB, candidate filing systems, etc. This is just the data, it's not the actual VRDBs, it is not the GIS systems, it is not the candidate filing systems. Again, pursuant to the definition of Hava, that is not a voting system. But the data is going to be coming into your system, into a voting system. So, should the imports be within scope?. And then the second question was should the manual input of that information be in scope? Currently it is, and that doesn't mean that we certify the person that is doing the manual input, but is what is being entered actually being received on the other end. And so those two things filter down into what we came down to as the core function of to have the capability to input data necessary for constructing a ballot. Moving to the next one is combining or merging that data to create ballot styles. In discussion it was more than just merging, it's creating the association. And so the core functionality came down to having the capability to associate the data necessary for constructing that ballot. The next step is laying out the ballot. You have to have the look and feel of a ballot and not just in PDF, but the actual ballot definition files. How is that gonna be laid out and how is that going to be transported, transmitted to alternative devices? And so, the core functionality there is to have the capability to lay the data necessary for constructing a ballot. And the last step, in this portion of ballot construction and development, is generating the ballots. And you generate those ballots again in multiple formats. You can generate that ballot in a PDF. You can generate that ballot in an election definition file that's gonna carry through to other devices or components within the system. And so it's making sure that that ballot generation is being done correctly. So that would be, start to finish, of the constructing of ballots. The next part is the display of those ballots. Again, to be able to display that ballot, you have to be able to transfer that ballot data to what its gonna be displayed on. If that is in a paper format, you have to be able to export that PDF, you have to be able to export that piece of what is going to end up being generated into a piece of paper. If you are going to bring it up electronically or in audio, you have to have the election definition data that is going to transfer to the device that will bring that display up. And then you have to be able to transfer that data within the device. And so again that merges down into having the capability to transfer ballots. And again, this is ballots is being used generically for electronic and non-electronic. You have to be able to retrieve a ballot, currently we call that ballot activation in most cases. But there's multiple formats of retrieving a ballot. It could be retrieved through a ballot on demand system, it could be retrieved through a digital format within a device, such as an EBM or DRE, where you activate the ballot and bring it forward. Or in an analog, in a manual process, a person has to be able to grab that ballot and retrieve that ballot. Again, that's not a system. So that wouldn't be within scope of certification. But it's within scope of the election process. The next, again, these are two modes of presenting ballots that are currently used in all systems. So the question was, should the presentation of a ballot, visually, be in scope and audibly in scope? Those are just methods and modes that then carry down to have the capability to present a ballot. So again, there's multiple ways to present that ballot but in the election process you have to be able to present that ballot to a voter. Creation of vote selections or cast vote records. After the ballot has been presented from the last slide, there has to be a method to capture the vote selections on the ballot. Some are done through a touch screen, some are done through a system, some are done through a manual process of hand marking a ballot. And so but you have to have the capability to capture those vote selections on the ballot. After those have been captured on a ballot, there are different methods and modes, again, of extracting the data that was captured on the ballot. So you can interpret the vote selections from a scanned ballot, currently ,or you can interpret the vote selections from an electronic ballot, and you can interpret it manually. When you do a hand tally, there is a canvassing board, or a tabulation board, who is going to look at the marks and interpret what those marks actually mean. So you have to have the capability to interpret the vote selections. After they've been interpreted, you have to extract them, and again this isn't necessarily left to right. There are systems that use the extraction method to then interpret and then re-extract. So some of these we will see are done multiple times within a system. But you have to be able to extract those vote selections from the scanned ballot, you have to extract the vote selections from an electronic ballot to memory and you have to extract it to paper in the case of an EBM. And again, in a canvassing board, there's a way to extract that sometimes through a set of processes that is merged into the next step. But after looking at the ballot, and saying, I interpret this mark as a vote for this candidate or the handwriting of this candidates name to be this candidate, you have to extract that into a tally sheet. So you have to have the capability to extract the vote selections, and then that gets into the next step which is presenting votes selections visually on screen, presenting votes selections visually on paper, presenting vote selections audibly, it's the presentation of those votes. This is our second chance. This is our review screen. This is, again, in the case of a manual tally, on a tally sheet. However it may be you have to be able to present what those vote selections were, both to a voter and to the elections official. So but the core function there is the capability to present those vote selections. And into the tally process. You have to transfer votes selections to internal memory. You have to transfer votes selections to external memory. You have to transfer vote selections to paper. You have to transfer votes selections across the network, you don't have to, excuse me, the capability is there currently to do all of these methods and modes of transferring votes selections. But by some means you have to be able to get that vote selection somewhere else. Again, manual tally onto a tally sheet. So you have to have the capability to transfer those votes elections. Storing those votes elections, again, we have storage requirements, 22 month requirements, we have storage within memory, within the system. After that's been transferred from for instance a DRE or an EBM on paper and then optical scan within the memory of itself. Typically, that is then stored at a final process in the EMS. So having the capability to store those votes selections Is a function of the election process. Retrieving those votes selections from memory. As we know, tally scanning of paper ballots and early voting electronically takes place many times before the close of polls. And so, at some point, what we typically think of as the close of polls, those vote selections that have been stored and maintained, have to actually be retrieved to go through the tally process. And so you have to have the capability of retrieving those vote selections as we know. Gloria, I'm gonna look at you. In vote by mail states, a lot of those paper ballots get mailed in ahead of time. You have to be able to retrieve those ballots for tally if you're gonna do a manual tally. Those are gonna go into a paper ballot box at the polling place that have to be transferred and then brought out of the ballot box. So you have to be able to retrieve those. And then you have tabulating the vote selections. You have to have the capability to tabulate all of those votes selections based on a set of processes. As some of them we talked about yesterday, different voting variations and the like. The algorithms are going to do that, but you have to be able to have a method of actually creating an output which is the tabulated results. Then you have to transfer those tabulated results. You can transfer them, again, on a tally sheet on a piece of paper. You can take those to hang outside the polling places. You can transfer the tabulated results electronically. You have to transfer them to a USB, you can transfer them via network, transfer them to the final system that is going to present those final reports that are required by that last step defined in HAVA. So you have to have the capability of transferring those tabulated results. And then the last thing is to present those tabulated results. You can present them on a piece of paper. As we know DREs, optical scans, devices that create tabulation in and of themselves. Create a paper tape, many times posted at the polls, there are paper reports that are printed out of the EMS, rarely now but there are, to be given out to media and the like. And then there are tabulated results that are posted electronically. So that can be on screen within the EMS. That could be exported to go to an election that reporting system or to another system in specific formats for the media and the likes. But those have to be able to be transferred outside of the system. And that would be the last step as prescribed by HAVA. It starts with the ballot generation, all the way through the presentation of the vote selections. And so what we see out of those 30 questions. Was a set of 17 core functions. Inputting data for ballot construct. Associating data for ballot construct, ballot layout, ballot generation, ballot transfer, ballot retrieval, ballot presentation. Capturing vote selections, interpreting vote selections, extracting vote selections, the presentation of those vote selections. The transferring of votes selections, the storing of votes elections, then the retrieval of those votes elections. The tabulation of those votes selections. Creating a set of results and then the ability to transfer those results and present those results. So I'm gonna stop there right now and go ahead and open it up for questions. I see people writing a lot of notes and so with these 17 core functions listed are these the correct functions? We'll get into whether how they're validated or what we assume them to be validated. But I wanna go ahead and open this back up for questions at this point.

Brian Hancock -- Ryan will have some examples.

[UNKNOWN-SPEAKER] -- Yeah.

Ryan Macias -- Some of the next slides will show examples in current systems that we know of the 17 core functions so that's coming up.

Matt Masterson -- And yeah so in that light, if we start getting to things that are going to be answered within the questions I might just refer to I mean to example is that I might just refer to the examples but I'll go ahead and open it up. And the examples include some of the fringe cases that we've talked about scoping and pulling them into a functional discussion, rather than a system specific discussion to help set the scope so.

Greg Riddlemoser -- Matt, did you guys map those back to NASED's major muscle movements, the big priorities?

Ryan Macias -- We're gonna be getting to that down the line. So right now really the question is just around the set of functions if there's any questions with these functions. But yeah we'll be tying that and associating it with all the objectives of NASED. And NASED said in the previous slide that's kind of were our starting point was. But more importantly is we're gonna tie them to your guys' as objectives that were in the project charter.

Matt Masterson -- So are there missing selections questions around the functions that you see here, the 17? Just for what it's worth, the amount of work and effort you all in the public working groups put into the process modeling, here's the payoff, right? We were able to boil it down to 17 core functions using that information. And so we anchored ourselves in functionality and that was kind of the goal here. And I think we've boiled the ocean a little bit to get to where we are. So the question is, did we miss anything, is there more to say? So Diane.

Diane Golden -- No, I'm just trying to get clear in my head the connection between the scope and the standard. So is the concept that if this is in scope then the standards would cover this for all systems regardless.

Ryan Macias -- Yes so again going back to the definition of HAVA.

[UNKNOWN-SPEAKER] -- Right.

Ryan Macias -- It's a total combination of mechanical, electromechanical, or electronic equipment. And so jumping back would be if these were determined to be the 17 core functions instead of talking about EMS's about marking devices DREs. It would be the functions contain within, because that has been one of the issues that we the EAC run into right now is when new technologies come down is we have to break it down to the functional level and then associate it to a device that is inside the standards now. And so instead of having to make some of those determinations, it would be to write requirements around each of the functions and the interfacing of the functions, the inputs and outputs. Hopefully we get to a spot where we can define what those inputs and outputs are from each of the functions, and create interoperability between them. And security requirements for the transference between one and the other. Again, some of the examples showed methods and modes for transferring so there would be different requirements for the methods and modes of going between function to function.

Diane Golden -- And I guess what I'm trying to wrap my brain around as, and this is really helpful. But just walking through this, there's accessibility issues kind of woven throughout and yet when I try to apply this to a typical lack of a better word voting systems that's really never been woven in. And I'm particularly thinking about, again, remote stuff. And the old absentee vote by mail remote, whatever, whatever. There's really never been any applicability or clear applicability of, and that will be very different. And I'm not sure then how that fits with the lab certifications of anyway. So that's where I'm at.

Ryan Macias -- Yeah, so along those lines again, taking a back to what we started hearing. We heard about it yesterday starting in 2005, 2007, 2009 moving forward is Interweaving security accessibility and now jump forward to 2011, 2012 interoperability. And instead of looking at any of those items as an add on to a device it would be woven into each of these functions throughout. And there'd be a set of requirements that would be tied to that combination of methods and modes of each of these functions. And that would be at the requirements basis. And then to the last point of how would a lab test it? That would be the hope is get down to those test assertions to that would then tie into each of the requirements, which are based on this method and mode this is how you would test it and then that would have flexibility to be able to be grown. And with new technologies and the like.

Brian Hancock -- Yeah and I think this recognizes and we certainly recognize that accessibility is a core component of the Help America Vote Act. And instead of kind of pushing it into sections, this is kind of a recognition that it should really flow through the process and all 17 core functions.

Matt Masterson -- If it helps and this is just echoing but I hate to put myself in your category cuz your smarter than I am. But I have trouble busting, I have trouble busting through that the previous paradigm because we've all sat around the table in the previous. The concept here is that accessibility, security and interoperability drive through each one of these 17 functions no matter what, no matter what. And that the total combination of these functions that make up the voting machine or voting system must include accessibility and security and interoperability as part of it. Because that's part of the charter which Ryan's gonna go back to. That's part of what you all have already instructed us and NIST to look at. And so whether it's presenting the results or generating the ballot there's got to be an accessible aspect that's required, that's recognized. But we don't have to latch ourselves into Ballot marking device, right? Let's break free of those molds.

Ryan Macias -- Yes, so I just wanna add more piece on that is if you wanna look at the kind of the structure that we have been talking about between principles, guidelines, requirements, and test assertions. This would kind of be at the guidelines level. And the principles are going to be the mandates from [INAUDIBLE], the accessibility requirements, and all of those. So the guidelines and the principles are what are going to, the combination thereof, is what's going to drive the requirements. I'm not sure if it fits in here where it would fit in but when we talk about like a log in security because the function of logging into the to the system we talk about that would that fall in here as a function or where would you put that kind of security.

Ryan Macias -- Yeah, and again, I think that would be tied into each level of where it's necessary. So we're talking about the ballot retrieval. Well if you need to log in to do ballot activation, then that could be a requirement that you would log in. How you would log in, would be a requirement or a test assertion down to that level. So at each of the functional characteristics of the system, we would, similar to what we were just explaining with Diane, is intertwine the security requirements.

[UNKNOWN-SPEAKER] -- Yeah, I think so, yeah.

Ryan Macias -- Yeah, I think because I was struggling with that too. The transfer of results is the easiest one. So if you're gonna transfer results electronically it must be done securely, right? And so that the function is the transferring of results but the security that inter matches with it is present throughout whichever one of these functions is there. Other questions or thoughts?

Matt Masterson -- I was gonna say I'm not as smart as you but.

[UNKNOWN-SPEAKER] -- Then we're in a lot of trouble.

[UNKNOWN-SPEAKER] -- [LAUGH].

Matt Masterson -- Go ahead Ryan.

Ryan Macias -- So we're gonna jump back to HAVA again this is what constitutes us in the first place. So we'll just bring those back up here and take a look at them real quick because we're gonna get to them here in the next slide. So let's look at the device based model which is the current VVSG. So 301 (b) (1) (A) is to define the ballots. Currently a device, I'm not gonna say it's the only device, but we typically think of that as an EMS. 301 (b), to cast and count votes. We look at ballot marking devices to cast those votes, we look at DRE and scanners to both cast, and count the votes. We look at to report to display election results, typically that again, a DRE and scanner is gonna present those reports in the case of a tally tapes and the like, but typically we think of that as being the election management system where everything is combined aggregated and produces the final report to display it. To maintain and produce any audit trail information, well that's again, that's an every one of those devices and it should be. And so that was one of the other items that was not mentioned as a core functionality, well why? Because it should be intertwined into every single function. So the EMS defines the ballot. What does it look like as a functional base? Let's go back to the 17 functions. First you have data entry. You have data association. You have data layout. You have ballot generation and then you have the transference of ballot data. That is the definition of a ballot within and EMS. But instead of looking at it as an EMS for this next iteration of the VVSG, let's look at it at what it does. So it starts with data coming in and then you have a ballot that is your output, both electronic, and paper. This one as you can see it says to cast and counted votes under the middle section but then it picks back up account, and I will get to that in a minute but it's because the output here is not the counting, and that's gonna carry, carry forward of the amounts but we do know as was just mentioned that a scanner, and a DRE do some counting as well. So EBM scanners, DREs, they retrieve ballot data and that can be in the form of, again election definition being brought into the system. It could be a piece of paper being scanned and reading the timing marks in the ballot data information that is on that piece of paper to bring up the necessary ballots style for tabulation in a DRE, EBM. You can retrieve that through ballot activation and you can do it electronically, you can do it manually. And there's many it different methods, and modes to do it but you have to start by retrieving the ballot data, and then presenting the ballot data. You have to capture those votes selections, and then you have to again interpret those vote selections, extract those vote selections, present the selections, and then transfer the vote selections, and store them. Again, as was discussed a little while ago the storing may be prior to the close of polls. So you have to hold those in memory until we get to the next bot. Again, using that same example of an EMS, which is a device that we typically think of for the aggregate. So those vote selections are retrieved. They're retrieved from a thumb drive, from via network, internal memory within that EMS, the tabulation portion of the EMS. Those votes selections are retrieved at what we normally think of pressing a button called close polls. We retrieve those votes selections. We tabulate them and aggregate them. We extract the tabulated data and then we present the results. And so this right here is showing the intersection of what we know from VVSG 1011, and going back to the FEC 1990's standards. You know from a device based model and what we end up with is 17 functions and looking at the VVSG 2.0 voting system model would be a set of 17 different functions and associating those two devices. Talking about devices is no longer necessary because we can now break it down to their core functionality. So why focus on functions opposed to devices? Well let's get into the objectives. The VVSG 2.0 objectives. To assess the ability of the election system to correctly execute secure usable and accessible elections in order to provide assurance to voters that the election is an accurate reflection of the voters' will. This will remain unchanged we can do this through devices or through functions. So we think that the functional base is a. More efficient way to get to it, but it can be managed either way. So we'll get onto to enable, not obstruct or impede, innovation and need responses to changing statutes, rules, jurisdictional and voters' needs. By focusing on these functions that make up a voting system, and the combination of those functions in a new and unforeseen set of devices and technologies will be able to be tested. Because we can look at it right now, hypothetically, I don't have an example in front me, but we'll get to some, but let's just say that an EMS is function one through five. Well, what if an EMS, as we know it, becomes functions one through seven or becomes two, five, six and eight? What we can do is then assign an associate that set of functions and those requirements to the new technology that is moving forward. We don't have to then go back and say, what is this device, how does this device fall within the VVSG, and create separate interpretations? It would just be associating the functions that are within the device. Because a device to us is just a set of functions. So to create a set of implementable guidelines that allows effective deployment of systems by jurisdictions constrained by election calendars, schedules and budgetary restrictions, as was mentioned a minute ago, we think that the functional based is a more efficient way. Particularly getting into the interoperability of the functions. If we can see that the inputs and the outputs are unchanged and it's only changes within a device, then we can more closely do testing on that device, or the set of functions that changes, and not the device as a whole, and not the system as a whole. Until we get to the point of the interoperability, there may be some regression testing across components the way that we do with modifications. But by breaking it down to its core functions, we think that we can also move the interoperability quicker because we can see what the inputs and outputs are from each of those functions. To facilitate the interoperability of election systems. I think we just hit on that. There's ability for quicker development of common data formats, as each function has a set of data inputs and outputs that can be focused on individually and simultaneously. Instead of trying to create CDFs for devices, that are ever changing and evolving. To facilitate an open and transparent process that allows voters and elections jurisdictions to assess the performance and capability of the election system. The guidelines are the functions of the capabilities of the election system. By defining each of those functional capabilities, creating requirements around those functional capabilities, allows everyone to know how they should perform. It provides the information, in conjunction with CDFs and enhanced audibility requirements, to make it more transparent to anyone, to assess the performance of those systems. And to provide a set of testable requirements that a jurisdiction can understand and use to evaluate the performance of election systems. Providing requirements for specific functions allows jurisdictions to determine which functions are required for election systems they're trying to procure. So I'm gonna use an edge case as an example that may be out of scope in a jurisdiction, election night reporting. Well, election night reporting does a set of functions. So it may be outside of scope or may not be submitted to the EAC for testing and certification within a system but, I'll use Rawson as a as an example. So say Wisconsin's looking at a new ENR system. And they don't require the ENR system to go through certification, and don't want it to have to go through the certification process. But what they can do is look at the set of functions and say well ENR is just functions 15, 16, 17. What are the requirements around function 15,16,17? We don't want it tested and certified. But we want to grab those requirements and the interfacing of the type of system that we want and put that into our RFP. So it doesn't have to go through the certification process, but elections officials can then take the data and utilize it. One of these that has been mentioned over and over again from elections officials and here at the TDGC, is make the requirements more usable outside of certification as well. This allows for it. Now why? Let's look at the why. So what constitutes a voting system? A combination of devices that fulfils all of the functions. This is how we would look at it from the VVSG 2.0. As we showed the association of the functions to HAVA, now we're showing the association to create that system and fulfill those requirements of HAVA. It would be fulfilling functions 1 through 17, would make up a system. But could any combination of the functions be tested by EAC? No, the combination of devices would also have to meet all the requirements set forth in the Help America Vote Act, and we'll get into that in just a minute. And as we look at examples, think to yourself about what John Wack said yesterday in his presentation when he referred to the 1934 book entitled Election Administration in the US by Joseph P Harris. The statement was, it is still relevant today. So think about that. A book in 1934 is still relevant today. So let's look at the No Tech Solution, something they might have used in 1934. This depicts handwritten ballots. Hand written ballots so let me say that again. Marked by hand and tabulated manually by humans. The elections officials gets a list of contesting candidates. And that starts at that data point. How they get it, doesn't matter, what they do is they have a set of contesting candidates, so they write that. They hand write it on a list of paper, so we're now going from functions one and two in the first bullet to three and four. The elections official hands the piece of paper to the voter. The voter circles the choices. The voter drops the ballot in a box. Gets the ballots from the ballot box. Reads the voter choices aloud. So that another person marks down a tally sheet, and then that tally sheet is posted on the wall. As you can see there, the numbers below depict the functions that are fulfilled by each of the steps. Functions 1 through 17 is that a system, yes. Is it mechanical, electro mechanical, or electronic equipment as defined by no. So the EAC won't certify, but it is a system. Let's get to an all paper voting system. This diagram depicts what has been referred to in previous VVSGs as a voting system with an EMS and a precinct scanner, that's it. Is it a voting system? Yes, as you can see, combined those two devices fulfill all the functions of a voting system. So, the EAC could test it. Could the combinations of functions be certified, no. At a minimum it does not meet the HAVA requirements for accessibility. So it would not pass certification. But could we look at it as a voting system? Yes, because it meets the definition. So let's add on a device. Let's add on here the digital path. In this case, it's depicting a DRE. Could this system now, let's say it now fulfills the requirements for meeting accessibility. The one that the paper path did not. So could this system move forward and be tested and certified by the EAC? It could if it met all the requirements. Cuz now it meets all the guidelines and the principles. Or it meets all the functions and the principles set forth by HAVA. Is it marketable? Who knows, it does not contain a central count system. So basically, this would be for a jurisdiction that has zero vote by mail ballots. So it may not be marketable. But could a manufacturer submit it if somebody was trying to procure it? And could the EAC test it? Yes. Well, now let's look at what we typically see as a voting system. The top path is that central count path. The middle path is that paper path that we were talking about it at a precinct. And the bottom path, in this example, is a DRE. And as we know, from an EBM standpoint, it would be similar. But the description is gonna be a little bit different. But this is what we typically see at the EAC as a voting system. And as you can see by just looking at the numbers, a voting system is very repetitive in those functions. And so it's the interaction of those functions that requirements and test assertions would be met. Or how we would test each of those functions. So next, let's look to the future, but not to the future. Let's look to the sci-fi world. [LAUGH] let's look to something that is very hypothetical and has not been proposed to the EAC but-

Ryan Macias -- And apologies to any manufacturers that might be considering this option.

[UNKNOWN-SPEAKER] -- [LAUGH]

[UNKNOWN-SPEAKER] -- This is example only.

Ryan Macias -- [LAUGH] We have a hypothetical here. What this is is you embed a chip into somebody's head.

[UNKNOWN-SPEAKER] -- [LAUGH]

Ryan Macias -- The elections official creates and generates a ballot on a system.

[UNKNOWN-SPEAKER] -- Where's my patent?

Ryan Macias -- [LAUGH] The voter telepathically receives that ballot. It's embedded into that chip in their head. The voter thinks about what they wanna vote for. The system captures, interprets, and extracts those vote selections directly from the chip within their head. The system sends confirmation of its interpretation and its extraction of those vote selections back to the voter. And says, this is how we interpret it. And so you, the voter, think about it again. And say, yes, that's how I expected it to be interpreted. The voter accepts vote selections. And says, yes, proceed forward to the tabulation and displaying of results back at that main system. So although this is hypothetical, what it's saying is this is a sci-fi world. This is probably never gonna happen. But it foresees, it looks into the future and says by breaking it down at a functional level, we now don't get captured by devices. We now do not get hamstrung. We could create new requirements and test assertions around these new technologies as they move forward. Fulfilling those objectives that you guys laid out in the past. So next, we're gonna jump into a couple of those use cases. By breaking down devices that are defined in the VVSG 1.0 and 1.1 to a functional level. So, again, let's reflect back on the question I asked that you think about as we go through this section of the presentation. Which is, why is the book from 1934 still relevant today? And it's because the functions performed in an election are the same today as they were then. The difference is the interactions between those functions. As you saw, the first reflects 100% manual process, 1934. This last slide is 100% digital process. Where we are today is in the middle, as it was reflected in the slides. But in all scenarios, we are using the same core set of functions. So this document could carry on. An election management system. An election management system in VVSG 1.0 and 1.1. These are actual requirements that are pulled out and part of the definition. It defines political subdivisions, boundaries, and multiple election districts. It identifies contests, candidates, and issues. Defines ballot formats and appropriate voting options. It generates ballots and election-specific programs for voting equipment. It installs ballots and election-specific programs. Test the ballots and programs have been properly prepared and installed. It accumulates vote totals at multiple reporting levels as indicated in the system documentation. It generates the post-voting reports required, and I left the by off. The process, it processes and produces audit reports of the data. As we discussed, some of these are requirements. These are not at a guideline level or at a functional level. So let's look at an EMS, again, at a functional level, and how each of these interrelates to a functional model. The other piece is, we call this an EMS now. But as we notice, many manufacturers actually have multiple applications that are combined to be called an election management system. This would also allow for upgrades or updates to specific applications. Or to break apart those applications by looking at it at a functional model. So we are no longer just looking at election management system. So that's what will be shown here. So across the top in the blue boxes, squares, are each of those items that were just described. And then below in the black boxes are the functions that are met by them and the interrelation. So defining political subdivisions and districts. Well, that's used in multiple functions. That can come from the input data necessary for constructing a ballot and as well as the association. So that could be, again, broken down even further into this functional level. So we're not looking at it as just defining political subdivisions. It's defining it at the functional level. Identifying candidates, contests, and issues, again, same thing. You can identify that through the data input that's gonna go in at step one. And then you can re-identify it and validate it against the association after they've been brought together. Defining ballot formats and voting options. This is, after it's all been associating it, defining it is laying it out and generating it. Generating ballots and election-specific programs ties directly into the generating of ballots. Installing ballots and election-specific programming, that would be the transference to the other devices as necessary. Testing the ballots and programs installed properly. While you're going to look at the transference of the inputs and outputs that are taking place at that transference and then the ability to retrieve them within the device. And so that's really the ballot construct portion of an EMS. But as we discussed, EMS is also thought of for the tabulation piece and for the reporting piece. After everything comes back in and at the end. So you jump down to the below. You accumulate the vote totals, multiple reporting levels, which is tabulating the vote selections. You generate post voting reports by transferring the vote results and by presenting them. And so you have functions 15, Then you have this process and produce audit reports of the data. Well as we had stated earlier, when we were going through the definition of HAVA, that's really a requirement. And that requirement would then be built in to every one of these functions. So the auditability. You need to be able to audit each of the functions and the inputs and outputs of those functions. So let's look at electronic ballot markers. By definition accessible voting station that produces an executed human readable paper ballot as a result and that does not make any other lasting record of the voter's votes. So let's get into the association. An electronic ballot file is loaded onto the EBM via media or network. So you have the ballot transference, which is function five. You have the activation of an electronic ballot. Manually or with a ballot activator. That's the ballot being retrieved. An electronic ballot is displayed on screen, the system presents the ballot to the voter. The voter marks the ballot, the voter transfers the vote to the ballots, and the system captures the vote selections. That is the capability of marking. The voter reviews the votes on screen. The system interprets those vote selections, it extracts those votes selections, and it presents the vote elections back to the voter. That's the independent functions for reviewing. And then it prints a paper cast vote record. Or a paper ballot. The system is transferring those votes selections to a piece of paper in this model. This is always been in scope as a device, but is as part of a system that is in scope. It has never been able to be certified in and of itself. That was one question that came to the EAC years ago. Could you certify about marking device by itself particularly in the case of remote or mobile marking devices. And no, as you can see, it only fulfills a subset of the functions. So you would have to actually combine it with the rest of the functions to be a system. But as you can see an EBM is a whole bunch of stuff. And It must do all of these things. But how is this different from something that we have talked about or at least from VVSG 10 and 11 as being out of scope? Which is a remote ballot marking device. How is this process any different? Well, it's not. So, if one is in scope, why is the other out? Really the difference is the interaction, the interfacing, and the method, and mode by which you transfer from one function to another. So what requirements need to be written for a remote ballot marketing device? Yes, but at least from a process standpoint and a functional standpoint, there is no difference. So why would one be N and why would one be L? What we are saying is the EAC is neither shall be in scope and neither shall be out of scope. It is one way to get to functions 5 through 13. That could be a DRE, it could be a component or a device that we have never heard of. It could be a combination of new devices and new technologies. But as long as you get to a place where you fulfill functions five through 13 and combine it with one through four and And so we need to have requirements and test assertions for those functions. And, again, the functions are identical here, where the requirements and the test assertions are going to differ is the interaction in the interfacing amongst those devices. So, this is one of those edge cases and I end with this for a reason as to sit back and look at it and say, these are the types of determinations that we the ESC have had to make now. And sometimes we've had to make the determination such as a remote EBM that it's out of scope. Because the VVSG doesn't cover it. And again if a state wants it certified, we should have the capability to certify it. And if a manufacturer wants to bring it in for an RFP at a state that we need for this to be certified, we should have the capability to test it. But it does not mean that it is going to be required. I want to get back to that fact that a system is a set of 17 functions in this as described in this discussion. How you fulfill those gives you the manufacturer the flexibility and gives you the states, the flexibility to say, our state needs the certifier. And the manufacturer, if they're going after one are of peer going after a set of states, they can bring in a system and say, these are the devices that we are utilizing to fulfill functions 1 to 17. Six months later, a new state comes up. That wants that same system, but maybe wants a device that's added. We can now add it and look at just that device and or that new set of functions as a modification, and incorporate it into the system as long as the functions within the system that was already certified have not changed. Now, if there is new input and outputs that need to be modified for this new device is gonna be added. Then we can break it down at the functional level what is changing and be able to look at a modification from that perspective. So, that's actually the end of what I have from a slide presentation. So again, I wanna open it back up for questions and discussions to see where we're at and what the thoughts are.

Ryan Macias -- Questions, thoughts, concerns, reflections?

Ross Hein -- Ryan, I thought this, and Brian as well, I thought this is a group presentation to look to to take in. It's a different way of approaching This subject matter but I really do think it's a forward approach. And I commend you for putting this forward. I think it makes sense to have the 17 core functionalities. For me, cuz then you can break it into all different types of systems and it gives you that flexibility. For me, I'm having a bit of a difficult time identifying what would be something that the EAC potentially would certify? And what would be something where something, that would be something out of scope would be able to meet the standard, but you wouldn't provide any certification. Maybe that gets directly back into what's provided in HAVA, the electoral, mechanical stuff. But I'm just curious how that would actually play out in reality.

Brian Hancock -- Ryan, can add to this, but so, again, it's looking at the functions, right? So out of scope would obviously be functions before one in four, right. So a voter registration database. Not included in 1317 so it's out of scope. Anything that potentially would come along after, not sure what it might be, but after function 17 also out of scope at this point. But again as what Ryan said as long as it meets these 17 functions and meets the requirements of the Help America Vote Act, and the definition of a voting system that he put up there that would potentially be in scope, okay?

Matt Masterson -- So let me see if I can, so that, go to that EBM, the one at the end. So electronic ballot marking, whether you're talking about it an auto mark or about delivery system. Right now as it stands scoping, if you submitted just an auto mark, we can certify it because it doesn't do all 17 of these functions. That would still be true. Now, under Ryan's discussion, because it still doesn't do. Also it only does these functions that you see up there. But if a remote electronic ballot marking device, or an auto mark as we have now Is submitted as part of a larger system that includes all 17 of the functions then we would have a way to test it, right? Because we will have already identified it as containing the functions that we need to be able to test but it alone, standing alone is not a voting system, right? That's not what it is. And so it needs to fulfill all 17 but it alone isn't a voting system by itself. You've gotta have the total combination of components and parts. Does that make sense?

Ross Hein -- I think it does, and like I said I think it's just a little bit, it's just a change in mindset, and I think that's for election officials, that I think is gonna be the most difficult component, is just understanding the shift and how everything relates and that just is gonna take some time. And I think the simplified approach to start with helps, but I think it's just going to take a little shift.

Brian Hancock -- I've had to train myself to not think of devices, right? Because we've been doing this so long and thinking of devices when we are talking about the functions but we don't need to.

Ryan Macias -- And so the other pieces is I think to your specific question is what would be a system the EAC would look at, what if the devices are unchanged?. So right now we would look at an EMS and EBM scanner, a DRE and an EMS. But that EMS could be broken down into a ballot, layout application. It could be a ballot definition application. It could be a multitude of individual applications that could come in that could be changing, it could be the combination there with what we know and EBM. Or a remote ballot marking device. Or a DRE. Whatever that device is to fulfill that next set of functions. And then at the end, we call this the EMS down here but it could be just a ballot accumulation software that doesn't put out any type of report. I mean it has to put out a report but not visually. So then the next piece of that that would fulfill just the last two steps there could be an ENR system. And so you can mix and match types of devices that we currently see to make up a system. And then when it comes into the EAC, we would look at it and say, is it meeting the 17 functions? We don't care what the devices are that are doing those 17 functions. Bring it in how you want, manufacturer and or how the jurisdiction wants. And so you guys can still think of it as a device if you're looking at a set of devices and what are those devices do? Well, we're gonna have some mapping to that and we can assist with that. But really is, from a guidelines perspective or from a functional perspective, it doesn't matter what those devices are. It's these core functions.

Mary Brady -- So I just have a quick follow up question to the examples. So if you're manufacturing, you bring in a remote ballot marking device, you say, out of scope, we're not going to certify that, right? But if you bring it in and you have an entire system that maybe doesn't have a remote ballot marking device, but marks ballots in some other way, you'll certify it if it has all 17 functions, right? And then, so let's say you certify it and now you're manufacturing, you want to add a remote ballot marking device. Is it now in scope? When it was out of scope previously because now you have the entire system.

Ryan Macias -- Yeah, because it's gonna be combined, so it's gonna be that total combination, cuz now it's gonna be added to whatever we call the functions one through four, whatever that device was. And then whatever was after that where the EMS ended I think it was there at the 11, So you're combining it with a system that already fulfills those other functions. So all you are doing is adding in another device that then again is repetitive to the functions that were done by the EBM. And so you look at that as a modification to the system, but it doesn't take away the other portions of the system.

Mary Brady -- Okay, so if I'm a manufacturer and I build a device that doesn't do all of the functions, I can never get anything certified unless I partner with someone.

Ryan Macias -- And that's the case now. Yes, and so as the example that Matt used with the auto market was a question that came in originally could EAC certify the autumn argument this was back in 2008 2009. And we looked at it and we said, no, it's not a system. By definition under the VVSG, it's not a system. It's a device within a system. So now, my answer would be, no, it's a set of functions that does not fulfill the definition of a voting system. It doesn't do the rest of the functions that are necessary for a system. And so, if you just want to bring in that device, yes, you have to find a way to fulfill the remaining functions to create a system. But if you have a system, you can do an add on and as we saw in, let's go forward here. That would be this example, you get this certified, you now have this because you brought on a new device which is that top layer that's just repeating the functions that are across the top.

Mary Brady -- Just an observation, I mean, I understand completely what you're saying and I can understand the challenges of testing just a subset of those functions, because you don't have the other pieces but. You know it, just from a innovation perspective. I'm not sure that it meets our goals of allowing new innovative approaches. So, it's-

[UNKNOWN-SPEAKER] -- So-

[UNKNOWN-SPEAKER] -- Go ahead, go ahead.

Diane Golden -- Which is sort of where I was going in terms of maybe asking the election officials the extent to which it is a real hindrance to not have, for whatever, I don't know what, how to describe it, but component certification. And I don't know if it's your state statutes or whatever, how much flexibility you have to use something that is quote unquote not certified as only delivering X number of functions within this chain rather than the one to 17. And to the degree you would have that flexibility, but if you have state laws that say you can't do anything that's not certified, and the certification won't do component certification, then it, I'm thinking it could potentially really stifle. I don't know.

Matt Masterson -- Do you all have a response to that?

Greg Riddlemoser -- Ryan, if you would, go back to your, the middle slide, I forget what you called that. No, the remote ballot marking. To me, there's real beauty here because this presents in a way that I think we can describe to the key members of the various general assemblies who sit on the election related committees and things like that, this is where I think the innovation comes in. Because this allows manufacturers to fill this gap in a number of different ways. It also, this is the portion of the one through 17 that allows us to have various approaches to and the disabled community with bring your own technology, because that fits in this gap. So the idea that election officials create ballot proofs, for lack of a better word, and at the very end capture voter's intent and then report results, whether that's for a handful here or there or the entire jurisdiction, the ability for manufacturers to jump into this void with a half a dozen or more different approaches, it allows us as the folks who buy election equipment to use, especially for this portion, whichever seems to meet the need of our community most effectively. And across the state, we have one 133 election jurisdictions in Virginia, and we don't have a single vendor requirement in Virginia. There's any number of folks that can jump into this particular gap in the marketplace, regardless of the stuff that's already in my warehouse ,and that's where the innovation comes, Mary. I think this just leaves it open. I don't see this as needing to be tested, if you will, or certified, if you will, because we can finally describe this part of the process and how it fits into the total process. And I think that's been the stumbling block to the curmudgeons in our general assemblies and the folks that are really wanting to be innovative but feel hobbled by the overburdenedsome requirements community.

Ryan Macias -- So, I appreciate that, Greg. And so, the other piece that I want to get to the specific question is, I think it was really talking about the modular certification realm and just looking at the modules and not getting to the point where we need to be for true innovation. In a perfect world, I would say that we wouldn't incorporate that into this. What I'm saying is this doesn't prohibit that. It does in an essence, because it's gonna be one through 17 as a system. But by definition, right now, that's what HAVA tells us we certify as voting systems. And so, if we get to the point of the interoperability where we know what those outputs are and the formats of those outputs and the inputs, then I think that we can start merging different components. I don't know that we, the EAC, could get to that point of certifying a component outside of a system. I'm not the attorney, so I'm gonna through that out from a voting system standpoint. But if Lori and or Bob and or Ross and or Greg said we want these components to be merged together to have it certified and fulfill functions one through 17 on a modular fashion to increase innovation, I think that once we get to the interoperability standpoint we can start looking at that. And then you would have a certified system. Well then, you could then input a different device into that system. You can remove a device and replace it, and start looking at different configurations of that system by replacing, removing, adapting to the devices, I mean, to the system, and it would allow for that innovation and to move forward.

Ryan Macias -- And what that speaks to is those currently few but potentially more jurisdictions that are trying to be innovative, right? The LA Counties, the The Travis counties that are essentially trying to be integrators themselves.

McDermot Coutts -- As a manufacturer, I very much appreciate the limiting of the, the clear identification of the scope and the boundaries of it. And so, from that perspective, I quite like this. The question I have is in the interest of innovation. Say we have Function 18 or Function 23.

[UNKNOWN-SPEAKER] -- [LAUGH]

Ryan Macias -- Yes, pick one. So, if we've got a system and it is certified and it meets all the requirements and we have Function 18, what is the limitation of connecting Function 18 to the system itself? What has to be tested there? Can we just say it does these things, we drop it on the system, and everything's fine because it does not impact one one through 17? Or does it have to go through testing? And what would that testing look like? So, again if it was 18, 19, 20, then it would probably be outside of, or it would be outside of scope of what is defined by HAVA as a voting system. So, let's take an actual example. Let's go to an EPO book that starts at negative 2, function negative 2, and goes through function 3. How does that interact to the system? We don't look at it under this standpoint, we don't look at as an EPB. We don't look as an e-Poll book. We look at it as function negative 2, negative 1, zero, 1 and 2. So we start at 1 and 2. If that is what you decide to bring in as Function one and two. If you decide not to bring it in as one and two, and that's the manual entry or whatever the case may be to fulfill functions one and two, you can have a system certified. But if a jurisdiction says, okay, well, now you're going to use the ballot activation feature out of the EPB, so we, the jurisdiction, need that certified so you have to come back in. We're gonna take a look at it and say, okay, you start negative two and you go through two. We will pick up at one and two and the starting point of The data entry which is number one and how does that data get there? And then that that would be the starting point everything prior to would be outside of scope.

McDermot Coutts -- I guess my question is what if it doesn't interact with any of the ones or what if it doesn't actually perform any of the functions one through 17? What is the limitations that I have the function 18? Or -20 to connect to the system in whatever way it needs in order to-

[UNKNOWN-SPEAKER] -- So-

[UNKNOWN-SPEAKER] -- Is there a limitation? Do we have-

Matt Masterson -- So we have that example now, right? So that's not an outside the box question. E poll books is a good example voter reg system. We're not gonna test voters, they're clearly out of scope, everyone agrees out of scope. But what we look at is the data coming into the voting system, is it correct, is it consistent, whatever. And so if you're designing system 18, Really the only consideration you have in my opinion is a market consideration of is the outputs from the voting system in an efficient manner such that it's worth the election official buying that system. Right? So we're not testing 18,19, 20 because it doesn't fit within the scope. It's going to be up to the marketplace. It's going to be up to to the states and locals to say we want that data output from the voting system to be able to be taken by your system 18, 19, 20. I mean and third party auditing system would fall into that same kind of mindset right? We're not testing that third party audience but if I were an election official right. In an RFP I'd sure want my data to be easily taken and used. From my voting system into you your 3rd your 18,19, 20 system.

McDermot Coutts -- Would installing any of those modules onto a complete system, would that violate the certifications?

Ryan Macias -- And, so, I think that's where the the requirements come into it, and

Ryan Macias -- In the example of a VRDB, if you're not actually going to be transferring any data from a VRDB onto a voting system. My first question would be, why is it gonna be connected if there is really no interaction? And then from an EAC standpoint, we would look at it from where does that interaction start. But from a requirements basis. That's where I think it would come in, because I think it would be the security of now attaching a device that doesn't fulfill a function. And so that's, that's a very good question. Again, I can't see an example where you would want to but-

McDermot Coutts -- That's what innovation is.

[UNKNOWN-SPEAKER] -- Understand.

Linda Lamone -- Does this in any way require the manufacturers to for example to have an electronic poll book or does it preclude separate people, entities from having to selling them.

Ryan Macias -- So the answer is no no what it is again. So an epoll book is is for the ballot activation piece let's just say because that's what it's typically used for today. So as it is today most manufacturers submit a different ability to activate the ballot. It could be manually, it could be electronically, it could be bar code scanning on a piece of paper, it could be. EPBs through an EPO book. So what we're saying is you have to fulfill that function which is function two well, I believe it was or function three. We don't care how it is that you fulfill it it us for to look at it as a system but then if you come back and or your legislature or your state statute says that because it's connected now It has to be certified, then you can request that the manufacturer bring that in to replace or to add an additional function to the system and we can test it. But it would, it doesn't require any devices to go through certification. It allows for all devices that fulfill any of those functions to go through certification.

Marc Guthrie -- I think everyone at the table knows more about election processes than I do. But I have a lot of folks in the blind community tell me that some systems are far more accessible for them to vote privately than others. How does all this fit in to that issue?

Matt Masterson -- So, goes a little bit to Diane's question. It's a good question. That accessibility and that expectation of privacy, as part of it, the HAVA requirement to vote privately and independently. Right? That's what HAVA says. That goes to the entire process, so the expectation is that's woven throughout. Now whether one system does, so you meet the requirement whatever that requirement is, right? So we'll test and certify, there may be one that does it better and that could be true in any functionality. Whether it's keeping privacy or exchanging data well or something like that is in part a market decision at that point if it meets the standards that meets the standards a state a local could put in there a fee or even somewhere else. This is what our expectation of privacy is that may be different than what or on top of what the requirements say but there's a baseline requirement for privacy as part of a system to provide that accessibility. That's that's just part of it.

Brian Hancock -- And the accessibility has been revolutionary, right? I mean Diane mentioned it yesterday. There are systems out there right now that the accessibility is not great. But the systems we've been seeing recently, the accessibility is much much better and the products that we're seeing, the summit of usability test reports that we're seeing are big strides forward into making more usable and more accessible systems and I see that continuing under this process as well.

Diane Golden -- Yeah I'm going to in trying to envision how this is going to work. I think this is actually going to be extraordinarily helpful in addressing that problem we talked about of the original HAVA vision of a polling place and a piece of equipment which as you know just not hardly the way. People are voting anymore in polling places and with early voting and vote centers and everything else the whole landscape of voting has changed. By doing this that slide that you just pulled up with that middle piece not the election management on the front and in but the actual voter experience piece those functions If excess ability is clearly defined in those functions, then it's going to be quite frankly a lot cleaner for people within the disability community to say to any voting jurisdiction, I'm not getting this. Right now what tends to happen is the answer is, well but we had that one machine on polling day, in the corner usually, which is not how the majority of people with disabilities end up voting because they're on a permanent absentee list, or they're on this, or they're aren't, and so right now they have no recourse. It's just they don't have any accessibility. But the answer is because of the system based standards we have now it's well yeah there is that one machine it's just that it's at the polling place you can't get to and you know blah blah blah. I think this will If it can be packaged and turned into a self checklist. That the disability community and election officials can actually use to look at their voting process and you know these are the functions of being accessible in that process of Retrieving a ballot, marking a ballot, all of those middle functions, and there's accessibility features, yeah. And if 99% of your people with disabilities are voting, and they don't get any of that because of the way they're voting, then that's probably an indication there's a bit of a problem. So in that sense, I think it will be helpful. Now, like I said, I'm a little concerned that that's the focus and yet the certification. And that's why I was asking election officials. I mean, I don't want you have an innovative, accessible solution that you can't deploy because your state statute says the thing has to be certified, and you can't certify that piece in the middle kind of thing. That's where I don't want the whole thing to fall down, where everybody wants to do the right thing on your side, and we can't do it because of some state law.

Bob Giles -- And I think that Bob was gonna ask that, and maybe more, less of a question than a statement, kind of along the lines of what Ross was saying, and kind of wrap my head around all this. So if you have 1 through 17, I'm just trying to think of a situation other than an auto mark that would fall somewhere in between 1 and 17. But I don't know of too many other things, cuz to do tabulation, you have to have the front end. You have to design the ballot to get to tabulation. So I'm just not sure other than an auto mark, off the top of my head, what a ballot marking tool would fall in between 1 and 17 standalone. What would you that wouldn't be part of an end to end solution?

Ryan Macias -- It could be anything, it could be an ENR system. It could be a standardalone.

Bob Giles -- But see, to me, ENR is outside, that's post. I'm thinking in 1 to 17 is kind of like Election Day, and then when you get those totals, and maybe this is where I'm getting confused. So we talk about an e-poll book that, to me, that's kinda pre-election. That's leading up to activating the system, and that's where I could see it as a standalone hey, I wanna activate. But you can't certify that e-poll book unless it touches the system, and now it's part of this end to end, and say post-election audits. And if you wanna do a third party auditing, again, to me that's outside of this 1 to 17. I'm just trying to, when you're saying to me ENR is not in the 1 to 17.

Ryan Macias -- It's 16 and 17. It takes the tabulated data and presents it publicly. So it is number 16 and 17. But let's take another one, New Jersey right now is looking at ballot duplication systems. What is a ballot duplication system? A ballot duplication system takes a ballot, and it captures the vote selections off of that ballot. It interprets that vote selections, it extracts that vote selections, and it presents it. It presents it in a manner in which it can turn it into a paper ballot that can be tabulated. So if you wanted to make the ballot duplication system something that was able to be certified, or your state required that it be certified, such as California, then it could be brought in within a system, or you could just use the requirements for your RFP to move forward. And so that's another one that falls within.

Bob Giles -- But, and I guess with the ENR, to me, until it touches it, if I just export data and put it into an ENR system, that's, to me, it's no longer part of the 1 to 17 in the sense of an intense system. And I guess that's where I'm kinda having some difficulty with this. You're putting it in, you're putting it, and you're pulling out, cuz to me, same with the e-poll book. The e-poll book stands alone until you touch the system. Election night reporting can stand alone until you try to make the two talk. If I just export files, it has nothing to do with 1 to 17 in the truest sense.

Ryan Macias -- So the way that I'm hearing that is, that's the state law. That is your implementation within your state. But for instance, say a manufacturer wants to have an EMS that does not present the vote totals, for whatever reason. And they want to bring in a separate ENR system to fulfill functions 16 and 17. It can be part of the system. It can be excluded. It could be, if it fulfills function 16 and the certified system. And if your state doesn't need your ENR to be certified, then yes, function 16 and 17 are being fulfilled by another device that does not need to be certified based on your state statute and your state regulation. But it can be substituted in to the voting system, because it falls within these functions. And so that goes back to kind of, I'm gonna say kind of what McDermott's question was, is what happens to a system that is outside number 18 through 23, truly outside, as I was thinking about it. Right here from the definition of HAVA is, it's not a voting system, so it would have to fall down to the requirements level, because it would be outside of scope. So it's going to be the interfacing and the connectivity of functions 18 through 23, connected to what we know and is defined as a voting system. And so it would just be the interfacing and the requirements level, or the test assertions of connecting it. But it could not be tested and certified as a voting system because it doesn't fall within the definition.

Bob Giles -- But it becomes part, again, with the ENR, if a third party is coming in and wants to interface with my current system. To me, that you're gonna bring that in, now you bring it in. If I leave it standalone, and that's what I'm trying to get in the real world. I'm trying to figure out who would do something like this. I mean, hypothetically, yeah, you could have an ENR system that touches your voting system, but that's gonna require two vendors agreeing to do this and allowing them in. For me to say all right, third party, you can come into my current system, well, there has to be a lot of work that has to go on for those two to talk. And that's when then it gets added on to your well, now we already have a reporting system, but now we wanna do this extra one. So I guess I'm just trying to find, a lot of it's hypothetical, and maybe that's where I'm having difficulty.

Matt Masterson -- I think this is the exact discussion we wanted to have, right? That this is why we're in this discussion, and so let me propose two things. Let's take a short break, let it sink in.

Matt Masterson -- And it's not going to get any better.

Matt Masterson -- At least not for you. And then we'll come back to it, because this is why, we're throwing this out there for you all to think about and discuss, right? In the end, this is for you all to scope out and think about how this applies, and whether it's appropriate, and take back to your respective communities to have a conversation, whatever. And so we'll come back and dig back into it. But I want you all to think about Ryan's statement about, it's not that it's required to be in, it's that if you wanted it in and tested, we were able to do it, versus not. So your ENR system, you wouldn't have to submit an ENR system, but you could if that was something you felt was necessary and touch the system. And yes, that would require coordination between vendors perhaps, if it wasn't from the same vendor. And so that's, those are the required. But part of what is trying to be respected here, which I think is pretty obvious, is the states that develop their own systems. That the Marylands that develop their own ballot mark, the state should have that ability to innovate without us interfering in that, right? And that's been a big topic of conversation, and so we're trying to strike the balance where we could have requirements the test that kind of functionality, but it doesn't make a state, cuz we can we don't have the ability to do that to states. That's not what we do or how we do it. So that's just thinking about it that way, because I think the concern around innovation is a good one. And we're trying to respect that innovation by saying it can stay out. But if a vendor wanted to innovate and bring it in and have it certified, that's also an option. So that's the balance trying to be struck. So we'll revisit it in 15 minutes, so 10:30, 10:30.

### 9:45 – 10:00 AM: Break

## TGDC Day 2 Part 2

### 10:00 – 11:45 AM: Scoping VVSG - Continued

#### Open Discussion

Matt Masterson -- We'll go ahead and get started. I know David's coming back as well as Matt, so I wanna pick off, what? David Wagner will be right back. Yeah he will be right back. We're gonna pick up where we last left the discussion off. I had a request during the break to put up the 17 functions, just a list of the 17 functions. So, if we can go to that slide to help understand it. And sort of like a presidential press briefing, I'll call on Lori Augino. We've already got it teed up coming out of the break for a comment, so Lori, the floor is yours

Lori Augino -- So, to kind of Dove tail onto the comments that Diane made. I have a real life example of that being a challenge for me. My state law requires that the piece of equipment that's used in a voting center, one in every county at least a minimum. Is the device that was certified by the EAC through the certification process. But that device isn't the most accessible device isn't the most widely used device they're not the ones that tend to be we've struggled to be able to innovate or I will put it this way. We have innovated while we're still required to keep that piece of equipment in the field operational and I think that becomes. Now that's an issue with our state law because I think we could try to find a way within our state law to make modifications to that. But that is a challenge for us, because if there was the ability to take a different device that might be more accessible in terms of just marking the ballot. That might not necessarily be something that's interfacing with tabulation, it might just be marking the ballot. But if we could find a way to just certify that particular tool, then I wouldn't have to, there wouldn't be a requirement to change my state law. But I also like the fact that I can say that it's gone through EAC certification because that means something. It means that it's gone through rigorous testing it means that it meets these standards and that's meaningful for us. So that is kind of a challenge for us. Where we I have locals who are required and they don't like it to have to take the time to set up that additional piece of equipment set up all the audio files it takes a lot of time. And no one's using it and there are better devices out there that are available that are more widely used so.

Matt Masterson -- So part of that, I think it's a great point. And part of that strikes that two things that I guess come into play here. One is there's the requirement for one accessible device. That is what it is, that's the law, right. And that goes back to your presentation last TDGC meeting where you walk through the legal requirements, maybe to meeting to go, where you walk through the legal recourse, that is one of the legal requirements that exist. Also existing is an ADA requirement which is much broader about the process having to be accessible, right. That is part of the a requirement. The second factor in play here, I think for this body to consider and we deal with in the certification department all the time, is a balance between wanting to provide you the certification service you want. We think certification is a value, it's nice to hear that it is, but also allow you all to innovate outside Outside of the certification process if you choose. And so, if a state wants to create their own ballot marking system from a ballot marking system. It's not the EAC's place to say one way or the other but we should be available if someone wanted to test it. And so that's I think part of the tension that we're hearing in this conversation is, I'd really like it tested, but I really don't want you telling me I have to test it. And that's why we looked at the functions is try to strike that balance to say okay we don't care what it is if it functionally fits within it submitted to us we need to have a way to test it. So, I don't know that makes sense but that was the thought process behind it at least.

[UNKNOWN-SPEAKER] -- I think it makes perfect sense, given that I know, [LAUGH].

[UNKNOWN-SPEAKER] -- [LAUGH].

Matt Masterson -- And I will add, given that challenge with, it still absolutely makes sense that the system should meet, because if you're going back to the definition. The system should meet all 17 of those core functions. In order to be required, or in order to be eligible to be submitted for certification. And the other kind of idea that I had that we were talking about on break, is, so even if I don't have a EAC certification there's nothing stopping me from asking that technology provider to work with the. And have that system certified to the EAC standards or to these, the VVSG 2.0, test the function.

Matt Masterson -- And I think that you were smart to take the break cuz they took me outside and beat me over the head and I, I get it now.

[UNKNOWN-SPEAKER] -- [LAUGH]

[UNKNOWN-SPEAKER] -- [CROSSTALK]

Matt Masterson -- So you wanna take another break then, Bob?

Bob Giles -- Yeah exactly, yeah. Then you guys wanted, I'm not going to lunch with you. But now to Lori's point I think that's where some of the confusion at least for me because you guys there's a difference between EAC certification and having it tested. Can you put up that line that you had with the one through 17 where you broke out the functions. So, if you wanted to. No didn't you have one where you had one through, like you broke them out, this is 1 to 2 and then 5 to 7 and, yeah. So like that, so if I I just wanted to do something that fell into 5 to 7. That's what I was getting at. I can do it outside the EAC certification. I can tell my vendor, I want you to go, I want you tested to the VVSG functions. The 5 through 7 or whatever it is. And then, I can bring it into my system it's not touching the system. But it's outside the system. But it is tested. So, I get it and that's makes a lot more sense to say you can test the functionality, and it's still the same days trying to get of that device mentality out of our head but and I I think that's much better. I like that approach that now that I understand you or your specific that EAC certification versus this they'll test that.

Matt Masterson -- That's correct. Yeah and the hope of writing the guidelines and requirements as such is so that you can pull whatever it is that you need for your VSTL testing, or the VSTL will already have it, or you can use it for your own testing internally that may not be through VSTL, if you have your own certification. Vacation board or body and so for instance on this slide if this was the EAC system but this is the functionality that top line that you want to do at your state, but you don't wanna bring it back to EAC you could just take that top line and put it through a VSTL and have it tested. And so this would still be the EAC certified system, but you could do that. Or you could bring it through the EAC. And so, if it is something that we could look at, it could be looked at separate and apart. So, it could just be that piece, and so it's not a system to us. But you would still be able to see what the functions are, and have that tested outside of the EAC certification. So that to like the ENRI I can even if I exporting a file I still it's not touching my system but I want some kind of testing done. I take it and I say go to the VSTL with ENR and then I will. And Ryan it just alluded to this. And so, my thought about it a break while a systems in for certification. If you had a separate ENR system. You could request that separately ENR vendor to go to the lab where they were the full voting system is in for certification and have it tested at the VSTL while you're, the voting system's in there. Because they've got those systems in there, and that would be separate from the EAC certification for that ENR. But you have an efficiency that's built in, because the system's in for testing and end of still knows how to test the required. So, you could get a separate New Jersey State Report about ENR, that talks about that interaction with a voting system that was in for testing. So, there's efficiencies that are created in that functionality as well.

McDermot Coutts -- There are definitely efficiencies that it get created there, but there is also additional cost that gets created there. And, I realize, that the States think about themselves and, that is that appropriate unfortunately we have to think about all 50. So, if we get a requirement for you that you want to go back through an EAC campaign. I am either creating a New Jersey specific version, or I have to go back through all my states to re-certify on all the states. And so, in one direction I have increased my cost by a ridiculous amount, or I've created a configuration management nightmare. So, these are some of the issues that I would caution.

Matt Masterson -- So, as it connects and, I mean, that occurs now we with our current systems we an example for New Jersey is we have our say, we're four point o. But Louisiana needed something different. So, they're four point one. Four point o is certified in my state, because it works for me Louisiana needed something additional, so they're four point one, and the bottom line if you wanna do business in that state, you're gonna do it. So, and you're right, we're looking out for us, because we have to protect our interest as election officials, and we're gonna come to you and say, this is what we want or this is what we have to have if you wanna do business in our state, I get it. There's a cost.

Ross Hein -- Yeah. But what I what I'd add in it. Unfortunately the election officials are thinking about themselves. The manufacturers not thinking about themselves.

[UNKNOWN-SPEAKER] -- [LAUGH]

Bob Giles -- So that, right. But the other part of that is if states are asking for this. Separate functionality to be tested right outside of the certified system. Those test reports, and that testing if taken to a VSTL by New Jersey is tested to known requirements. Requirements you know as a as a vendor, other vendors would know, because it's part of the fully EAC certification, and therefore other states could choose to use that New Jersey testing to evaluate in their state as well. Right, because they're known requirements. They're not New Jersey specific requirements, they're EAC requirements that exist around functions five through seven, right? And, so they're known requirements that the VSTLs know how to test, that the states are familiar with, and that you as a manufacturer have design to or at least are designed with in mind in that way. And, so you're right it's gonna cost money. But I actually, I think, that there's more efficiency to be found as well, because these are known requirements that you're testing to versus some states you just say, hey take it to a lab and make sure it works. Well that's not unknown requirement, that's just take it to a lab make sure it works.

Brian Hancock -- The commissioner and just to add on to that. And this is probably more down the road, but to the extent that states can can look at these functions, and kinda build that into their state certification process, the state certification group can kind of look at this, and see if it's something they may want to add it, may have additional benefits a little bit further down the road once those can be incorporated some more.

Matt Masterson -- And the last part of the efficiency going back to what we're talking about is for instance, if New Jersey takes it through even if it's for a state certification, if they can tie the test assertion to the requirement, they can then give it to us the EAC, and we could build it in as a test assertion. So, we were talking yesterday about the multitude of rotation, Jack alluded to that and said you know we test what we know based on where people are going. Well we build in those test assertions, so if you know you're going to a state that could be incorporated now into the EAC testing even though it was at New Jersey previously, at for their state level testing they've provided that test assertion based on the requirement and the functionality. And so then, that can carry through to every certification, so that they then don't have to retest it. And that could be something that could be pitched to the state legislatures, and or the election boards, or whomever the body may be to reduce some of the testing that may be done at a state level. Because the EAC is now wrapping that in the way that we do with some tests now. But we can actually point to specific test assertions that will carry forward.

[UNKNOWN-SPEAKER] -- Perhaps this context helps think about it too. So, 47 out of 50 states use some part of the EAC certification. That maybe full certification, so the sticker, that may be just the standards, that maybe the VSTLs, but to their own testing requirements. And, so part of what, I think, the structure helps facilitate is that of a state does its own certification using our requirements. These requirements are going to cover what they need the system to do within that state for the most part. There may be some unique requirement, but if someone wants to take it they can take it. And it's gonna cover the variety of systems that they're gonna see introduced to their states, and use it in that way. And, so it makes it, for those states that simply require use of the requirements, but not our certification, if they wanted to test at a vistal on their own, these requirements are likely to cover what they need the system to do. So, that makes it more applicable. So, we're trying to serve that Chinese menu of selections that states have chosen to use of our program. Which, I think, is good for everyone. Other thoughts

Ross Hein -- Just a question when you're talking about them how this ties particular to the scope. Then the question that we may give as election officials is RVR systems in scope, and what is the best way to address that? I assume the answer is no, but the particular components like offices, and candidates, and various jurisdictional level data that gets then utilized as part of the voting system is. And so, I think, that's just as when we have to craft this to a various constituencies, just to make sure that we're on the same page of how that pertains to the scope.

Ryan Macias -- And, so as it was discussed at the last meeting VRDB is out, voter registration is out, it doesn't fall within the scope here. Where that would start is the input of data. So, as now if that data is manually input, that's where it starts. Is you get a piece of paper that says here's your list of candidates in contest. Now, type it into your EMS. Here that's step one. So, that's where it would start. If you were going to bring that in electronically, then we would look at that interface of bringing it in electronically to be able to give you the assurance that what was exported from your VRDB, is able to be imported, but it has that feature the import feature not the export feature, where we start here is the the input data. So, that's really where it ties.

Ross Hein -- Well, and just a follow up, I think, that's important, because you I don't think any election official really is looking for a full VR system vs system certified. But we constantly are hearing about inner operability, and common data formats, and being able to utilize from the beginning all the way to the end, and create efficiencies. And, I think, that's part of the message for election officials to be able to tell our constituency that although we're not gonna be looking to give voter registration system certified. We gonna still be able to utilize all the data that is pertinent throughout the entire voting process. And that, I think, is a critical element.

Matt Masterson -- Additionally there's one of the things you all approved. I think, at the last meeting, as part of the charter is this idea that the work we do here can help inform best practices information around a variety of systems. So we. We're not gonna test and certify VR databases, but we have a checklist on the EAC website that was based on NIST information, and what not, and DHS information on securing voter registration databases, right, things that you get a checklist for that. And so this work informs other work, but no, we're not testing and certify because it's not within our scope, it's just simply not within the scope of the voting system in that way.

Mary Brady -- So I think this speaks a little bit to the conversation we were having yesterday on interoperability, and what parts should be in scope. I would view a common data format surrounding voter registration information as potentially being one of the methods that can be tested. If you're reading that information in using that format.

Ryan Macias -- I would say yes that the data format for the input would be something that could carry forward with interoperability because that's gonna be number one. Is the system that we're gonna be testing from a voting system standpoint, if it can take in that electronic data, then that format would be important.

Mary Brady -- And just a follow up on that, it might only be one of several ways of getting that information in.

Ryan Macias -- Of course. Yeah, again, we're not prescribing any method, but if that is the method that you want to be have tested and certified, then you could adopt the interoperability, the common data format for candidates and the like.

Matt Masterson -- John, get to work.

[UNKNOWN-SPEAKER] -- [LAUGH]

[UNKNOWN-SPEAKER] -- I was told it was done yesterday, and I won't start singing. Anyone else?

Lori Augino -- I'm curious if anyone has any, we've heard support, I think, for these 17 core functions to be in scope. Does anyone silence, or not hearing any concerns? Are there any concerns, I guess, I'll ask that, that we should be considering before we move forward?

McDermot Coutts -- I actually do not have any concerns about this because I like, sort of the limited scope, I like us breaking it down to bite sized pieces and identifying, very clear boundaries of the system. And then at that point, we can identify, through common data format, ways to interact outside of the boundaries of the system. Now and then, at a later iteration, if it becomes necessary or desirable, we can extend that common data format out to testing, and assertions for those external devices. So this gives us a really solid core that we can work from, and it gives us a base to grow on. And so I personally don't have any objections on this one, and those are my reasons why.

#### Final Agreement on Scope

Lori Augino -- I think we might be ready for a motion. I move to adopt the 17 core functions as in the scope of the VVSG 2.0, and direct whoever the appropriate people are [LAUGH].

[UNKNOWN-SPEAKER] -- [LAUGH]

Lori Augino -- To continue the work of writing the guidelines for us to consider at our next meeting.

Matt McCullough -- Second.

Matt Masterson -- Okay, so we have a motion on the table, if I may clean it up a bit.

[UNKNOWN-SPEAKER] -- [LAUGH]

[UNKNOWN-SPEAKER] -- You do [INAUDIBLE].

Matt Masterson -- Friendly. The motion on the table as is to adopt the 17 core functions as defining the scope of VVSG 2.0, in order to allow the public working groups nest in the EAC to move forward with the writing of The guidelines to these 17 core functions in the scope.

[UNKNOWN-SPEAKER] -- Perfect.

[UNKNOWN-SPEAKER] -- That what she said.

[UNKNOWN-SPEAKER] -- [LAUGH]

Matt Masterson -- And it was second.

Matt Masterson -- And it was seconded by. Matt, is there any discussion? Hearing none, we'll take a vote. All those in favor, say aye,

[UNKNOWN-SPEAKER] -- Aye. <Unanimous>

Matt Masterson -- All those opposed? <None> Wonderful, we did it, mission accomplished, mission accomplished. That's a beautiful thing.

[UNKNOWN-SPEAKER] -- [INAUDIBLE]

[UNKNOWN-SPEAKER] -- You don't actually, we'll talk afterwards.

[UNKNOWN-SPEAKER] -- [LAUGH]

Matt Masterson -- So we have a decision, the next decision's perhaps the most important decision we're gonna make, today. It's 11 o'clock, we have NIST and DHS teed up for noon, however, they're here, and so we can break for lunch now. It's 11, it's a little early, but I'm not afraid to eat. Or we can bring NIST up, we'll start with Josh, bring NIST up, and kind of roll through that to get that done. So is that what we wanna do, and not it heads? All right, so we'll bring Josh Franklin first from the National Institute of Standards and Technology up. Josh will be talking about the Cybersecurity Framework that NIST developed, and has improved upon since, and how it may inform our work here. Do you need a minute?

[UNKNOWN-SPEAKER] -- [INAUDIBLE]

[UNKNOWN-SPEAKER] -- Okay.

[UNKNOWN-SPEAKER] -- [INAUDIBLE]

[UNKNOWN-SPEAKER] -- I asked him to either slide.

[UNKNOWN-SPEAKER] -- Mary asked him that, yes, we'll take a ten minute break, so 11:15, 11:15.

[UNKNOWN-SPEAKER] -- [INAUDIBLE]

[UNKNOWN-SPEAKER] -- Right, it's all right, 11:15, we'll take a ten minute break, go. It's a five minute break, five minute break.

### 11:45 – 12:00 PM: Break

## TGDC Day 2 Part 3

### 12:00 – 1:30 PM: Working Lunch Discussion: Cybersecurity in the Real World

### Cybersecurity Framework– Joshua Franklin

Matt Masterson -- We'll now discuss the cybersecurity framework for elections and how that works. Josh, the floor is yours.

Joshua Franklin -- Thank you so much and thanks for having me up here again. I wanted to talk a little bit about NIST cybersecurity framework and see how we might be able to apply it to elections via NIST CSF or cybersecurity framework is a set of standards, processes or methodology procedures, basically to help organizations manage cyber risk. It is an abstracted version of NIST's risk management framework and it is made to be very easy for CEOs and top level managers to work with, and then basically provide information to their actual technical implementors. The NIST cybersecurity framework was created by executive order 13636 in 2013. NIST put out a request for information about how it should create this framework. It received input from a huge amount of companies, states. Other governments, folks like J.P Morgan, Boeing, Microsoft, Carnegie, Carnegie Mellon, Huawei, AT&T the the list goes on and so all this information was basically collated and put into a single framework to rule them all essentially.

[UNKNOWN-SPEAKER] -- [LAUGH]

Joshua Franklin -- [LAUGH] Yeah so the framework is meant to be fairly extensible, any size, any sector. It can be useful for folks who already have a chair cyber risk management process in place or for folks that actually don't have a risk management process in place. It can work for the federal government just as well as a really small election jurisdiction. The framework itself has three different components. The Framework Core on the far right, the Framework Profile, and the Framework Implementation Tiers. The Framework Core basically shows, it describes a number of potential security controls things that you might want to do to, help secure your system. The Framework Profile is basically a subset of that Framework Core meant for your individual organisation. The needs of the telecommunications sector are going to be very, very different from the needs of the manufacturing sector, banking so on. The Framework Profile is actually built by folks in that sector or discipline and then applied. The Framework Implementation Tiers show a methodology for how to measure maturity. How well or how well are you managing cybersecurity risk. Let's take a little bit of a look at the core here. There are five high level functions. Identify, protect, detect, respond and recover. Identify is basically what things in my network am I really looking to protect hardware, software, people things such as that, generally assets. What safeguards are available? That's the protection function. Detect is basically, what can I do to figure out what's going on in my network and in my organization? Respond is if there is something malicious going on what can I do to basically stop that from happening? And then recover is how do I get back to my organization's baseline? The core itself looks like this. Each function has a number of categories within it and each category has subcategories. We can see this is generally what it would look like when you're creating your profile from scratch and so the very first category inside of the identify function is basically about asset management. And this says the data personnel, devices, systems, and facilities, it goes on. And then, you have this actual subcategory here is that physical devices and systems within the organization are inventoried. The very, very next one is basically software inside of your organization is inventoried. And then each of these things are mapped to industry standard, basically to industry standards. There are NIST standards here, there are a number of other sectors specific standards and this basically allows certain industries to quickly pick up this framework and start using it. Once you understand the framework core, you have to basically pick out which things inside of that core are important to you, essentially. And that actually, that selection process ends up creating a profile. And this is a sector specific list of cybersecurity controls. Yeah, and so when this is actually happening, you have folks at the executive level that can basically use these high level controls and basically describe what they feel like their whole organization needs. You have people in the middle generally that are really, really good at basically business and process unique needs, and then all of that information is typically sent down to the technical folks actually for instance installing firewalls or doing network monitoring. The whole framework itself has a, has a 7 point process. Basically you have to Prioritize and Scope. What systems inside of your organization that you want to be under this framework. The Orient section is basically. What risks do I need to be worried about, at least at a very high level? The create a current profile is that process of selecting security controls for your sector. Conducting a risk assessment take some of those risks that you identified earlier, flushes them out and then provides impact metrics things like you know scale impact. Yeah, and then create a target profile is where you want to be. If I had a blue sky world where should my organization be in terms of managing cybersecurity risk? Determine, analyze, and prioritize gaps is the next section. And that's basically looking at that difference between where you currently are and then where you want to be. And then the implementation action plan is how are we going to close that gap? How fast are we going to do that? How much money are we are we willing to spend? Just some overall things here, the framework is definitely not a prescriptive standard, it is completely voluntary. We have tons of folks using this standard. Taking it on, modifying it, making it their own. And it's definitely a living document it's being updated I think in April to version 1.1. And all of those framework core. Security controls are basically being updated with information from people who have actually implemented this framework and then found issues or things that could be made a little more robust. So who's actually using this this thing? It's actually a fair amount of folks. Italy basically adopted this framework and modified it. I assume translated it and made it basically their national framework for cybersecurity. Folks from the energy sector. American Water Water Works, which is a, it's a very large nonprofit that basically works with every single level of government in the US to make sure everyone has clean drinking water. And they took this framework made their own profile. Said, what is important to us from a cybersecurity perspective for water treatment plants and other facilities? Examples of state and local use. I was gonna say anything but New Jersey, okay? Yeah I mean, so this is, there's some, [LAUGH]. Yeah, I mean it's being.

[UNKNOWN-SPEAKER] -- Yeah, right.

Joshua Franklin -- Yeah, [LAUGH] it is actually being used at the local and state level. So this isn't something new that the elections community would be embarking on. This has been done before. Recently NIST worked with a number of large companies from the the manufacturing sector to create a profile for the manufacturing sector. And they did some interesting things. They actually said we have four different general types of manufacturing plants. And they each have different goals. Be that personal safety, environmental safety, quality of product and production goals. And they have a different framework that folks are basically recommended to use. And so basically folks that have a personal safety mandate, and a quality of product mandate may overlay both of these control categories here. So application to elections, that's a big, big question. There's not really a unified way for elections officials and others involved in this community to basically talk about cybersecurity risk cybersecurity posture. It's really difficult to say look at not gonna say who they are, but the largest election jurisdiction in the whole US LA County, okay? Versus a really small county in Georgia, and it's really, really difficult to see where both of those jurisdictions are from a cybersecurity point of view. And this can really help make that discussion come alive. The elections community could create a profile. Just thinking off the top of my head, I would think that there would be a large, medium and small jurisdiction profile. Maybe we want different ones focused on the type of equipment that they have, that would be decision for this whole community to make. The framework is really, really nice because it doesn't just focus on technology. It focuses on procedures as well, which are really key in elections. It definitely takes two to tangle. Who would lead this? NASED, EAC, NIST, I have no idea. But whoever, it would need broad community involvement. But would have to be led by election officials, I think, because they know their jurisdictions best, they know what's reasonable. Yeah, so any questions, thoughts on that?

Bob Giles -- Yeah, I have a question. So would this be something like a profile we would wanna or could develop for the VVSG and somehow tied into the VVSG? Is that something we would look to do or? And I guess maybe this afternoon we'll have more discussion on critical infrastructure. How is this document impacting the VVSG now that we're critical infrastructure and should we create a profile based on it?

Joshua Franklin -- That is a very, very reasonable question. I'm not sure how it would end up but I mean that is definitely one route to take and I see nothing wrong with that.

Bob Giles -- And if we asked NIST to do it, it would work?

Joshua Franklin -- No, I don't think I make those sorts of decisions.

[UNKNOWN-SPEAKER] -- [CROSSTALK] [LAUGH]

[UNKNOWN-SPEAKER] -- Don't answer that.

[UNKNOWN-SPEAKER] -- Don't answer that, okay.

[UNKNOWN-SPEAKER] -- [LAUGH]

Bob Giles -- Yeah, but I think we can have this discussion this afternoon further but it's is the big question for us as to where we fall with this.

Matt Masterson -- I have a question you worked when you were at the EAC a little bit with the risk assessment tools that were developed as part of EAC work. This seems like a practical approach that could use those to apply it. Do you see application from what we already have or is that kind of a separate?

Joshua Franklin -- My goodness, yes. Yeah, I mean, there was a lot of great work done there and I feel it's been a little bit under underutilized maybe. And that could feed directly into the risk management process. That is like step five here. Yeah definitely, I think a lot of that would be copy paste and then sort of up level a little bit. There would potentially be, areas to basically bring in some of the some of the risk assessment work done for you cover risk assessment. There's just a lot of good work that could be compiled into one single document. Conduct a risk assessment number four.

Matt Masterson -- Anyone else for the question. I've got more, but how long does this take? So, what have you seen in other industries as far as length of time to create? It's probably an ongoing process once it's created, but the initial steps of what you used the water industry what's a general time frame. I think at NIST for the, for the manufacturing sector that's you know that's the only data I have. I think that did take about nine months but that's not really taken into account, how often folks, you know met to work to sort of work on this and make it better. It could definitely be done quicker if there's if there's a big need for it.

Ross Hein -- How do you think this works with when I know we're going to talk with DHS just one critical infrastructure. I know many states utilize services that they provided with doing security scans and they're going to have all three and I'm sure just gonna talk about some of the options with more full scale assessments. How does this differ from the services then offered from DHS.

Joshua Franklin -- Well, I can't speak for DHS but DHS, you know does offer these real world services that they have came and briefed on last time at the DGDC. This is more of a framework to basically help election officials help themselves and express what their security issues are. DHS has definitely provided very deep input into this whole framework. They were they were definitely involved in it and the water profile, I mentioned here was one of the the the main folks creating that American waterworks profile.

Lori Augino -- This is excellent. I could see where this could fold into the work that we're doing on our continuity of operations planning.

[UNKNOWN-SPEAKER] -- Okay.

Lori Augino -- And almost it could be an addendum to the work that we do already on an ongoing basis to be prepared in the event of an emergency. Because really our infrastructure technology infrastructure we're so dependent on. And so this could be a really nice way to modernize our continuity of operations planning. So thank you and lower, so we have the templates and all that.

JF - Okay, yeah definitely. I can make that happen. We can send it around. I assume there's some sort of mailing list.

[UNKNOWN-SPEAKER] -- [LAUGH]

Matt Masterson -- Ross, just bring that back up after we have the-

Ross Hein -- Yeah, let's do that.

Joshua Franklin -- Presentation I did because that was sort of the purpose here, is to give you a little bit of background on the Cybersecurity Framework, a little bit on the

Joshua Franklin -- Cybersecurity Center of Excellence and DHS services and then have a discussion about these are tools that are in the repertoire. And how do we want to move forward?

Matt Masterson -- Given where we are on the VVSG now on development, we're kind of mid to later stream. Quite honestly is there anything that can be taken from this now and used to help inform the VVSG to make some of the decisions that David mentioned yesterday about given takes away one thing that I think election officials inherently do is identify risks and their processes mitigate those. It's an ever evolving process for them.

[UNKNOWN-SPEAKER] -- Sure.

Matt Masterson -- And so, we go off of anecdote in those steps

Matt Masterson -- But is there a way to get to undertake formally just within the confines of the 17 functions that were just approved to formally look at. Okay, what are the real risks work with the election officials to do that to inform the cyber security requirements instead of just going of we're really afraid of this or this concerns us greatly right like let's have an informed process that assesses that. Using the 17 functions as the scoping could that be done now given where we are in the VVSG process?

Joshua Franklin -- I could definitely think that it could be done. This whole framework is really meant to be pulled apart and used however a community needs it and if we want to for instance put in our various principles as one of these areas or all of these areas. We could definitely gathered you know data and sort of use that as input to a risk assessment process. That is definitely something that we could do. It will really end up being what this body thinks in terms of what our priorities are. And so, if this you know if this body ends up thinking you know maybe this cyber security principle isn't as important or we feel that it's that it doesn't prove prove vital as much you you utility as others. Then, we will basically make the framework profile, 1 way versus a different way.

BG - So, and I guess back to what I was talking about yesterday as far as with the vendors or the manufacturers. If we develop something that became part of the whether it's the application process. And developed something they would have I guess to follow. If you're gonna be a vendor or manufacturer voting equipment, through this we've set up a certain risk assessment and you maybe have to go through vulnerability assessment and different things like that. I don't know what, you guys think about that as far as incorporating it somewhere in the process.

McDermot Coutts -- We just have to be careful to limit the scope on that because a lot of what is informed and here is contextual. Contextual to your setup and your layout and how were in your process he's in the state. So, we can suggests perhaps that this would be best process based on what are the way we've designed the software. But if you choose not to do that then we have to redefine and you have to make that redefinition.

Bob Giles -- You said different companies use this and maybe that's why I'm looking like we're kind of have this big picture, not maybe down to that but to say, you know there's certain things you need to do as a manufacturer, so we feel secure you're not only who's building machines but how they're built. How your processes are, and are you following the security measures that we need?

Matt Masterson -- So let me flip the question I asked before a little bit.

[UNKNOWN-SPEAKER] -- Okay.

Matt Masterson -- Within the cyber security public working group,

Matt Masterson -- Was any sort of risk assessment or some sort of framework like this applied to identify principles and priorities, or was it just that expertise that was shared or both.

JF - That's a great question. Yeah, I mean, I would say that many of us thought that a risk assessment should be done first before we started doing anything. But frankly given the truncated timeframe that we were working on, we were directed to identify principles and guidelines and that's what we did. I think the whole working group would definitely like to undergo a risk assessment process, I would think.

Matt Masterson -- Dr. Wagner.

David Wagner -- Dave Wagner. I don't know what your timeline is but, all right. I'll be blunt. I don't think we need to do it. I think this is already informed via risk assessment. The community's been working on this, thinking about this problem for a decade. The people on the cybersecurity working group have been thinking about the security risk for voting systems. We have dozens and dozens of in depth reports and papers and analyses of broad variety of risks on the previous iteration and the TGDC we did an exercise where we did this attempt to try to do a comprehensive list of risks and severity. I'm concerned that this would become a paperwork exercise where we repeat what we already know and it doesn't really move us forward we're at the same point where we're at before we did it. I guess I would like to understand better what the purpose or the goal of the work would be, what are we trying to accomplish? What decision is it gonna help us make?

Bob Giles -- And I don't know if it's creating the profile and having one place to point two. You made the statement that there's all these documents out there and there's a lot of work out there. I don't know if doing something like this in creating a profile focuses all that into one area, or one document. And I don't know if that's, make sense.

David Wagner -- I think we're having a discussion about a couple of different things so let me see if I can try to separate them. One is the VVSG, which really relates to what are the requirements for the equipment? Like that the outside vendors that are building a certified voting system what are those have to meet? That's not the totality of cybersecurity concerns. I mean this security of your operation is also dependent a lot on your posture, your operations, your processes, the deployment, and kind of IT management operations, all of those aspects are outside the scope of the VVSG, but then are within this framework. This framework incorporates all of these kinds of protective measures that you might be using, monitoring or access control and who are the personnel who have access? And how do you respond to incidents? And do you have continuity plans? And who are your partners and your suppliers? And a range of these kinds of management and operations concerns that would go beyond anything in the VVSG. The framework I don't know I'm not an expert on it but I interpret it as a language or a framework or a hierarchy for talking about those different kinds of techniques that are often used in IT security. Many of which are going to be outside the scope of the VVSG. If we're talking about what's the impact on the VVSG? That's one question if we're talking about, is there some resources that could be useful to election officials to help manage their operations or you know think through these kind of concerns going beyond just the scope of the VVSG. Then that's different that maybe leads to something more like this framework. Is it fairer?

Mary Brady -- Yeah and I do think it is the latter of those two that this is potentially a tool that could be used by election officials to look at things like the continuity of operations or maybe to think ahead about the problem that you talked about yesterday. Lori where you had knowledge but the IT people that were implementing it didn't, have those to facilitate those kinds of conversations so you can ensure that you're on the same page and you've got the coverage that you're hoping to achieve.

Matt Masterson -- Yeah it seems to me, and I may be way off, but it seems to me that in writing the VVSG keeping this framework in mind as a means by which we can have a follow on discussion about procedures not we this group but that the elections community using this framework. That if I'm buying a new voting system certified to the new VVSG part of what I can do is understand what does the VVSG cover within the confines of this framework and then what do I need procedurally and otherwise to help bolster what's already covered within the conflict because like David said the systems can only do so much. There's then you have to look at your own operation and office and how things are secured there. And so it seems like one can inform the other but if I'm making purchasing decisions part of what I'm going to try to make as far as a purchasing decision as far as a system I think is to understand how that system fits into my larger cybersecurity framework within my office. And that seems to me like information that we get we can create profiles around what those offices generally look like to help inform beyond what the testing certification already takes care of and I don't know if that makes sense at all but.

Joshua Franklin -- It definitely does. And if you wanted we could while we are creating these profiles we could definitely highlight which one of these things are inside of the VVSG and which ones aren't. And that might be another useful piece of information for election officials.

Bob Giles -- And I think that would be great, if you could map it to, I think that would be excellent to say what's inside, what's outside and then.

[UNKNOWN-SPEAKER] -- Definitely, do that.

[UNKNOWN-SPEAKER] -- We can address it accordingly. That would be great.

[UNKNOWN-SPEAKER] -- Yeah.

Matt Masterson -- Other questions or thoughts for Josh? Awesome, Josh thank you. I think that this framework really puts into what structure in writing what many ways a lot of elections officials try to do inherently as they look at their operations but at but having more information about how to do step by step go through that is this important so I appreciate it. Next up roll on. We're just going to roll on.

Joshua Franklin -- You're actually not done with me.

[UNKNOWN-SPEAKER] -- What.

[UNKNOWN-SPEAKER] -- [LAUGH]

[UNKNOWN-SPEAKER] -- All right go ahead.

[UNKNOWN-SPEAKER] -- Questions, [INAUDIBLE].

[UNKNOWN-SPEAKER] -- Yeah go ahead.

Joshua Franklin -- I can move a little bit faster here.

Matt Masterson -- That's all right.

### NCCOE – Joshua Franklin, NIST

Joshua Franklin -- I was asked to talk about [LAUGH] the National Cybersecurity Center of Excellence which is the NCCOE. The NCCOE is often stated as NIST cybersecurity lab that is that is often how it's basically shared with other people but it is a separate facility about 15 minutes from this NIST main campus that basically is a place where companies and government come together to basically build a real world cybersecurity architectures and build outs. Overall, the mission is to accelerate the adoption of security. Technologies, so what that means is there's often a really great and really cool tech that is basically out there that no one's taking advantage of and so NIST basically brings those folks in-house and we actually apply that tech to a given discipline or sector and then we show everyone else how to do that. This was an initiative that was sponsored from the very very top. It was definitely sponsored by the White House, NIST, USD, Department of Commerce, Congress and Montgomery County and the state of Maryland. The state of Maryland actually ended up giving the the building to NIST for us to have our own cyber Security facility. We basically bring everyone that we possibly can together under one roof to basically talk about cybersecurity and what challenges need to be solved that is definitely Industry, Government, Academia, interested advocacy organizations. And basically, we are trying to get US companies to build this tech into their networks. Every single solution that we make is supposed to be standards based. NIST really likes standards. Spoiler Alert.

[UNKNOWN-SPEAKER] -- [LAUGH]

Joshua Franklin -- Modular, so we are sitting here talking about component certification earlier. This is so you can essentially pick up one part of this solution repeatable. Commercially available and nothing's secret, top secret. Proprietary is built there, usable and open and transparent. So we are basically signing on companies who want to work with us every single day. We have some pretty big names there folks like Microsoft and Akamai, Cisco, HP, and this this list is basically growing every single day. Each company that basically signs up as a former partner freely offers its technology to the to the center to basically use to solve cyber security challenges. So I was asked to say, okay what is this actually look like? This cell sounds really really nice. So I lead the Mobile Security build there. Our overall goal was, basically secure email contacts and calendar. That's what, those are primary work force drivers on your phone and so how can we do that so clearly? We worked with four different companies Microsoft, Symantec, Lookout, and Intel to basically build a solution. They signed up at at front Helped us figure out what principles and characteristics we were sort of worried about. And so these are what we ended up thinking would be pretty in important items. We designed the system that that we actually wanted to built and then we and then we built it right, and the NCCoE is basically the the real world implementation of NIST standards. And so that's that's basically what we are trying to do. We wrote up step by step instructions for actually how to to build this. We are trying videos. Maybe we're not exactly sure what the public wants and so we're definitely working to see how we can make our solutions be more applicable. So can we basically bring election systems into this model? Maybe. It would be pretty interesting. We would basically architect and build some sort of elections deployment that could be voter registration, that could be vote capture and tabulation that could be ePoll booths. I'm not quite Sure, maybe we want to set up our own polling place at the NCCoE. But whatever we did, we would basically document the whole process step by step and show every single elections official how to do what we did in our lab. We would need the right folks to participate. So vendors would basically have to come in and sign Cooperative Research and Development Agreements, so CRADAS. It is a standard legal agreement to protect both sides but it will also show that they want to provide their token basically help us use and show it. But it's really only worth it if in the end election officials are going to use our output. We don't wanna build something that's applicable to like 15 different counties and that's it. So if we're going to do something like this it would need to be pretty high scale. And we would be, hoping to get a good bang out of our bark. So, yeah. I would just like to see what your thoughts are on something like this. Questions, thoughts, comments?

Lori Augino -- Holy cow that's super cool.

Joshua Franklin -- Yeah it's fun.

Lori Augino -- I want to go there and I want to start building.

[UNKNOWN-SPEAKER] -- It's not legos.

Lori Augino -- But that's amazing and I think that it's like you said if people, if technology providers are willing to come and kind of share their work and collaborate that could be a really powerful way to move forward and we should do a field trip to the location at a future NIST meeting. I just have a vision of what it looks like.

Joshua Franklin -- It's really really cool looking at, they have very large meeting room we could host something like this. I'm probably getting myself in trouble right now other comments, thoughts.

Bob Giles -- I agree, I think it's a great thing to look into and it's got excellent potential.

McDermot Coutts -- One of the things that we're currently struggling with is the standards around security and for better or worse the encryption and everything because for some reason it seems to often boil down to that for better or worse. Would this be an area where we could create a standard implementation of encryption and protocol for use in voting systems?

McDermot Coutts -- What we definitely could do is you would essentially have NIST engineers working side-by-side with you to basically meet Fip's standards. I'm not saying that we would create a new standard there but we would basically create a step by step best practice. Type thing. It's just NIST is generally sensitive about standards coming out of the NCCOE. But I mean, it could definitely be real world implementation guidance for basically how you could deploy FIPS, validated crypto modules in voting systems, definitely.

Matt Masterson -- How do you all decide who gets in, who doesn't? So, is it one company that needs to come? When do you reach critical mass if this becomes worth your time, money?

Joshua Franklin -- So money is a big thing. It definitely talks, yeah but you're also sort of getting into interesting legal area there. It's generally first come first serve. So, NIST says, okay we have a project that we are looking for, a security challenge that we are looking to solve. They put out a federal register notice and basically a general call to all companies in the IT cyber security community, and it's generally first come first serve. Whoever comes first gets in as long as their tech meets the cyber security goals, principles, challenges. As of right now I am working on a single mobile build that has probably 12 different companies in it because a lot of folks responded, so we have three different builds in one project.

Mary Brady -- So it's my guess it's not free. That it [LAUGH] to take it off you have to put together a project proposal/white paper for consideration and then that's what gets-

[UNKNOWN-SPEAKER] -- You who? Josh puts that together or the community?

[UNKNOWN-SPEAKER] -- The community.

[UNKNOWN-SPEAKER] -- Okay.

[UNKNOWN-SPEAKER] -- Although we would have to decide what portion do we want to bring in and explore inside with the NCCOE?

Bob Giles -- So if the disability community wanted to look at electronic return of ballots would be something, I know it's something that's always outside the scope of what we're always talking about, but it's always coming up in our discussions. Would that be something, and whether it's the military and overseas voters, or the disability community, would that be something you guys would look or is that too much of a hot button issue? I don’t want to put you on the spot, but-

Mary Brady -- I mean you know, there's no doubt it's a hot button issue, if that's something that as a group we'd like to pursue, then we have to write it off in a couple pages and float it by the folks over at the NCCOE.

Matt Masterson -- And it this isn't to dampen it but just to put in context, the role of the TGDC isn't to do the right, we're right stand it would have to be the elections community. Whoever that may be that had that discussion.

Bob Giles -- I'm not saying this group but I'm just saying is that, I was just curious, because it keeps coming up in our conversations but if there was an organization that wanted to take that on I was just curious if that's something these guys would do?

Diane Golden -- Yeah I'm still trying to get clear in my head the process the who and the how and the money question that's been the perennial problem. This is not, I mean there's a center for cyber security there isn't a center for accessibility, go figure. It's because that's where the interest in the money and the companies are, and so if it's, if there's money required then where would that come from is the question?

Mary Brady -- Yeah well I mean the NCCOE is set up to accept funding from many different participants and it's not necessarily all funded by NIST. So there are defined processes for these things and we can certainly get you more information.

Joshua Franklin -- Yeah, I mean the DHS has a continuous monitoring lab set up at the NCCOE, and it's basically an outside funded project, and NIST engineers and other folks all work together to help solve that problem.

McDermot Coutts -- One question on this to kind of defray the costs is, how much of what would be done in this environment would be reusable as part of the VVSG tests? So it does this inform the security assessment, so that so just the thought.

Joshua Franklin -- That's interesting.

Joshua Franklin -- That's a really good question. Yes I mean the NCCOE tests every single thing build for both functionality and security, and they actually do create test plans, and so there's not really a generalized test protocol. It's basically created for every single project but I mean It would be interesting to see if some of that, I would think that some of those testing procedures could be reused for standardized VVSG testing.

McDermot Coutts -- Well, reused or could we get the report accepted?

Diane Golden -- Accepted, just accepted, though it's already done so the there's no reason to repeat it.

Joshua Franklin -- So any testing that the NCCOE does is basically not under NVLAP's program. So I mean that would be a big issue. I'm gonna defer to Mary there, how are you doing Mary?

[UNKNOWN-SPEAKER] -- [LAUGH]

[UNKNOWN-SPEAKER] -- [LAUGH]

Mary Brady -- Hey guys, I think it's something that we can investigate. Josh says is actually right, it's not an NVLAP accredited laboratory, it hasn't been accepted by the EAC as an accredited laboratory. But certainly it's a place where we can learn. We can implement, we can build solutions, and maybe transfer that solution for use by laboratories.

Matt Masterson -- Further discussion? Anything? Are you done now?

Joshua Franklin -- I've got third. Oh, yeah.

[UNKNOWN-SPEAKER] -- [LAUGH]

[UNKNOWN-SPEAKER] -- All right. [LAUGH]

### DHS Services and Critical Infrastructure – Geoff Hale, DHS

Matt Masterson -- Again, it's 11:54, I'm good with pushing on, that's okay with me if that's what you all want to do. Technically we're scheduled for a 30 minute break to get food and bring it back, but I'm good with pushing on if that's what you all want to do. Let's do it. So next finally, is Jeffrey Hill. Jeffrey joins us from the Department of Homeland Security. Jeffrey is kind enough to come talk to us about the work the DHS did during the selection and then perhaps more importantly to discuss the designation of election systems as critical infrastructure, and so, Jeffrey will discuss that, and then we'll open for questions, of which I'm sure there are many. And Jeffrey it's no surprise to you, the election community eagerly awaits being able to ask some of these questions, and begin to have this conversation around what this designation means. So, I appreciate you being here.

Geoff Hale -- Sounds good. Thank you. Yeah, again, I'm Geoff Hale from the Department of Homeland Security. We are, in my mind, still a young agency, although it's getting to the point where I can stop saying that. These are our five core missions. I've highlighted the one that I work in, safeguarding and securing cyberspace. My overall organization is the National Protection and Programs Directorate. We work in resilience for cyber and physical infrastructure. In the corner here, and there's a larger graphic of this later, there are 16 critical infrastructure sectors which Which we serve. How we do our cyber mission is we have direct capabilities online to protect the Federal Civilian Executive Branch IT networks. We provide the private sector, state, local, tribal, and territorial governments with expertise and some services to help manage their cyber risk. And in the case of an incident, we have teams that we can deploy to help you recover and restore your networks. So for that second one, the services, information and assistance that we provide to state and local governments. We focus the areas on identifying and eliminating vulnerabilities, assessing threats and sharing relevant information, and applying security expertise and best practices. And again, there's Fly-Away teams to stand next to you and assist if necessary. I did the slide the last time I was here because I feel like we always have to explain why is DHS here now. I've been working for, I guess as long as we've existed with state CIOs or chief information officers and information security officers. And as the Commissioner continues to say, elections are becoming more and more like IT managers. So we wanna make sure that as IT managers, you are aware of the services that we already provide to states and local governments through the CIO and CISO shops. And that those are also available to you. So some of those services we went around providing. I believe I spoke in September about this was our primary push, was the Cyber Hygiene program. It's a no-cost remote, recurring, un-credentialed scan of Internet-facing systems. So for the vast majority of stakeholders, that does not include voting systems, that does include perhaps online VRDBs. And so this is a very kinda fundamental scan of what an adversary might see. We had 33 states sign up for this between September and Election Day. We had 36 local governments do it as well, just for elections. We've also had private sector vendors, academia, media, all in the push for better election assurances. These scans are actually rooted in a vulnerability and configuration error database that NIST hosts. Many of the states that chose not to use the service said they had a similar capability in-house. Some states had that as well and chose to use us just as a verification tool. This was the main push. Because we got into the election space so late, we knew there was very little, as far as policies or actual structural, opportunities for change. So this was something that you could protect a server or Internet-facing infrastructure fairly quickly. It's a routine task for an IT manager. We have a more in-depth Risk and Vulnerability Assessment. This is the one that we'll have a team that takes the first week to try to exploit your networks from afar. And then the next week, goes on site, does the kind of cute tricks of leaving USB sticks in the parking lot, and you'd be shocked how many people will actually stick that into your your network. We have social engineering, there's operating system scanning. This is the one that gets a really detailed look of how your network can be penetrated and exploited. Because these have to be scheduled ahead of time, only one existed for election systems before the election, but we've got several on the queue now. There is a nine-month wait for the general private sector to request this, but there's always priority given to critical infrastructure, so we can get these done faster. This is another assessment that focuses more on policy. We did not push these for that reason I gave. There are very few opportunities to alter policy between September and Election Day, so I don't even think I mentioned this. We have field-based personnel that can come sit with your chief risk officer, your CEOs, walk through some of the best practices and policies that take place. This aligns to the NIST framework, DHS loves the NIST Cybersecurity Framework. We find it's almost the best Rosetta Stone for your IT manager to talk to a CEO. It's about the only opportunity they could speak the same language. This can also be done as a self-assessment. We have our tools and services available on our website, that I'll show later, that you can walk through and check off that you're performing these policy duties and best practices. The regionally-based personnel that I just described are Cyber Security Advisors and Protective Security Advisors. They are responsible for making themselves available to the private sector, to state and local governments, assisting in any way. These are not law enforcement, they are not incident responders. They are subject matter experts that you can sit with at your location and understand what the rest of the country is doing. So that kind of covered the opportunities to identify and address vulnerabilities. On the threat and information sharing side, we run the National Cybersecurity and Communications Integration Center. This is kind of in the nexus between law enforcement information, the intelligence community, the private sector and, of course, the federal government. And with all these feeds, this produces analysis and reports to share with, in this case, critical infrastructure sectors on actionable ways to reduce their exposure to risk. We produced the best practices document on voter registration databases. There were threat and information briefings. And, of course, the secretaries produced public comments on the security of elections that all kind of were distributed through this channel. The end kick which was that location Is also an incident response. So this is not the most important thing for this discussion. But in case you have a problem you can reach us by these means and we will help you restore your asset to the best of our ability. There is also a multi-state information sharing and analysis center. That is grant funded by DHS to perform the information sharing duties and an incident response for state and local governments. It gives it a little more tailored look and filters out things that might be affecting the private sector that don't apply. Summarizing those services and when the table in case you wanna show anyone else. When we add meeting DHS kind of burst through the door into the election community, we were using the term election infrastructure and I'm not exactly sure that that necessarily resonates with the community at large. We use infrastructure to mean everything. All the supporting networks, assets, people, systems critical to enabling a process in this case the election process. So we are talking about storage facilities, polling places, tabulation, VRDBs and voting systems, and the rest of the information technology and infrastructure used to manage the elections. This would include election night reporting systems. This would include election management systems. What's not on here is party. So we don't consider that election infrastructure right now that's politically affiliated. The election infrastructure as critical infrastructure. Obviously in early January the then secretary of homeland security Jay Johnson established election infrastructure as critical infrastructure. A sub sector within the government facilities sector. He did identify my parent organization as the sector specific agency. That really just means we are responsible to responding to you. Right now, the way to understand critical infrastructure is, In this case, it was the belief that affecting election systems would have such a debilitating effect on public confidence and potentially affect that peaceful transition of power. This was one of the reasons that DHS determined that systems in assets and election infrastructure would qualify as critical infrastructure again here are the other sectors. So what does designation mean we've discussed you all ready get priority in all of the other services that are offered publicly. This would also create coordination mechanisms entirely voluntary that would be able to discuss threat information at a greater level of depth and with protections that allow candid discussion across the table. We find that there are some stakeholders who don't really care about threat. They just want, they don't need attribution they want. Let us know if it's a big baddie or a small baddie or zero or what type of adversary we're facing. Are they well resourced or not? What we find more often than not though is a measure of the persistence of an adversary can impact decision making more significantly than attributing to this character or that. Some of those information sharing protections I was referring to, include the CIPAC protections that allow you to. For government official this is kind of moral relevant, to come bring in expertise to the table and have them discuss, analyze your system. Let you know what might be problematic. Without this necessarily being available to FOIA or, State Sunshine laws. This allows you to address those vulnerabilities in a timely manner before they can be exploited. Everyone knows the pace of government, is a lot slower than the pace of media. So this is what that's trying to address. Protected critical infrastructure information is another protection that vendors and and owners and operators of critical infrastructure systems can share information with DHS. This information is protected from civil use and civil litigation, regulatory use, foyer request, state sunshine laws. And it's not just you can't submit your entire source code potentially but if you do come out with a potentially a patch. You can share that and say I need to get this to my clients as quickly as possible. If one state knows this, knows of a vulnerability and wishes to share it with other states they know use the system. This allows for that information to be shared again rapidly. Without hopefully preempting any opportunity for someone to exploit that vulnerability. That was those two were protections that really assist you in identifying and addressing vulnerabilities. Again, to work to the threat side of the equation that this designation allows for election officials to attain security clearances. That allows us to get to a greater level of depth in the threat conversation, again threat and persistence seems to affect decision making. There are also policy protections. Now this is perhaps a little bureaucratic, but being critical infrastructure, there are a set of International norms that say these countries agree that don't step on these critical infrastructure networks otherwise or don't attack these networks. Otherwise it's considered an act of non peacetime. So that it also enables us to use particular executive orders. To hold potential adversaries that do step on these networks accountable. This was amended and used in late December of this past year to identify 30 some actors and the secretary of, treasury pointed to certain individuals foreign individuals that are now limited in their ability to come to the United States.

Geoff Hale -- So, I'm sure you have questions.

[UNKNOWN-SPEAKER] -- [LAUGH]

Matt Masterson -- Thank you, Geoff for being here and I will open the floor for questions.

Lori Augino -- So first, I wanna thank you and your team for all of the support that you did give us. We were one of the states that benefited from the cyber scans and are working toward expanding the services within our operation to ensure that we can really what I all echo what I said yesterday it provided. It augmented our already, it has the cybersecurity that we already in place had in place, but it was nice to also be able to talk about it and to talk with our citizens and to talk with a folks about the partnership that we have that I think really helped provide more confidence in the system. Having said that, you guys had made a commitment to us to work with us on making a critical infrastructure designation and it didn't really feel like it happened that way when the directive finally came down. I think we had about a day's notice on a phone call with the secretaries and I appreciate having a little bit more information today. I think we still want to ensure that there is a meaningful process and really identifying what this means, and with meaningful input from elections administrators from boots on the ground elections administrators up to state elections officials as well. So I would like to hear more about what you're planning to do to engage us in a more meaningful way, moving forward.

Geoff Hale -- So, thank you. So, the next step in establishing a subsector would be to begin to charter the coordination groups. This will. Because of the nature of election infrastructure, we reached to state and local government officials first to begin to shape how that would be chartered. DHS will have a charter as a sector specific agency that gives us charged to make these groups, basically. If I had to pass it a guess, there would be potentially three coordination groups. One of state and local officials. One of federal agencies that can assist those two would be government coordination councils and the third would likely be the private sector vendor community, potentially advocacy community based on how the initial state and local government officials would want to charter. The timeline for this is there's not an exact clear timeline, but we're looking for opportunities to begin that process.

McDermot Coutts -- A couple of questions. In your estimation, what is the risk profile of system that is not internet facing?

Geoff Hale -- Low and I kind of think it's funny to low, but not none. I think it's funny to come and speak to this group twice, because I do think through mechanisms like the VVSG. And obviously, the security by diversity that the actual voting systems are probably the most secure aspect of election infrastructure. This is certainly good practice and there's continuity of operations for those. We found a lot of the touch points on the rest of election infrastructure to be a little less prepared.

McDermot Coutts -- And then on the other side, I think one of the places that we could focus is if you could provide resources to the labs as the systems are going through tests. Because at that point, that spreads out to all the different counties. So if we can have an assessment in a risk profile on the systems to provide best practices at the lab as we go through the test, as part of our security and penetration testing, then I think that, that is something we could use as vendors to inform out to the counties to buy the systems.

Geoff Hale -- Thank you.

Matt Masterson -- As that would be the whole lot more efficient, I believe. Others?

Lori Augino -- I'll just add, I know you're probably more the messenger than me than the convener of these groups, but I would hope that you would go back and talk to your leadership and let them know that not having a clear timeline is problematic for us. And that we're hoping that since this designation was made, I recognize it was made by the former secretary. It's kind of likely it's been crickets and we'd like to see would like to see more information about what that means, and really identify a clear path forward.

Geoff Hale -- Absolutely.

Matt Masterson --Others I got a bunch of it.

Bob Giles -- It's your committee, so I don't know wanna and I guess one of the questions is will be will you be coming out with some kind of document explaining it more, cuz we hear it's voluntary and I guess that's the concern. Is it truly voluntary or is it not?

Geoff Hale -- It's absolutely voluntary like even if no one shows up, we will still write into the National Infrastructure Protection Plan that elections are considered critical. We'll still give priority to anyone who wants in this sector who wants those services. However, attending the councils or even the existence of the councils is absolutely voluntary And to be charted individuals like yourself and there wouldn't be anything that that would come down.

Bob Giles -- I guess the part of the concern is, are there like the cybersecurity framework. If states don't follow certain things, nobody wants a gotcha is I guess, that's the concern.

Geoff Hale -- Not at all. This is by regulatory or r have any sinews attached at all. If there is funding to come and I'm not in a position to say that. Those have their own conditions, but that's typical to grants.

[UNKNOWN-SPEAKER] -- Thank you.

Greg Riddlemoser -- Geoff, with regard to the subject matter working groups that you guys will put together, I'll rephrase Lori's question, because I don't think she asked it. On the second date, who calls who?

[UNKNOWN-SPEAKER] -- [LAUGH]

Greg Riddlemoser -- On the second day who calls whom?

Geoff Hale -- Yeah, that's what Lori was asking. We're ready for our second date, who calls who?

Geoff Hale -- So, my office is preparing to reach out with you all. There has been an administration transition. That has-

[UNKNOWN-SPEAKER] -- [LAUGH]

Geoff Hale -- Occupied our time for the moment, but we will be working towards communicating with everyone as quickly as possible.

Bob Giles -- And I just wanted to add, we have been working very closely with you guys and it has been a good partnership. And you're right, it has been voluntary. And we're looking to utilize, and with our statewide voter registration system, some of the stuff we actually paid to have a third party do, we're now going to partner with DHS. And they'll come in and do that, penetration tests, stuff like that. So to that aspect, we really appreciate the partnership that we've has so far.

Geoff Hale -- Wonderful, thank you.

Ross Hein -- Yeah, thanks Geoff, I wanna echo what Bob and Lori said about the services. Wisconsin was also one of those states that utilized the hygiene scans. And we partnered with our state CIO and we found that to be of critical value and importance leading up to the presidential elections. We thank you for that. I'm sure you heard Josh's presentation about services that NIST can provide, specifically related to voting equipment security. And what are your thoughts with DHS's role with that? For election officials it's easier I think you know to have at minimum the least amount of different contexts, depending on the subject matter. And I know that you guys focused a lot on voter registration systems and you went through your list of infrastructure and it's pretty vast. What are your thoughts in regard to specifically voting equipment? And I guess a follow-up would be do you think that would be best addressed by groups like this? Or I guess I'm just looking for your general thoughts.

Geoff Hale -- Okay, to answer that I think I'd first wanna step back and kind of characterize the NIST to DHS relationship. DHS is kind of operational. We have incident responders. We take the overall standards that NIST creates. We provide input but we assist people in implementing them. The very kind of core of my office, US-CERT, Computer Emergency Readiness Center, our team was initially a NIST pilot program way back when. So there's a long history of of handing off developing standards and identifying the way things work with NIST and then DHS taking this to begin to help implementing and begin to help stakeholders implement. As I said we're big fans of the cyber security framework. We look forward to the new release and getting ourselves completely up-to-date on that.

Greg Riddlemoser -- And Matt, what I meant to imply earlier was that given all of the folks in our community, whether it's the EAC Standards Board, or the Board of Advisors, or or this body, this body seems to be more specifically tied to the kind of stuff that Geoff's talking about. Because of our cyber security and the fact that we're talking with hardware and certification and specifications and all of those kind of things. And all's I mean to suggest is that, in this relationship going forward, I would like to see this organization, the TGDC component, be the folks who are interfacing with DHS as they get into this subject matter expert guys that are facilitating their ongoing process.

Matt Masterson -- So I appreciate that and I think there's agreement. I would flip that actually and say that DHS, and Geoff has been at the last two, if not three meetings, is welcome to participate in the work we're doing, right? We, through the TGDC and then the EAC, set the standards for the voting systems. And DHS has information to provide to help inform our process, right, for saying that. It's something we'd talked about. And so as DHS begins to work on whatever this critical infrastructure is, EAC, I think, has been very active in pushing them to communicate what this is. And answer these questions via I mean, our avenues, this body, the standards board, the Board of Advisors, however we can put and facilitate that conversation. That's been a focus for the EAC because election officials, the elections community, has a lot of questions, a lot of concerns, right? And that's pretty public, I don't think that's, and so we've been pushing on that, and I think this is the first step in that conversation is here today, and it's good that it's in front of this body. Which actually leads me to one of my questions, which is leading into the election throughout last year, the EAC worked with you all states and locals via the Standards Board, Board of Advisors to facilitate your all services, the available, all of that. It seemed to work, seemed people what lots of states took advantage of it. And then this designation comes. What was wrong with the approach we took through the election where that facilitation was taking place and you weren't going to have to have this designation in place to do it. The relationship, all those services you put up there are available whether this is critical infrastructure or not is my understanding. So why now, after the successful relationships that were built throughout the 2016 election?

Geoff Hale -- So I agree that that mechanism worked for 2016 as best it could and we really appreciate your facilitation. It was absent the full threat information available to a critical infrastructure sector. Additionally, the priority against other requests wouldn't be there. Potentially waiting nine months for risk and vulnerability assessment may not work on a procurement timeline. So this step was felt to be necessary to institutionalize this as a vital and important aspect of our democracy.

Matt Masterson -- Okay, so, I guess that leads me. Presumably it was vital important before based on what was going on. I guess my question is what services, what information, maybe it was, is there additional threat information that could have been shared that wasn't because this wasn't critical infrastructure. I mean those services were already there for the states and locals and so what additional is brought to the table through this designation?

Geoff Hale -- So there were the subsequent protections that work at an international level and the ability to discuss vulnerabilities in a manner that should rapidly allow election officials to address them or for vulnerability disclosure to occur at the vendor side. Those we found that in other sectors these are considered highly valuable. It's much more common among chief information security officers to work within the vulnerability disclosure process. But without institutionalizing this through a designation of critical infrastructure, there's no guarantee that the services would be available.

Matt Masterson -- Okay, so DHS may not in the future have provided those services to election officials despite their requests.

Geoff Hale -- So yeah they are. For the most part limited resources, and we do have to make decisions on where a person, where a request falls in the queue. So the designation was really to institutionalize the availability of services and information sharing.

Matt Masterson -- So, that's helpful. Presuming this was a good idea in January, when the designation was made and the promise to work with state local election officials before making a determination, or as part of it. If this was a good idea in January, presumably it would have been a good idea and May, June, July whatever. Why was the effort not made prior to the designation to have that working relationship? Why was it necessary that January had to be the time, versus going through the process that was discussed to work with state and local officials?

Geoff Hale -- So, we had the, under the past administration there was a request to hold off until after the election certification in late December. This was, however, a priority of the previous Secretary, which gave less than a month's opportunity for him to make the decision. He felt that he had been in conversation, conversing about his opinion on this since August. And he, with the advice of his counsel, believed it was a necessary step to ensure future protections of election infrastructure.

Matt Masterson -- Go ahead, Brian.

Brian Hancock -- Do you have more thoughts in that direction or, cuz I'm gonna go in a little bit different direction?

Geoff Hale -- No, go ahead.

Brian Hancock -- Hey, Jim. Thanks for being here today. I wanted to kinda go back to some of your initial discussion about the definition of infrastructure and maybe the scope of the charter document that presumably would be coming out. I think everyone around this table, and at this point you probably know that when you're talking about election infrastructure, it's wide, right?

[UNKNOWN-SPEAKER] -- Right.

Brian Hancock -- The tentacles are out there. So, just as an example, and maybe if you're seeing this in other industries, things like, that aren't connected really to election officials, things like ballot printers, third party ballot printers, right? California certifies those, but that's generally about as far as it goes. Would those third parties be included under this definition of infrastructure, potentially?

Geoff Hale -- They could be. As a kind of third party vendor o, you said that some of them are certified. What is important about understanding what is within the scope of an election infrastructure, that's really what type of information DHS will help filter to you all. So, if there is a threat against ballot printers, we would identify this body as the group that needs to know that there's a threat against ballot printers.

Matt Masterson -- So, I appreciate the scoping question, and you may just polling places. Okay, that was included on your slide of-

[UNKNOWN-SPEAKER] -- Yeah.

Matt Masterson -- I know it's voluntary. But presumably, apparently based on your last if there was a threat against polling places, whatever that means, you all would issue guidance, you all would issue what? Because securing polling, I mean, you talk about broad in scope. And, I mean, we're lucky to have enough polling places, let alone if, and this is an example, this may not be what you all would actually say, but if it had to have closed circuit television around, some sort of monitoring, security detection. I mean it, again, it's hard enough to find a polling place let alone secure it in that way. And so, the question is, how, tell, walk me through how that works, how would that guidance be provided regarding polling places to help election officials and in a voluntary way?

Geoff Hale -- So, I guess, in sequence of information sharing there might be best practices learned from handling mass gatherings. However, with, this is an area where I actually find the election community to be most mature. So, in all likelihood, we wouldn't be providing guidance. It would very much be yourselves sharing the information that you know, the best practices that you employ. And if we are aware of a threat, we would be sharing our awareness of that threat with you. You guys are the risk managers. You own and operate and facilitate the process. And you make the risk decisions on your own, so-

Matt Masterson -- So, you're saying there wouldn't be a situation in which DHS, for instance, would put out a checklist, let's say, for securing polling places that says, and I'm just throwing it out, I don't know if it's a good example, fenced in, monitored and whatever, has intrusion, some sort of security locks or anything. That's not something you'd foresee for the physical security of polling places?

Geoff Hale -- No, not in any type of guidance that way. I would think that a document or guidance could be produced on how to write a continuity of operations plan, or things that I know exist within your committee. Which is why I kind of recognized the maturity of this community in very many aspects of physical infrastructure protection and some aspects of cybersecurity protection.

Matt Masterson -- You mentioned the sunshine laws. And you said state sunshine laws don't apply. Is that true? I've heard the FOIA part, but does DHS have the ability to say that state sunshine laws don't apply when information's shared in that way?

Geoff Hale -- We could have counsels discuss this, but, yeah, that's how protected critical infrastructure information by statute has been arranged.

Matt Masterson -- So, if private companies are involved, so private security scanning companies or something, does that also, so can they not turn around and use the information that they find as part of scanning, to then monetize that, for lack of a better term, to benefit from that scan? So, they're part of your process, with scanning, a state brings you in, and then they can turn around and say, hey, we know you have these vulnerabilities and we'd like to help you mitigate them.

[UNKNOWN-SPEAKER] -- So

Matt Masterson -- Do they have confidentiality applied to them?

Geoff Hale -- So, we don't have third party vendors doing our scanning.

Matt Masterson -- Okay.

Geoff Hale -- So, your information is entirely yours, we don't share it with anyone else. You have the opportunity to share your experience, your lessons learned, the things that you did to mitigate any vulnerabilities found. So I think that would avoid the opportunity for kind of that exploitation.

Bob Giles -- We did use a third-party and they did have to sign a confidentiality agreement. So, just-

Lori Augino -- I had a concern raised by a local elections administrator who's been working through his county IT to try to get some support, some scans. And the feedback that I had was that it's taking a really, really long time. So, I don't know if perhaps he's asked, going about asking through the wrong channels, or how, I mean, how would a local or a state, obviously the state would be a little bit more obvious. But how would you suggest that we engage with you to ensure that you know it's an election entity? That's requesting the service and support.

Geoff Hale -- This email is monitored by several people and if we're talking about cyber hygiene scanning, I'm very surprised to hear this. Because we can have a response and have that system operating within a week. So please connect them to me in this email and it'll happen.

[UNKNOWN-SPEAKER] -- You mentioned DHS and specifically your section is gonna be the sector specific agencies, is that correct?

[UNKNOWN-SPEAKER] -- Yes.

Matt Masterson -- In this subsector, traditionally that, what is it, a government facility subsector, traditionally it's who GSA?

Geoff Hale -- So within NPBD which is my organization there's another branch called Federal Protective Service and GSA and FPS are co-lead of the government facilities sector.

Geoff Hale -- However, there are other subsectors within this for example, the education facilities sector which has the SSA of the Department of Education. This is modeled in the same way where the urge necessarily, there isn't any level of interaction at the GSA FPS side unless for some reason the chartered body would request it.

Matt Masterson -- So did the declarator or the designation of critical infrastructure. As part of that declare your section. I forget the acronym. I'm not trying to try to change make you all the sector specific So was that part of the designation How does that happen.

Geoff Hale -- So the secretary with his authority to to review and and establish critical Infrastructure sent a memo internally assigning that responsibility within the department to the National Protection and Programs Directorate, which is my body.

Marc Guthrie -- The county that I reside in two weeks ago I think, two weeks ago tomorrow I think, was hacked by ransom and everything and counting was down for I think they may have had phones up within a week. But I'm not sure everything is up yet, and I communicated with one of the elections officials there assuming that the IT system was somewhat integrated and they sounds like it was and that they were. Their process of handling the elections say this ransom would have occurred during the election would have just pushed them into a complete manual mode. Is it, has that happened anywhere in the country? I mean, I think we've had two or three counties in Ohio that have This happen in the so I can't speak specific I mean ransomware is a known issue and IT security I would I would tell you and and DHSS and we put it out to our Standards Board of Advisors, put out information about handling ransomware.

Geoff Hale -- I mean it was given to election officials but it is not election specific. And that is part of any election officials continuity of operation's plan is understanding and having a plan in place to handle those sorts of attacks and attempts that's part of how you plan for an election in that way.

Bob Giles -- Geoff if you could talk a little bit about the relationship between DHS and State Homeland Security offices. Like we have our NJ cake, and when should we be working with them or you? When do you guys work together? When do we go to you and not them? Or should we go through our State Homeland Security and then through, like, how does that relationship work? If you can talk about that.

Geoff Hale -- So I would say we have an excellent relationship with all State Homeland Security offices, and you can operate in the way most comfortable to you. As commissioner sometimes says, with elections it depends. My particular agency's responsibility is called asset response. This means that we focus on bringing your operations back to bear. We are less focused on law enforcement and attribution side of the house those responsibilities at a federal level reside with DOJ, and so there, I know that in many states, fusion centers could have a role. Somebody might feel more comfortable going there but that tends to be more of a law enforcement staffed body. So it's all about where you're comfortable with the starting point. Our responsibility is to share information with everyone possible.

McDermot Coutts -- Hi Geoff, one other question. So given the certification and the testing and the fact that the counties manage the systems once they're purchased do you see a concern with any foreign or partisan ownership of a manufacturer.

Geoff Hale -- Not initially. Not at this point. [LAUGH] That's not something I'm trying to deter.

McDermot Coutts -- Okay awesome.

Matt Masterson -- Our voting system test laboratories are a critical part of what we obviously do here, the EAC does and really even states rely on. Do they fall into the sort of private sector arena that of people you would be working with? To no proof testing, but they have information, whatever, is that someone you'd work with? ESTLs traditionally, the test laboratories.

Geoff Hale -- We do work with several national labs. I don't know how many of ESTLs. However, I would think that in working with EAC through this, you guys would be the representative body that tells us how they operate and where they are appropriate or where it's appropriate to engage them yourselves or the election officials.

Bob Giles -- Got an example of that was the VIP for this past election. Because we embed them into our website. I had a concern that would there be an issue there and I know you guys ended up reaching out to them and so in that aspect there's a third party that really is not my, I give them my information they share it and so I know you guys definitely work with them on this.

Matt Masterson -- I appreciate bring that cuz it's really good scoping point and I know you are working through it so the answer maybe we don't know

Matt Masterson -- But whether it's CST LVIP, frankly the AP, at what point does this line of a what you mention the parties aren't included which is only interesting because that's where much of the news coverage came from are around all of this right, and then from a show where. How do you decide where to draw that line? I mean is the AP, did they fall over critical infrastructure in elections because of what they do is far stringers in results reporting or is that?

Geoff Hale -- So the media is already part of critical infrastructure in a separate infrastructure sector. However there's several instances where kind of there's a cross sector dependency. And this would be one of them, would kind of handle that somewhat frequently. And it's up to how the group would like to charter its bounds as to whether you want to invite them to the table for every single meeting or invite in an ad hoc as appropriate manner.

Matt Masterson -- So walk me, I promise, it's just helping. Walk me through the steps. What are the, I know there's not a timeline. But what are the next, what happens next? What, I mean, there's these groups apparently that get formed. How do they get formed? What or who decides who's invited and who's not? How does that happen just functionally?

Geoff Hale -- So that's actually something where DHS is going to solicit feedback from its partners, that we've met through this past election, as to what the shaping and scoping body for the first charter should be. And that will be taking place shortly. That will develop an initial draft charter to start to share around that community and then that would convene a group that begins to create the councils. If they so choose.

Matt Masterson -- So there's a group that then creates the groups. Is that correct? I'm being serious. I'm not, I really.

Geoff Hale -- Yeah.

Matt Masterson -- So there is a group that has to create the framework around it?

Geoff Hale -- Yes.

Matt Masterson -- Is that correct?

Geoff Hale -- Yeah.

Matt Masterson -- Okay.

[UNKNOWN-SPEAKER] -- Who are they?

Matt Masterson -- Yeah who? Go ahead. Go.

Lori Augino -- Yeah, who are those people and how are those people selected?

Geoff Hale -- Not selected per say, but the views seeking subject matter expertise for DHS to begin to shape the appropriate chartering and it would be the people we know at to be subject matter experts through our past engagement. So the list has yet to be determined, but in all likelihood since I've spoken here twice that this would be one forum.

Matt Masterson -- Go ahead Diane.

Diane Golden -- Totally different direction.

Matt Masterson -- Great.

Diane Golden -- It's been fascinating though.

Diane Golden -- There's a lot of questions.

Diane Golden -- [LAUGH] So DHS I know has a really active internal group that's OAST or something I don't know if you call it something that DHS is kind of one of the leaders in accessibility, quite frankly, in terms of ICT stuff. Which is really nice, given you're also focused on security. It's a nice balance. But I assume that that function is really internal to your agency rather than the work you do. For example, supporting election officials, talking about security scans, etc does not include accessibility. So I guess that's what I'm asking is, as you're helping these folks with security issues is there any ability to also help them or at least make sure that whatever they're doing to ensure security isn't messing up accessibility on the back end or ignoring it? Kind of thing. And I know you all do a good job in-house. I just don't know the extent to which that expertise that you have in-house bleeds over to your external technical assistance.

[UNKNOWN-SPEAKER] -- And welcome to that debate.

[UNKNOWN-SPEAKER] -- Yeah.

[UNKNOWN-SPEAKER] -- Yeah, welcome.

[UNKNOWN-SPEAKER] -- Yeah, [LAUGH].

[UNKNOWN-SPEAKER] -- [LAUGH]

Geoff Hale -- The easy one? You're right. We do have quite extensive accessibility office. Now as I showed my office is aligned to our cyber security mission and the two have not been bringing the accessibility to stakeholders to bear, but as chartered that can absolutely be a collaborative function.

Diane Golden -- It would be extraordinarily helpful. Honestly DHS and Department of Ed there's a few federal agencies that have always kind of been on the forefront of accessibility stuff and others who have not done so much. So that would, you have some internal expertise and some procedures in-house that I think if you're in-house people could talk to you guys about helping external people would be really helpful for again balancing some of this stuff.

Matt Masterson -- One last one. Bottom line. I'm talking to Sheryl down in Jackson County, Ohio. Tiny county and she wants to know what does this mean to me? How is this going to impact my operation? What what do I tell her?

Geoff Hale -- Very. You don't tell her very little.

[UNKNOWN-SPEAKER] -- [LAUGH]

Geoff Hale -- You tell her it impacts her very little. At the election director or the Secretary of State level that someone has a clearance and and has made risk management decisions and hopefully passed those risk management profiles down through the structure. But if you call law enforcement first, if you have your phone tree those all remain the same. We don't have any new authorities, we don't have any, we are here to help but cannot compel anything.

Matt Masterson -- All right, anything else? I wanna thank you for coming, for beginning this discussion. It's important, right, and I know our staff's been talking to you about the importance election officials are wanting to know what this is gonna mean to them. They are concerned and just are wanting answers and this is an important first step. The other thing and this touches on something Lori said that's really important, is I'd encourage you working through us, you know however we can be helpful to share those communications, that information as rapidly as you can. It's something we talk about a lot in elections working at election speed, right? There's always another election. There's elections going on right now. And so it may, you all, and I don't want you to rush, either. I want you to answer the questions and go through this in a partner. But understand that election officials are constantly moving on to the next election. And so the answers to these, understanding what this means operationally, this is just another piece of uncertainty in an election official's life, and their entire mission is to limit that uncertainty, right? Ironically, I think a little bit of your mission too, right, to limit uncertainty. And so whatever we can do to facilitate answering those questions and helping election officials eliminate some of that uncertainty if this CI designation is their reality that they deserve the answers to those questions and to move forward. And so, just I'd encourage you to continue starting today share information and use these forums to do that. So thank you for answering, indulging me and the rest of us on the site, I appreciate it.

Geoff Hale -- Thank you for the opportunity.

Matt Masterson -- Anyone hungry? I am hungry. So we will take a half an hour to run out and bring food back to this table so that we can then come back and conclude our discussion, complete the meeting, do whatever else we need to do. So, we're adjourned for half an hour which means we'll say 1:30, 1:30.

[UNKNOWN-SPEAKER] -- 1:30, all right.

[UNKNOWN-SPEAKER] -- 1:30.

[UNKNOWN-SPEAKER] -- Got it.

## TGDC Day 2 Part 4

### 1:30 – 3:00 PM: VVSG Development Process

### Coordination with Standards Board, Board of Advisors & NASED

Matt Masterson -- What? She's in charge. So the final piece of this puzzle which I don't think will take an hour and a half, and so I think we can wrap things up relatively neat and tidy here is to do a little coordination talk about the EAC Standards Board of Advisors. NASED meetings coming up to go over the presentations that will be done there. Then timelines the next steps including talking about next meeting in the context of when we want to have the VVSG done, because you all have a couple more steps to take before we can even get there. So, I'm gonna hand it over to Brian Hancock and Mary Brady, to tee up this discussion, right? Or are we just doing it? All right, we'll just do it. I'm not handed it off to anyone. So the first is starting with the Standards Board of Advisors. So Greg And Bob, right, are Standards Board reps and so I don't know if you want to talk about when the meeting is. And then we'll talk about, we'll talk about, don't worry you don't have to Bob, what will be presented but talk about the meeting. And what work you already did with the Standards Board.

Diane Golden -- [INAUDIBLE] So as far as the Standards Board, I reached out to the Executive Board and the VVSG Committee that they have. We had a couple conversations and then we ultimately had Brian and Ryan give a webinar on what was going on with the functions. And what we were going to look for as far as scoping. And I can say that the Standard Board unanimously agreed with, the VVSG Committee of the Standards Board unanimously agreed with the the scope and document that was put out, so.

Matt Masterson -- And I know Linda, the Board of Advisors got a chance and they input it on that as well or at least, the information which provided to them as well as NASED through Ross and Lori. And so, we've shared that information, the Standards Board will be meeting in San Antonio in April, right? And so the plan is to take what was done here, both the scope but also the work product that's been put out by the three working groups and feed it into the Standards Board soon. So that they can begin to weigh in on that with the goal of continuous involvement by them, as opposed to just dumping something on their desk at the time we're done. And so that's why we involve them in the scoping discussion and will continue to provide work product that comes out of this body directly to them afterwards. It's posted publicly as well, but make sure that they have it to reflect on and the same with the Board of Advisors. NASED, I think who, all three of us are presenting to NASED later this week, is that correct?

Lori Augino -- So we have on Friday, we're on the agenda from 9:15 to 10:15 to brief the full membership on the activity that happened this week. I did join the NASED Executive Board call as Bob coordinated with Standards Board and I think you coordinated with the Board of Advisors and got also unanimous support on the scoping discussion. So I don't think they will be surprised by what we'll be delivering and updating them on later this week

Matt Masterson -- So timelines the next steps. So we have a stated goal of getting this done in early 2018, so early next year. To understand what that means, I at least want to give you some perspective on what the process looks like for those who are unfamiliar. I hope I get this right, so Hancock you can correct me. This body at some point will vote out a proposed standard, whatever that may be, that goes to the Executive Director of the EAC to provide to the Standards Board and Board of Advisors. At that point, the EAC has to allow 90 days, I believe.

[UNKNOWN-SPEAKER] -- Yeah.

Matt Masterson -- Yeah. For the Standards Board, Board of Advisors, and presumably the public to weigh in on that document. Is that right? I think that's right. [COUGH] At that point the EAC and NIST get the comments in and have to make changes presuming that there are changes on suggested documents, our standards or requirements. Then the EAC [COUGH] itself would put out proposed VVSG that the public has to have 60 more days I would say to comment on. So you're looking at essentially 150 days of public comment including Standards Board, Board of Advisors input on whatever it is you all vote out of this committee. And then of course, the EAC commissioners at the end have to vote to approve it, which is the very end of the process. So all that's to say we're looking at a 150 day minimum comment period, and then also time to resolve those comments throughout the process.

Matt Masterson -- Yeah and that's not necessarily to be taken lightly, right? Because under the rules of when you publish something in the Federal Register for public comment, you have to make some disposition of every single comment you get. You don't have to use it, but you have to say no, we're not using and here's why. Yes we are, here's why. And we've gotten hundreds, 700 or more comments in the past, so it's a non-trivial exercise to deal with those comments, as well.

Matt Masterson -- Yeah and the part I'll add, the optimistic part of me says, we won't have nearly as many in part, cuz the document will be much smaller and in part, because this is all been publicly vetted through the public working groups all along. All of this is public now, can take input now, the Standards Board, Board of Advisors are giving input now. And so the reason for that was to streamline this at least a little bit. And so I'm optimistic, we will of course get comments. I'm not saying we won't get comments, but I hope it's not nearly to the extent that we've previously gotten when we just dumped a big document on a desk. Also I anticipate, based on the work product we saw at this meeting, that it's much more understandable. That the principles and guidelines make understanding this much easier, and therefore will lead to less questions around explanations and clarity, which we've had in the past. So, I think those are all reasons for optimism at least on clarifying some of what's done. So with that said, I think and I guess I'll throw this out there for reflection, we probably need another TGCD meeting in August. Thoughts on August? Just I see general head nods, except for Lori who's-

Matt Masterson -- So August is our NASED meeting. So would you be looking to capitalize on existing meetings or are you looking to bring us back here?

Lori Augino -- I don't think we know but I think we can look at capitalizing on the existing meetings. I mean, it's at least worth exploring.

Lori Augino -- NASED and Election Center meet jointly in August in California.

Matt Masterson -- California, right? We can at least look at that. I'm sure David would welcome a trip out to California.

[UNKNOWN-SPEAKER] -- [LAUGH].

Matt Masterson -- And McDermott. So we'll at least explore that. I can't tell you that that'll happen, but we'll look at that to try to streamline it. Cuz we like coordinating off of other meetings anyway, if that's something we can do. So we will send around, we'll look at that first. Well, do you know the dates of that by any time just so others can at least look?

Linda Lamone -- NASED is August 22nd to 23rd.

Matt Masterson -- It's my birthday.

Matt Masterson -- 25th.

Matt Masterson -- Well, I'll go celebrate. So we'll at least look at that, and if that doesn't work for whatever reason, we will send out to you all some proposed dates to respond to otherwise as a way to get there. Cuz I think we need to move pretty quickly to get a meeting scheduled and on the books. So the next step that I think we need is just to reflect on the conversations we had yesterday and see if there's any action items for the working groups moving forward, for each one of the working groups. I promised we'd revisit at least the security discussion. My proposal I think at the time was for the EAC to help facilitate at least one if not a couple in person meetings between some members of the cybersecurity and human factors working groups to discuss some of the challenges. Is that something you all are open to?

[UNKNOWN-SPEAKER] -- Yeah.

[UNKNOWN-SPEAKER] -- [LAUGH]

Matt Masterson -- Yes, easy answer, yes, and yeah that's what I was thinking about the charge for the working groups to move forward under the new 17 chunks of the process. I think we're good except for that question of, and I won't get the words right but casting. The markings finished, the verification is finished, quote unquote, verification kind of iffy and then it's cast, quote unquote. Well, I mean if we're looking at that in total, then that happens in multiple ways. And if we're writing accessibility and usability standards for that, and yet these guys have or something that impinges on that, then yeah, we've got to figure that out. Yeah, so it's a joint question of resolving what to do with some of those issues. Cuz we can write something, and they can write something, it's like well you can't do both.

[UNKNOWN-SPEAKER] -- So I wanna avoid that.

[UNKNOWN-SPEAKER] -- Get real, [LAUGH].

### Timelines & Next Steps Discussion

Matt Masterson -- And keep in mind our time frame, right? And the tight time frame, so what we'll do is get in touch with you too as the leads and figure out how to facilitate that, to tap that discussion. And as I said yesterday, I believe we're gonna get there. We're gonna figure this out. I don't think we're that far away. So we'll facilitate that, and make sure that happens to have that discussion. Anything else for the working groups? Any other reflections on actions that we heard today, or that you'd like explored? Technical guidance from NIST that you'd like to see? I've one idea, sorry Mary and that is to look at the cybersecurity framework. [COUGH] Not in the context I think some correct concerns were raised about how it could be used for the VVSG, but at least for the next meeting exploring development of profiles to help inform, The election community, I'd say, on the use of the framework. So if they were interested in using the framework, what would that look like? Is that within scope or at least something that you're willing? No, okay, that's fine.

Mary Brady -- Well, [INAUDIBLE]. I mean it's something we can talk about but as we indicated during the presentation, that's really not part of developing the VVSG which is what we're tasked to do. Respecting this committee but it could, we can still talk about how we might be able to move forward on it.

Matt Masterson -- Yeah, I thought we were kind of talking about mapping it to see if there was anything. And maybe that's if there's something that does fall within the VVSG and maybe you know already that it doesn't, but then we could have a discussion cuz if there's two or three items that do, then it's there, but if not.

Matt Masterson -- Okay, it's all I got, unless anyone has anything else?

Diane Golden -- I assume that the 17 and I'm struggling with what to call the things, the functions [CROSSTALK].

Matt Masterson -- I appreciate you embracing it already.

Diane Golden -- Say the function to me as being able to grasp things, being able to, that's a function to me. That's a human function, anyway so. I'm assuming that information or I'm asking, can we get it in a lay persons? Not really complicated and not with graphics making it inaccessible. [LAUGH] Can we get a nice clean text version of 1 through 17?

Matt Masterson -- Yeah, there was already a draft document out there that I think what you're looking for. So yeah, yes.

Matt Masterson -- Okay, perfect. Because I think I will try doing some strategic sharing of that. Trying to generate some interest on the disability research side of things because that's something I think they can glom onto and understand is in terms of a focus. So if yeah.

Matt Masterson -- David?

David Wagner -- You asked for what we wanted and I guess I'm gonna answer not with what you wanted but just a question for clarification so I know what the cybersecurity group is working on. Should we be work, I'm not sure whether this got resolved. Should we be working on requirements for the remote electronic ballot marking task that was something that was raised in the past, and never really resolved as far as I know? So I'll start with that one, and then I'll ask a few other.

Matt Masterson -- Yes, so I [COUGH], I think that was a tasking from before that this committee has said they would like work done on. I think if I remember correctly from last meeting the resolution was first work on the stuff that's we already know is in scope and we need to get done. And so if you're prioritizing that work would be prioritized. But, I mean I think this body voted last time to work on that.

David Wagner -- Okay, that's fine. I had the recollection that it was come back with, do a little research, come back so that this body could decide. So if that's what everyone's decided, that's fine.

Mary Brady -- So based on, the decision was made to support these core functions, you're going to need requirements for remote ballot marking systems. They may be certified. If they're part of a larger system, so we'll ultimately we're going to need requirements. And in fact, many of our questions regarding scope, outside of the voter registration database, are now within scope. If in fact they fulfill those functions.

David Wagner -- Okay, and then can I continue with a second? This is maybe getting really narrow now but support for wireless is another one that I've heard raised. Is that one they would like to see us be looking at either wireless within the polling place, or wireless and telecommunications for reporting unofficial and certified results, would either or both?

Lori Augino -- Yes and yes.

Brian Hancock -- Yes and we're seeing those now, we'll be seeing more in the future. So I think the answer is yes.

Matt Masterson -- I don't know about Bluetooth, we can think about that.

Matt Masterson -- These are good questions, so did you have any other? I mean, that's exactly the right questions we're asking. Anyone else? Anything for the good of the order?

[UNKNOWN-SPEAKER] -- [LAUGH]

### Next TGDC Meeting & Wrap-up

Matt Masterson -- All right, well, I want to thank you for your time. We accomplished what we set out to do. I feel like we took another big step forward. Those of us who will be presenting at meetings upcoming can walk in the room with our heads up held high talking about the good work we've done here and the good work that's been done on the public working group. So, I want to thank you for that and the progress we've made. Linda.

Linda Lamone -- I think I wanna speak on behalf of all the committee members for a well organized and good presentations to both EAC and NIST. The meeting, I think it was one of the better meetings that we have had and then we got a lot accomplished. So thank you guys for doing all that work.

Matt Masterson -- Thank you for that and all credit goes to the NIST and EAC staff for their incredibly hard work on all that. So, thank you, thank you for saying that. And with that I think, unless there's anything else, I think this meeting can be adjourned. And thank you.