

United States Election Assistance Commission
Technical Guidelines Development Committee Meeting

Held at

9:12 a.m.

September 19-20, 2019

1335 East West Highway

Suite 104

Silver Spring, Maryland 20910

VERBATIM TRANSCRIPT

DRAFT

The following is the verbatim transcript of the United States Election Assistance Commission (EAC) Technical Guidelines Development Committee (TGDC) Meeting that was held on Thursday, September 19, 2019, and September 20, 2019. The meeting convened at 9:12 a.m. on September 19, 2019, and adjourned on September 20, 2019, at 12:13 p.m.

CHAIRMAN COPAN:

Well, good morning, and welcome. I'm Walt Copan, the Under Secretary of Commerce for Standards and Technology, NIST Director, and I'd like to welcome everyone in the room here with us, as well as those who are joining this -- these proceedings by webcast. We have a tradition of starting the TGDC meetings with the Pledge of Allegiance, so I'd like to ask everyone, please, to stand and join me in saying the Pledge.

[Chairman Copan led all present in the recitation of the Pledge of Allegiance.]

CHAIRMAN COPAN:

Thank you so much. I'd like to say thanks also to the Election Assistance Commission and especially to my colleague Commissioner Ben Hovland, who serves as the Designated Federal Officer for the TGDC, the Technical Guidelines Development Committee. And we appreciate your hospitality and the organization and hosting the meeting.

I'm very glad to join you. And in accordance with the Help America Vote Act and as Director of NIST, I'm honored to serve as the Chairman of the TGDC.

Today, we'll consider proposed updates to the Requirements of the Voluntary Voting System Guidelines, as we affectionately know them, VVSG 2.0. And this is a very important time for America as we look forward to the upcoming elections. The work of the TGDC is all about securing a foundation of confidence and trust in the U.S. voting system. As we do, many eyes are upon us, trusting that the new standards will be sufficient to enable our voting system stakeholders to meet the challenges ahead. It will also provide much-needed guidance to replace decades-old voting machines and to incorporate modern usability, accessibility, and security practices.

We want to allow for an improved and consistent voter experience to enable all voters to vote privately and independently; to ensure that all votes are marked, verified, and cast as intended; and to guarantee that the final count represents the true will of the Nation's voters. We do so in an environment where attacks from nation-state actors on our elections have led to critical infrastructure designation for the voting system. The cybersecurity of election systems is of paramount importance to the integrity of the election

process and should be at the forefront of our thoughts as we consider the revisions to the VVSG.

As you know, Requirements development began after the TGDC adoption of the VVSG 2.0 Principles and Guidelines. Prior to our consideration of these Requirements, we will hear from Jerome Lovato, Director of Testing and Certification at the EAC, on the resolution of comments regarding the Principles and Guidelines.

The VVSG Requirements have been widely vetted through the VVSG email lists and biweekly discussions over the last two years among the over 600 election and technology experts who have participated in the original pre-election, election, and post-election public working groups, and, more recently, the human factors, interoperability, cybersecurity, and testing groups. We're truly grateful for the expertise of all the participants and their willingness to help and for the tremendous progress that's represented in the VVSG 2.0 Requirements.

The VVSG Requirements represent the latest in both industry and technology best practices, requiring significant updates on many aspects of voting systems. Human factors requirements now reference Federal accessibility standards, Section 508, and web content accessibility guidelines. Voter interface requirements have been updated to incorporate recent

usability research and interactions that result from modern devices and now fully support accessibility throughout the voting process.

Common data formats are now required and provide low-level support needed for risk-limiting audits. Defensive coding practices, reliability, and electrical requirements were reviewed, updated, and streamlined. Guidance relevant for testing and certification has been moved to the EAC's Testing and Certification manual. New security requirements call for software independence and advanced auditing methods, including support for risk-limiting audits. There's also a dedicated section on ballot secrecy, preventing voter information from being carried through to the voting system, as well as two-factor authentication is now mandated for critical voting operations.

Cryptographic protection of and new system integrity requirements ensure that security protections developed by industry over the past decade are built into the voting system. These include aspects like risk assessment and supply chain management, secure configurations and system hardening, exploit mitigation, sandboxing, and runtime integrity. All sections of the prior VVSG have been reviewed, rethought, and updated to meet modern expectations about how voters should interact with the voting system and how voting systems should be redesigned and developed.

The task of this committee to serve as the technical advisor to the EAC and, by extension, to the States that administer elections has never been more complex, nor more essential to our American democracy. And the specific charge to this committee to assist the EAC in developing voluntary standards and guidelines for voting equipment and technologies is a critical requirement for making accurate, accessible, and secure elections possible. Our goal for the group at this meeting is to carefully discuss our current requirements, assessing the risk to our elections introduced by technology used to conduct elections, and to weigh it against the recommended controls, detection, and mitigation strategies.

In particular, as I think you all know, we'll be looking for feedback in several critical areas that include common data formats that enable transparency and auditing; indirect voter associations, which can be used in handling conditional and provisional ballots; barcode and encoding schemes used to store critical voting data; and wireless technology in the polling place used to print ballots for activation cards or tokens for authentication or to connect assistive technology mice or keyboards; internet technology used for remote access, transmission of election results, or software updates; as well as, finally, cryptographic end-to-end or E2E systems, an innovative software-independent option that can be paper or paperless-based.

I look forward to fruitful deliberations that help the Nation improve our voting systems. I thank you all for your input and your diligent work. And it's my sincere hope that after thoughtful deliberations today and tomorrow, we will move to adopt the VVSG 2.0 Requirements and forward them to the EAC for consideration and adoption. Again, many thanks for being here and for the important steps that you'll take today and tomorrow to finalize the VVSG 2.0 recommendations.

Next, we'll have introductory remarks from the EAC's Designated Federal Officer for the TGDC, Commissioner Ben Hovland. Ben?

COMMISSIONER HOVLAND:

Thank you, Dr. Copan. My name is Ben Hovland. I'm the Vice Chair of the U.S. Election Assistance Commission and the Designated Federal Officer for the Technical Guidelines Development Committee, or TGDC.

The TGDC is a 15-member advisory committee established by the Help America Vote Act, or HAVA, to assist the U.S. Election Assistance Commission, or EAC, in developing the Voluntary Voting System Guidelines. As Dr. Copan mentioned, pursuant to HAVA, the Director of the National Institute of Standards and Technology, or NIST, serves as the Chair of the TGDC. HAVA also

requires NIST to provide the TGDC with technical support -- the technical support necessary to carry out its duties.

Today's meeting, which is called pursuant to the Federal Advisory Committee Act, has been noticed in the Federal Register and published on the EAC website. This meeting is open to the public, and I welcome those of you who have joined us here in Silver Spring. The meeting is also being webcast.

For the record, I believe I'm required to take the roll, and so how about we just go around the room and let people introduce themselves and we will check you off the list. If we could start with Neal, and then we'll just swing around.

MR. KELLEY:

Good morning. Neal Kelley, Registrar of Voters, Orange County, California.

MR. LUX:

Paul Lux, Supervisor of Elections from Okaloosa County, Florida.

MR. WAGNER:

David Wagner from UC Berkeley.

MS. SAUNDERS:

Mary Saunders, Vice President of Government Relations, American National Standards Institute.

MR. HALE:

Geoff Hale. I'm here in my personal capacity today, but I am the Director of the Cybersecurity and Infrastructure Security Agencies, Election Security Initiative.

MS. GOLDEN:

Diane Golden, Assistive Technology.

MS. BRADY:

Mary Brady, I'm the Manager of the NIST Voting Program.

CHAIRMAN COPAN:

Walter Copan, Chair and Director of NIST.

MR. WALLACH:

Dan Wallach, Rice University.

MR. COUTTS:

McDermot Coutts, Unisyn Voting Solutions.

MS. BRADY:

Lori Augino, I'm the Director of Elections for the State of Washington.

MR. CHOATE:

Judd Choate, I'm the State Election Director for Colorado.

MR. GILES:

Bob Giles, Director of the New Jersey Division of Elections.

MR. GUTHRIE:

Marc Guthrie, U.S. Access Board from Ohio.

MR. PAVITHRAN:

Sachin Pavithran, U.S. Access Board.

COMMISSIONER HOVLAND:

Great. Great, thank you all. And actually, that exercise is a good reminder that, as we proceed later on in the program, if you're going to talk, please introduce yourself before speaking. We know you have a name card, but it is beneficial for the webcast and for the record, so thank you.

I'd also -- I'd like to thank all the members of the TGDC who were able to join us here today. Many of you traveled from across the country, as we just heard. A few of you traveled from across town. Either way, we appreciate you being here to discuss this important topic, and your input plays a vital role in the process. I'd also like to say thank you on behalf of the other Commissioners, Chairwoman McCormick, Commissioner Hicks, Commissioner Palmer. I know they plan to be here for parts of the meeting but may need to come in and out and catch some on the webcast.

Commissioner Palmer and I were sworn in at the beginning of February, restoring the quorum for the Commission. Since that time, the future of voting equipment in this country has been at the forefront of the EAC's activity. Our first action with the restored quorum was to start a 90-day public comment period on the Voluntary Voting System Guidelines or VVSG 2.0 Principles and Guidelines. As Dr. Copan mentioned, Jerome Lovato, the EAC's

Director of Testing and Certification, is on the agenda this morning to discuss the comments that were received and the efforts undertaken by our Testing and Certification team, along with NIST, to work through those comments.

We have also had three public meetings on this new draft version of the VVSG Principles and Guidelines, during which we heard that the VVSG 2.0 is a significant step forward to modernize voting technology. It was also made clear that the voluntary -- that the voluntary nature of the VVSG results in a system where the full value is only realized if the guidelines and the EAC's Testing and Certification Program are utilized across the country. In other words, we should strive to create a VVSG and a Testing and Certification system that is responsive to the needs of election officials and provides for the access and security that the American voters deserve.

Prior to today's meeting, we also met with representatives of the voting system manufacturers or vendors and our voting system test laboratories or VSTLs. What we heard was that the VVSG 2.0 that this body recommended are an excellent set of high-level principles, but in order to build or test compliant equipment, the details are needed. That is our primary goal of the next two days, to work out the details of the next generation of voting equipment that will be an integral part of the infrastructure of our American

democracy. That task is not an insignificant lift in a day and a half, but I believe we'll be able to do it because of all the work that has taken place in the past several months.

Mary Brady from NIST will speak shortly about the process of updating and drafting the Requirements that we're here to focus on. I'd like to thank Mary and the NIST team for their work and dedication to getting us to this point.

Many of you were able to participate on the four conference-call presentations that we had to discuss the Requirements in advance of this meeting. We had an overall update call in April to discuss the path going forward. Then we've had three additional calls over the course of this summer on various sections of the Requirements. The first call looked at the requirements around usability and accessibility. The second call focused on the requirements for high-quality design, high-quality implementation, transparency, and interoperability. Finally, our third call examined the new cybersecurity requirements.

Today, we bring all of those sections together for a more comprehensive conversation. I'm hopeful that the calls from this summer have laid the groundwork for a productive discussion and ultimately a successful recommendation to move forward with these draft Requirements.

Again, I'd like to thank everyone for their work and efforts to get us to this point. Finally, I'd like to thank the EAC staff for all of their work putting this event together today. And so, again, thank you all, and let's get to work.

CHAIRMAN COPAN:

Perfect.

MS. BRADY:

Good morning, everyone.

COMMITTEE MEMBERS:

Good morning, Mary.

MS. BRADY:

My name's Mary Brady, and I am the Voting -- the NIST Voting Program Manager. So I'm here to talk a little bit about -- to give you a little bit of an update on what we've been doing in terms of updating the Requirements. And let me see if I can get this to work first. Nope. It's like the remote at home, right? When the little box is hitting, you can't get anything to work. Ah, there we go.

[Laughter]

MS. BRADY:

So, first, I think I'd like to take a little bit of a trip down memory lane so we can level set. There's a number of new folks here that are on the TGDC, so I want to be sure that we're all on the same page, and then I'll talk some about the Requirements,

why we had to -- you know, what went into updating them, the process for updating them, some of the changes. In some ways I'll be restating some of what Director Copan said in his opening remarks. And then we'll go over the agenda for the next couple of days.

So many of you remember this very busy slide that tried to set the stage for why we were -- we thought that perhaps this time around we should use a slightly different process from what had happened previously. At the onset of the development of VVSG 2.0 there were a number of activities that were being undertaken by various organizations, by NIST, by the National Association of State Election Directors, the EAC, the Federal Voting Assistance Program, and the common data format work at the time was housed in IEEE.

So we sat together and we said, okay, how can we capitalize on all this good work that's going on and continue the conversation? And we encapsulated all of those activities in a set of public working groups. So there were three public working groups that were formed to address elections, pre-election, election, and post-election, and there were four constituency groups that we called at the time -- which became known, as time went on, as the technical groups. So these were focused on cybersecurity, interoperability, human factors, and testing. For

quite some time we didn't get the testing work off the ground, but more recently, I'm happy to say that the group is fully engaged and moving forward.

And the reason we did this was -- and let me contrast it a little bit by past efforts in developing the VVSG. In past efforts NIST serves as a technical arm of the TGDC, and we would spend, you know, several cycles of TGDC meetings going back and forth on pros and cons of various technical components that might compose the VVSG. We get it to the point that the VVSG -- that the TGDC would be willing to vote and adopt it, in which case it moves on to the EAC for further review.

The EAC is then -- as stated in HAVA, it needs to send those Requirements off to the Standards Board and the Board of Advisors for their feedback. When it comes back to the EAC, they then in the past have gone out for a public comment period, as well as some of the public meetings.

So this time around we wanted to -- and what that -- the end result of that is there were a lot of questions on the back end of the process because not so many stakeholders were included on the front end of the process. So this time around we wanted to tap into as many experts as possible and get continual feedback as we were developing the Principles and Guidelines first and then the Requirements. So that was the focus of the public working groups

is to provide input into NIST and downstream to the TGDC and the EAC in order -- in the development of these Principles and Guidelines and the Requirements. And in fact if -- you know, that's the way most standards committees work is you have all the stakeholders at the table at the time that you're developing as opposed to asking them for feedback at a later date.

So we did this, and as part of -- you know, early on, the election groups created these process models. Those of you that were around for them remember the large sheets of paper that Ben would carry around with him, you know, Ben Long would carry around with him. We'd put up on the walls, we'd ask, you know, folks to come and review. We had a lot of activity in those groups with many States and counties putting forth their own processes and procedures, which were all collected on a TWiki, which, you know, it turns out that that was a great process at the time. It really sort of served to orient our work. It served for further discussions on scope. Those election process models, they were adopted by the TGDC. The -- they were later adopted by the Standards Board and the Board of Advisors and -- you know, the scope definitions, and, ultimately, we got to this set of core functions that define the scope.

Incidentally, as we're going through this process of trying to develop an election profile for the cybersecurity framework, all of

that work is coming back into play, so I'm really happy that we collected it on the TWiki and we have those resources to go back to.

In the end, we ended up with this definition of a voting system and this notion of 17 core functions that was put forth by the EAC at the February TGDC meeting. It starts with input data for ballot construction and ends with, you know, transferring and presenting results. This constitutes our scope here.

So some other activities, so some other components of the election infrastructure such as voter registration, the vast majority of election poll books, and, on the other end, election night reporting subsystems are not part of the scope for the VVSG, so it's -- oh no. Now I really did it.

[Laughter]

MS. BRADY:

Okay. We also spent quite a bit of time talking about a new structure, and we thought this was important because the VVSG at the time -- I mean, many of you can, you know, probably remember Bob Giles giving me a really hard time about the number of pages in the VVSG and, you know, the low-level requirements, and he had great fun with it. But, you know, there was a point in there that it was really hard to have meaningful discussions among the variety of stakeholders at the table, the security advocates,

accessibility/usability advocates, researchers, election officials when we were down in the weeds because what would happen is folks would jump down to the weeds and you really wouldn't get anywhere because, you know, some of the folks at the table, you know, weren't willing to go down that far. Others weren't willing to come up higher.

So part of what happened with the -- this notion of developing high-level principles is we were able to elevate the conversation and agree on really important concepts, and that's what's encapsulated in those Principles and Guidelines. And that gave us the ability to go about and developing -- develop requirements that were consistent with those Principles and Guidelines.

The Principles and Guidelines themselves, it was a process in and of itself, a year-long process in and of itself. We started with quite a number of guidelines. You can see -- if you look at the numbers there, you can see that they don't add up to -- the Principles and Guidelines don't add up to the bolded numbers at the bottom of the table, but they're much greater. That's because we started with a whole lot of principles and guidelines. Through conversations, we whittled them down to the 18 and 53 that were at the table, and then, through follow-up conversations with NASED, the Board of Advisors, internal conversations about, hey, some of

these really should go together, we ended up with 15 principles and 52 guidelines. And at one point, you know -- now we've added some white space and some front material and so forth, but at one point we had them down to five pages, so five pages with something that was easily consumed by the whole community where we could really talk about, hey, is this really -- does this represent the best of what we want our Voluntary Voting System Guidelines to cover?

And we had great agreement there. And, as I mentioned, there were adopted by the TGDC. They've gone through the entire review process. Jerome Lovato will talk about the comment resolution, and they are ready for -- they've been delivered to the Executive Director of the EAC. I've got a copy, and we believe they're ready for the next step.

So these are the principles and guidelines that we ended up with. So the first two, high-quality design, high-quality implementation really sort of speak to the overall system. So this is where voting system functions are encapsulated, things like what types of coding practices should we have, those types of things, so everything you might think about in terms of how do you design a system? Should you build security in from the start? Should you build, you know, accessibility/usability in from the start, reliability? Those types of requirements are encapsulated here, as well as how

do you go about implementing them? So that's what those two encompass.

Transparency and interoperability, here, you'll find various types of documentation that are required as part of the voting system, so later, what has occurred in that voting system is transparent and you can go back and it enables auditability. The common data format work is also encapsulated here in terms of interoperability.

And then the next set, the equivalent and consistent voter access; voter privacy; marked, verified, cast and -- as intended; and robust, safe, usable, and accessible are -- represent all of the human factors requirements.

The last set focus on security, so from auditability, you know, Principle 9 straight through 15, detection and monitoring are the security principles. And we'll be going over the requirements in quite a bit of detail this afternoon, so I don't really want to belabor them here.

So the requirements themselves, how did we go about updating? You know, it's -- we have over 600 individuals that participate in these public working groups. How do you take that many people and get them all moving in the same direction? So, essentially, we had biweekly meetings of the working groups and we had email list discussions. We started with the past voting

guidelines, including -- we went back to 1.1 -- 1.0, 1.1, even the TGDC-adopted version of -- in 2007 that was not adopted by the EAC, we went back to those. We looked at feedback from the testing and certification process and reports -- any reports of problems during elections. We examined relevant external regulations and standards, as -- in particular, those that have been updated in the last 10 years.

We considered reports, so we all remember the Presidential Commission on Election Administration report, the National Academies report on securing the vote, the Senate Intelligence Committee report on election security, various DHS products that have come into play over the last few years and alerts, as well as relevant research results from the past decade or so.

We examined updated best practices in election -- both elections and technologies, so risk-limiting audits didn't exist, you know, in the early 2000s, right? You know, there's been a lot of progress in terms of security and how you harden systems that has progressed over the last decade or so. So all of those were taken into consideration, and then we engaged the variety of stakeholders in deliberations.

I have to say that at times it was taxing. It's a little bit like managed chaos. There's a lot of folks in the community that are very sincere, very passionate about their role -- the roles that they

play in elections and -- but, you know, all in all, it was a great process. We got a lot of input. We kept moving forward, and I think in the end what we have today is the best of what we can do at this point in time.

So what are some of the changes? And in some ways I don't want to belabor these too -- too many because they reflect some of Dr. Copan's talking points, but let me highlight some, that's -- there's -- you know, systems now need to be auditable, and there's support for risk-limiting audits, but there's also supports -- support for other types of auditings like -- such as ballot-level audits.

The Requirements make software independence mandatory. And what does that mean in today's terms? In today's terms it means paper, you know, it -- that you have to have an auditable -- you know, you have to ensure that an error in the software does not result in an error in the election. So one way to check that is with paper. The -- but there's room there for other solutions. There's room there for innovative solutions as the Requirements currently stand, and we'll talk more about some -- you know, one of the promising new areas is E2E technology, so that is a possible new innovative area that could require paper or could be paperless.

We -- there is improvements in access control based on the voting stage. Data is -- data protection of both artifacts and

transmitted data, so there's -- you know, there's the need to protect data in motion, as well as protecting data at rest.

There's multifactor authentication for critical operations, and Gema is prepared to go over what those critical operations are. I know there was some discussion of, you know, what exactly are they on the Webex call that we had.

There's improved system integrity, so this includes risk assessments, supply -- and including the supply chain. There's been a lot of work done here recently. I know NIST has held a number of workshops in collaboration with DHS on supply chain activities, so there's ongoing work there that we were able to work side-by-side with our colleagues and, you know, bring in the latest work from those activities. System hardening, authenticated updates, secure configurations, so all of these are required now.

On the human factor side, it's equivalent and consistent voter access across all modes of interaction. And in particular here we -- it -- we want full support of accessibility, so we want to do away with that system that's in the corner that's only -- you know, that the accessible voters use that, you know, everybody should vote on -- the same way. It -- and have access to the same kinds of capabilities. So updates to voter interface requirements largely based on research that's happened in the last decade or so, so

what's the latest research on fonts and things of that nature? And Sharon is -- will go into more details there.

They reference Federal accessibility standards, so it's apparent now -- I mean, we've always said accessibility is the law that -- so we made it very clear inside the requirements which requirements are mapped directly or derived directly from -- you know, from legal -- from the Federal accessibility standards.

There's additional work, you know, whether it's the accessibility standards or Section 508, as well as the work that's -- the great work that's come out of W3C, the World Wide web Consortium's Web Content Accessibility Guidelines. There's -- the requirements ensure privacy for marking, verifying, and casting ballots. And this is for all voters, including accessible voters. There's some clarifications on the plain language requirement.

And finally, there's a high -- those other categories, the high-quality design, implementation, transparency, and interoperability. We've reorganized them, so in past VVSGs they were according to devices. This one reorganizes those activities, those voting functions as phases of an election, which can be mapped back to actual election functions and hopefully eventually back to the core functions.

It includes common data formats for imports and exports, and John Wack will go over some of that later today. Ensures that

usability, security, and reliability are designed from the start. Strengthens documentation requirements, particularly for security. Replaces code commentary and well-established coding practices, so past VVSGs spent a lot of time, you know, dictating how your comments should be -- you know, the comments for your code should be laid out. There are many well-established coding practices out in the industry, and this takes advantage of them rather than, you know, just picking a subset of them since, you know, there are good ones out there. Let's go find them and use them for your language. And it also provides additional defensive coding practices.

And finally, you know, the new guidelines streamline electrical requirements making them less costly to test, so this is one of the first activities that the testing group took on was, you know, really sort of meeting with the manufacturers and labs and finding out, you know, how this was working for them and was there anything that we could do to reduce the burden while at the same time have, you know, it meet the requirements that were necessary for voting systems.

So here's the agenda. That's a little hard to see at least for me, so I'll do it from memory.

[Laughter]

MS. BRADY:

So after me, Jerome Lovato is here to go over the public comment -- or the resolution of the public comments from the Principles and Guidelines. Then we'll take a break. I know breaks are important. That'll be followed by -- Dr. Sharon Laskowski is here from NIST to discuss the human factors requirements. We'll have lunch. Lunch is on your own. It -- there are several areas -- several restaurants and places to go right here in the immediate area. When we come back, John Wack and Ben Long from NIST will be here to talk about principles -- the high-quality design, high-quality implementation, transparency, and interoperability. We'll have another break to get you up, moving around, and then finally, Gema Howell from NIST will be here to discuss the cybersecurity requirements.

Moving forward to tomorrow, we'll have a final discussion of the issues. Hopefully, at that point we'll be ready to put forth some resolutions and to vote on the VVSG, to vote to, you know, hopefully adopt, provided the deliberations go well today, and we hope that they will -- to adopt the VVSG Requirements.

Let me note that this is the first step in the process, that it requires adoption by the TGDC in order to move onto those other -- the other phases, the review by the additional EAC boards and the public comment period before final adoption by the Commissioners.

And if there's time, you know, there's a -- the -- tomorrow's agenda is a little bit loose because our primary job here today is to carefully consider the -- today and tomorrow is to carefully consider the Requirements and get to the point that we're able to move forward. So if that discussion needs to go longer tomorrow, it will. But if we have time, I'll give an overview of the election profile work that's been going on, that the -- we've been -- we've started down a path of creating and launching a profile of the NIST cybersecurity framework, so I'll give an update on where that is, and Geoff Hale will provide some updates on the cybersecurity front.

And I think with that, I thank you all, and we're ready to get started I think. I'd be happy to take questions if you have any.

COMMISSIONER HOVLAND:

I was just going to throw in one housekeeping measure for both what people have in front of us and to clarify. So, one, the agenda is in front of you. For those of you that couldn't read it on the screen, I believe it's in the binder at the front. But then, Mary, can you just clarify if -- I believe you know. So at the beginning of this, so we have the Principles and Guidelines included in here, and my understanding is that the Principles and Guidelines that are in here are the ones that are reflective of the comments. And obviously, Mr. Lovato is about to talk about that and the changes

that were made, but then also the subsequent requirements are mapped to that draft, correct?

MS. BRADY:

Yes, that's correct, that these are the updated Principles and Guidelines. My understanding is they have not been voted on yet by the EAC, but the Requirements have been mapped to the updated Principles and Guidelines.

COMMISSIONER HOVLAND:

Thank you. We've also been joined by Linda Lamone, so I would like to thank her for being here. And I don't know if you want to formally introduce yourself for the record.

MS. LAMONE:

Thank you very much. Linda Lamone, I'm the Administrator of Elections for the State of Maryland, and I'm glad to be here and looking forward to a productive two days. Thank you.

COMMISSIONER HOVLAND:

Thank you. So if there are no additional questions or comments, let's go forward then with the next part of our agenda with Jerome Lovato, please. And again, welcome to Linda Lamone. Thank you for being a part of this.

MR. LOVATO:

Good morning, everyone.

COMMITTEE MEMBERS:

Good morning.

MR. LOVATO:

I just have a few slides, so this might be quick, or sometimes they end up being longer than they should be.

Just a -- I just want to go over -- provide an overview of the comments we received. We received around 2,800 comments from a wide variety of stakeholders. Pretty much everyone involved with voting commented on -- in some form or fashion on the VVSG Principles and Guidelines. The one that received the most feedback was Principle 13, data protection, which was the banned wireless, require hand-marked paper ballots. That was composed around 93 percent of the comments of the 2,800, and essentially at all said the same thing, banned wireless and require hand-marked paper ballots. The other comments were around 7 percent, composed about 7 percent of comments received.

And so in the timeline February 28th of this year the comment period started for the VVSG 2.0 Principles and Guidelines. June 7th, it -- the comment period ended. And then in -- on June 21st our staff, the Testing and Certification Program, and NIST had our first meeting to review the comments and talk in depth about it. We had three of those meetings, the last one being on July 30th. And then on August 5th I submitted the revised draft

to Executive Director Newby and to the NIST Voting Program Manager Mary Brady.

And so we took a deep dive into all of the comments. We didn't dismiss any, so we -- some are a lot easier to just review and say, well, okay, thanks for your opinion. Others were more, well, let's talk about that. And we had several times where it was, okay, let's table that because we're running out of time and let's come back to it. And really at the end of the process there weren't really much substantive changes at the end of -- just reviewing, reviewing, and more reviewing because we also did that during our non-meeting times in communicating with the EAC and NIST. And so the revised draft really didn't change all that much.

And so up -- this slide here is where I want to spend the most time, which is the summary of the comments. I just tried to capture here some of the stuff that we looked at. And really for us the way we looked at it was just the way the comments -- the format in which the comments were received. It was a little difficult at first for us to wrap our heads around, okay, how do we address this? Because some comments that were related to specific Principles and Guidelines were in a narrative form, and so it's like, okay, we have, you know, a 15-page document. What is this asking us to change on the VVSG? And so sifting through that -- others were really more specific saying look at this principle and

guideline, change this wording to this principle and guideline.

And so we had comments that are -- were in support of VVSG being two separate documents, Principles and Guidelines and then Requirements. We also had opposition to that format. There was support of the EAC staff to change requirements, and there was opposition to that as well. There were some rewording of the Principles and Guidelines, and those were the ones that we probably spent the most time on because we wanted to say, okay, what does that -- should that be viewed differently? Like where -- who was the -- understanding who the commenter was and kind of providing the context was helpful knowing that, oh, okay, this is this person and they have this level of expertise. And so from that perspective should something change?

And we spent most of our time on those types of comments because we just felt like if -- we weren't going to add, as one commenter recommended, an additional principle and guideline because then that would have just -- that particular one just was already covered in all of the others, and so we just didn't see any value in adding an additional principle and guideline.

Of course, the banned internet connectivity, banned wireless, banned barcodes, banned voting -- just kidding.

[Laughter]

MR. LOVATO:

That's not up there. I was kidding. There was a recommendation to add a glossary and defining terms. And some of this was difficult, too, in that the audience didn't have all of the requirements. And so I think there was some confusion with at least some people to say this is my one opportunity to discuss requirements as well, so they took a deep dive into items that are covered in requirements. And so that was also, for me, I think something that was challenging for some people to understand that. This document wasn't taking a deep dive into requirements, and so we had comments on requirement-specific items. And then we also received EAC policy recommendations.

That is my presentation. I do want to spend as much time as necessary to answer any specific questions you all may have regarding comments received, our process, any of that. I'm happy to discuss.

MR. KELLEY:

Neal Kelley, Orange County. Thank you, Jerome, for the presentation. You talk a lot about the comments and then doing the deep dive in comparing the existing documents with the comments. Was anything changed out of that entire process? And if so, can you identify those changes?

MR. LOVATO:

Yeah, like really not a lot was changed. The one I guess if you want to call it significant -- I wouldn't -- but in Principle 14, system integrity, 14.1, the voting system uses multiple areas of controls to provide -- the previous word was redundancy, and that was changed to resiliency. That was probably the most significant change. I mean, it's kind of laughable. I see kind of the smirks. But it just -- I think when we put the Requirements out for comment, that is where a lot of those comments that we did receive will carry a little more weight. I think there was truly a sincere misunderstanding of the Principles and Guidelines being just that, and so that's the impression I got from the comments that we received was that it -- and so there were a lot of comments still surrounding the -- so it's just that. When we had our discussions, our in-depth discussions with NIST and we had a lot of back-and-forth on some of them, it was just like, well, is this enough to really alter the Principles and Guidelines? And at the end of the day it just wasn't. But we did look at all of the comments.

MR. CHOATE:

I'm curious. Can you walk us through the top two points? So who and what was their argument for supporting the maintenance of one document or separating them into two documents? And then who was supportive of staff making requirements changes and Commissioners having that role?

MR. LOVATO:

The two that come to my head immediately are the -- the ones in support was OSET and -- for both support --

MR. CHOATE:

Supportive.

MR. LOVATO:

-- supporting the VVSG as two separate documents and the idea of allowing EAC technical staff to change, modify Requirements. That's -- and then the other in opposition to both was Harvie Branscomb. Those two are the ones that come to mind immediately. And there were several others that had similar comments.

MR. CHOATE:

And what was the sort of prevailing wisdom of those? What were they -- were they making any arguments that were sort of different than we've been hearing in the common discussion?

MR. LOVATO:

No.

COMMISSIONER HOVLAND:

I would just note that our General Counsel Cliff Tatum has a point to make on this issue I believe.

MR. TATUM:

Mr. Chair, the -- understanding the nature of the questions from the TGDC members to Jerome about the comments, the point I want to make is that the Commissioners have yet to fully review the comments and determine whether the recommendations, as proposed by the staff, will actually be accepted. So the nature of the questions are actually questions that should be presented to the Commissioners in either a public meeting for the adoption of the Principles and Guidelines as they were submitted initially or as they have been revised. So I'm concerned about getting into the identification of the folks that have submitted the comments until the Commissioners have actually determined what to do with the comments that's been submitted.

To the extent that the revisions to the Principles and Guidelines are mapped to the current technical requirements, I'd ask Mary if she could address -- if the additions or the edits to the Principles and Guidelines are not accepted by the Commission, would that change the nature of the technical requirements being mapped to the principles? Should I repeat that in a different format?

MS. BRADY:

No, I got your -- I just -- I'm looking at the team to see if there was anything substantial that -- no, it doesn't appear as though it substantially changes the requirements.

MR. TATUM:

So the technical requirements would stand as they are either to the Principles and Guidelines as initially published in Principles and Guidelines as revised by -- as proposed revisions by the staff?

MS. BRADY:

That's correct.

MR. TATUM:

Okay.

MS. BRADY:

I mean, from the NIST perspective the vast majority of the changes improve the readability of the Requirements, you know, and perhaps further clarify the intent of the principle or the guideline -- or not the readability of the Requirements, the readability of the Principles and Guidelines.

MR. TATUM:

So to that end, without any intended disrespect to any of the members with questions about the Principles and Guidelines comments, I think that we should focus on what the requirements are specifically so that we move the discussion along, and then there will be a later date for there to be questions about the comments and whether those revisions should or should not be accepted by the Commission. Thank you.

MR. CHOATE:

So this is Judd. Is -- are you -- Cliff, are you saying that the public comments aren't public?

MR. TATUM:

The public comments have not been accepted by the Commissioners to be made public, that's correct.

MR. CHOATE:

So we can't see or talk about the public comments?

MR. TATUM:

The public comments to the Principles and Guidelines does not impact the nature of the technical requirements, which is why I'm -- I believe your questions and discussions about the Principles and Guidelines do not impact the discussion about the technical requirements, which is why I asked the question does the -- would any revisions to the technical requirement -- to the Principles and Guidelines change the standing of the technical requirements?

And the answer to that was no, so there's no reason to go into the discussion about the comments to the Principles and Guidelines.

We're here to discuss the technical requirements.

MR. GILES:

This is Bob Giles. So if we don't know what the comments are, how can you say they won't impact the requirements? I don't understand how we can make a broad statement like that that if we're not going to discuss those comments and those comments

could impact what the ultimate principles and guidelines are or the requirements, I don't see how we can say it would be no impact.

MS. BRADY:

I can just -- this is Mary Brady. I can just say, you know, from our perspective, what we received as the redline version, the changes to the principles and guidelines resulted in just improved readability, so there weren't substantive changes in the principles and guidelines that would have changed the requirements. Now --

MR. HALE:

Are we able to see the redline version? Sorry, I jumped in.

MS. BRADY:

That would be a decision for the EAC I think.

MS. GOLDEN:

Diane Golden. I think the issue is if there's comments that did not result in a change because, as Jerome pointed out, those people were commenting on deep dive technical issues, those comments do have an impact on the discussion about the -- it's not the -- the things you changed might not have had any impact on the requirements discussion, but you already said people commented way beyond that, so there would be some comments that have an impact on the requirements discussion. I think that's the problem. Make sense?

COMMISSIONER HOVLAND:

And can I chime in here? So maybe to bring a few of these things together and see if this is helpful, so I believe what Jerome just presented was that on August 5th a redline version was presented to the Executive Director and to Mary. I think that I would be comfortable having that shared. I will say, as Commissioners, we have not, as Cliff said, been presented with that other than that we received this document in advance of today, so this shared -- this has the updated version, but I think it would be useful to see a redline version. It sounds like the proposed changes that were made do not impact the requirements. As Mr. Lovato indicated, the comments were thoroughly worked through. We were able to listen in to parts of those conversations. I assure you, it was an in-depth analysis of each of those. And so from my perspective at least we have arrived to a point of finality on the Principles and Guidelines, and I believe we should be able to vote on those as soon as possible. I think we are at that point it sounds like.

So to the degree that we need to -- you know, our procedures are that we can have a public meeting or that we can tally vote and that can trigger a public meeting if people don't think we're ready. I believe we do, speaking -- we are, speaking for myself, and I'm happy to move that ball forward. I think if it's help to the members of this body to see the redline version to allow them to

see the proposed changes by EAC staff and NIST, that that would be helpful and we should do that.

MR. LOVATO:

Okay. I'll do that during the break.

COMMISSIONER HOVLAND:

Thank you.

MR. TATUM:

Mr. Chair, if I may, on the last -- Mrs. Golden, you are correct in that there were some additional comments or comments made that would speak to Requirements as they are being developed. And the period of time for any comments to be made to the Requirements will be established after the draft of the Requirements are presented by the development committee here today. So any comments that were presented to the Principles and Guidelines that may impact the Requirements would actually be applicable to the comment period for these technical requirements.

CHAIRMAN COPAN:

Thank you very much. I think that that's a great clarification, and I think that having access to the redline version will provide that clarity that all are looking for to ensure that the final version of the draft text is clear and more readable as -- and more understandable for the community as -- at large.

MR. GILES:

Hi. Bob Giles. Mary gave a really good review and overview of kind of where we started and how we got where we are, and seeing those first four bullets place into a few comments that I have.

So going back to 2015, the discussion was to separate the VVSG into the Principle and Guidelines and Requirements. And we had moved that ball forward for years that they would be separate and that the Commissioners would vote on the Principle and Guidelines as the VVSG and then Requirements, and Test Assertions would be separate so we don't end up in a situation should we not have a quorum or we need something changed because technology has changed in a faster timeline, that these be separate and that the Requirements and Test Assertions not be required to be voted on by the Commissioners. So we worked for several years on -- under that principle.

Then in -- the Standards Board of April -- in April of 2018, the EAC Commissioners changed things up and said, nope, we believe we need to vote on the Requirements and kind of just slipped that in at a Standards Board meeting.

Fast-forwarding to April of 2019, a Standards Board meeting, the Standards Board unanimously recommended that the EAC Commissioners adopt the policy that acknowledges the VVSG is a

standalone document required by HAVA and that the Requirements and Test Assertions are documents that are established by policy.

At that time we were told that there was supposed to be a legal opinion coming, and so one question is is there a legal opinion as to the standing of that? And I believe the Board of Advisors passed a similar recommendation at their meeting. So I'm just curious where we are with the legal opinion on that.

COMMISSIONER HOVLAND:

So I will -- we did receive a legal opinion to consider as we think about how to adopt the Principles and Guidelines. I will summarize the -- it generally, and Mr. Tatum can clarify if I'm incorrect on it at all. But essentially, his analysis that we were presented with was that the Principles and Guidelines can be a separate document from the Requirements, but that doesn't excuse the Requirements from having to comply with the Help America Vote Act and the process and procedures that are set out therein.

And so I think that has brought us to a point where even if you disagreed with that analysis, I would say, number one, my personal reading of the room is the votes aren't there, and so I think the place for us to focus is how do we move forward? And I understand the quorum issue that you've raised and certainly both in my current role and my former role at the Senate was intimately

familiar with the quorum issue. And I would say that I hope we don't get back to that.

But I think the real concern that I understand or that I hear is about making sure that the Requirements and the VVSG don't stagnate and that they allow for updates and innovation, whether that's innovation or just fixing issues. At one of our public meetings we heard from the voting system test laboratories that there's been an issue with the decibel level that's been wrong for a decade. Like that is unacceptable.

And what we can do as an agency and I believe we should do is adopt principles and practices that facilitate regular updates so that we have, I would think, a placeholder annually for a cleanup of the VVSG or the Requirements where we meet, this body in particular looks to see are there pieces of the Requirements or the VVSG that need to be reconsidered or updated? And if so, you can follow the HAVA process by making that recommendation to the Executive Director. The Executive Director can then forward that to the other boards, as HAVA requires.

What HAVA tells us as EAC Commissioners that we can't do is that we can't vote until 90 days have elapsed from that forward or that sending to the other boards. And then in that period of time there needs to be a public hearing and a public comment period. We've had conversations that that can be streamlined so that we

can make a process that is more responsive, and I think that is a way that we can address these issues. I'm hopeful that that path forward would have three votes amongst the Commissioners, but I certainly think that one is one that is consistent with HAVA.

And again, I think what we can focus on here today is moving these Requirements forward so that we continue to move this closer to having an ability for the voting system manufacturers to start building machines to these improved standards.

MR. GILES:

So I guess the concern we've had now for several years is -- one is the quorum issue, and historically, that has been a problem with the EAC. And, you know, you hope that it doesn't happen again, but if it does, we are concerned -- and this was the whole point of separating these documents -- is that we don't find ourselves in a position that new technology comes along that requires some new Requirements. It should still fall under the Principle and Guidelines, but if we need new Requirements, the -- without a quorum of Commissioners, have you guys discussed a failsafe? I mean, there has to be a failsafe so that we as election officials and as vendors and as voters don't find ourselves stuck with old standards again.

COMMISSIONER HOVLAND:

I think in our public hearings around the Principles and Guidelines we had some very interesting conversations about that. I believe that the most successful path forward in my opinion is for us to adopt the Principles and Guidelines as soon as possible. I'm willing to have a vote on that next week. You know, let's give people a chance to read through the edits, and then let's vote on it.

Then I think the next step is adopting these Requirements or, sorry, actually this body recommending these Requirements be ready to move forward, which would then have the Executive Director send that -- well, actually, NIST does a final cleanup, sends it to the Executive Director. The Executive Director sends it to the other boards. We could then run a parallel 90-day public comment period, and at some point in there have a public hearing and then eventually vote. If we do those things, my understanding from the manufacturers and -- is that they would then be able to start building systems that look more like the documents here.

And then as to what we would do in a world without a quorum or if there are ways to streamline the process, I think those are all important questions to have answered and things to think about, but we can do that while people are manufacturing. We know that it will take years to build new systems, and I would rather have them be building those systems while we discuss what the next version looks like or how we update these things.

But in the meantime, as I mentioned, if we put in place an annual review or cleanup, you shouldn't have that stagnation as long as we have a quorum. And then if we don't, frankly, that's a Senate problem. And, you know, not that it doesn't have an impact here, but the Senate confirms people into these slots, and if they are not doing their job, they needed to be made aware of that.

MR. GILES:

So I guess -- and I don't want to belabor this much longer, but, you know, you're saying should we put a process in place to do a cleanup. If this discussion has been going on for, again, kind of the switch since April of 2018, why isn't that process in place? Why don't we have these policies in place so if we're voting on Requirements we know that, yep, we'll be back next year to clean these up. We don't know that. We -- right now, we don't. We just are, you know, kind of, well, trust us. We'll do something that will allow us to update these in a more streamlined fashion. I mean, look -- and that's a discussion to have, too. What is the timeline? I mean, we look at how long it's taken us to get to this point, years. So if you're -- if we don't have something in place that allows us to clean this up or move forward without a quorum, we are -- it's problematic. And I think we're just kicking the can down the road if we don't address it sooner than later.

You're asking us -- and I agree; we have to get the standards and Requirements out there without a doubt, but we also have to do our due diligence as committee members to make sure there's a process in place moving forward. And we haven't heard that yet.

COMMISSIONER HOVLAND:

And what I would say to that is simply, one, what happened here prior to February of this year was not something that I was here for, so it is what it is. You know, I think since February, as I laid out earlier and you've seen, we have been on a very aggressive timetable as far as chocking off the pieces of the law that we're required to follow.

I would say for the things that are within our control like having this meeting annually for a cleanup, hold our feet to the fire on that. Hold us accountable.

MALE SPEAKER:

Yeah.

COMMISSIONER HOVLAND:

We should do that.

MALE SPEAKER:

Yeah.

COMMISSIONER HOVLAND:

We have no excuse not to take those actions.

As far as what the Senate does, that's the Senate. And so I think it's about controlling what we can and trying to move the ball forward, which --

MR. GILES:

I'll just make one final comment. And I get it, hold your feet to the fire. We've been asking for a legal opinion for a year and a half. Holding your feet to the fire, we didn't get it, so we're only getting something now at the 11th hour. So my concern is you're telling us to hold your feet to the fire, but that doesn't seem to work. So, you know, I'm just being blunt with you that we can jump up and down all we want and you guys can just say, well, we'll get to it. We're going to kick the can down the road. That's how I feel. That -- and that's what I feel is happening right now.

MR. LOVATO:

Real quick. This is Jerome. I just want to let the TGDC know I sent the redline version of the document. Thank you.

MR. LUX:

This is Paul Lux. And I just want to say, too, you know, one of the very first things when we finally had an operational quorum with the EAC and we were able to reform the Standards Board, one of the very first things at the Standards Board and the Board of Advisors did was institute a policy that allowed for those boards to continue when there was no quorum because we felt it was that

important. That was like item 1, first order of business. Let's make sure while we have a quorum we put policies in place so that the Standards Board does not fall into disrepair, as it had previously, which is what makes what Bob is talking about so vitally important because that's -- I mean, because no quorum, no Standards Board to review, no Board of Advisors, everything just stopped in the world for voting systems.

And we can't have that happen again, and so we have to have a way for us to move forward either as the TGDC with the Standards Board, et cetera if you guys lose quorum again. I mean, we understand that there's problems above your pay grade with Houses of Congress, and there's very little we can do about that. It's just -- it's that important that this process not be stagnated ever again just because we simply lose a quorum because of political backbiting and infighting.

MR. KELLEY:

Neal Kelley. And just -- I know, Bob, you didn't want to belabor the point, so I will just for a second.

[Laughter]

MR. GILES:

I knew I could count on you.

MR. KELLEY:

But, Commissioner, I just have a clarifying question. You had mentioned that the Principles and Guidelines and the Requirements could be, through the legal opinion, two separate documents. And then you referenced your Requirements under HAVA, I'm assuming, to move that process forward. And I didn't -- maybe -- I'm sorry if I missed the nuance, but what specifically in HAVA -- does it give you the authority to make that decision, or does HAVA compel you to vote on those documents?

COMMISSIONER HOVLAND:

So HAVA requires us to vote on the Voluntary Voting System Guidelines. I think part of the debate is what that is. There is a camp -- I will call them the top commenters on this list -- who believe that this document, these Requirements are not part of the VVSG or not subject to the VVSG Requirements laid out in HAVA. I guess I hit it on the head.

[Laughter]

COMMISSIONER HOVLAND:

We still have -- I'll pause for a moment for station identification. There we go.

MALE SPEAKER:

Thank you.

COMMISSIONER HOVLAND:

So, you know -- and I think that requires, you know, some real -- I mean, it's an interesting thought about, you know, this body was formed by the Help America Vote Act to make recommendations to the Commission about what voting systems should look like. And I think the Principles and Guidelines are great, but we've heard from the manufacturers and others that that doesn't help them get there. And so then I think the question is should these happen in a vacuum? You know, should this be -- not to call him out here, but is this Jerome's job to figure this out by himself as the Testing and Certification Director? And that would be a difficult task.

I think one of the things we have in front of us, we talked about end-to-end verification. You know, I'm not sure that that's ready for primetime yet, but clearly there are people working on this issue. And so if it's not ready this year, maybe it is next year. I don't have an understanding of that level of cryptography. Very few people do. And so I am sympathetic to the argument that a public comment period, a public hearing is useful on that. But I do think there are ways that we can streamline this.

And I think there are pieces of it -- you know, in the public hearings that we've had, one of the things that came up was there -- not all requirements are created equal. Some of them refer to external technical standards. In this job I learned what the MIL

standard was, you know? If we reference that in a requirement, that external technical standard should not necessarily be frozen in time. And so maybe we can take those type of requirements and look for a policy that would allow those to be adopted by staff because it's common sense and -- or we put in an appeal process. And I think there are different avenues that we should explore. I can personally commit to pushing for those and exploring them because I think that is ultimately how the process gets better, and we provide the products that the States need.

And so to sort of sum that up -- and I'm happy to talk about this more, but I'm cognizant of the agenda -- and that the only way that we move this forward is talking about the Requirements in front of us.

MR. KELLEY:

So thank you for the clarification. And I think to your point about allowing some sort of a window for staff to be able to make some of those types of changes is a real step forward in my opinion. I'd love to see that flushed out further, especially before tomorrow.

[Laughter]

MR. KELLEY:

And then just a process question, I think, for Mary. You had mentioned that this body is required to take action. In other words,

if we affirmatively do that or we don't, but can the Commission then step in and override that I guess is my ultimate question?

MS. BRADY:

Down the line, yes. And in fact history has showed us that that is indeed possible. So they -- the 2007 recommendations they -- which were initially known as the VVSG 2.0, the first VVSG 2.0 was adopted by the TGDC, went through the public comment period, went out to the boards, and in the end they -- it was not approved. You know, it was not adopted by the Commission.

So, yes, that can happen, but it's not considered by the Commission until we adopt it here. So this is the first -- this is kind of where the rubber meets the road. This is where it all starts, right? So the Requirements get adopted here, they get forwarded by NIST to Director Newby, and then -- who then has a responsibility to send it out to the boards and to provide for the public comment period and the public meetings.

And then after comment resolution, you know, then comments come back in. There's a combined -- you know, there's a process of going through -- resolving those comments where NIST and the EAC both kind of participate in that and present a new version to the Commissioners for -- I guess at some point -- I think at this point, Brian, perhaps you should weigh in because this is EAC territory.

MR. NEWBY:

Right. Just to clarify, the process is that the TGDC creates the VVSG or comes up with its recommended VVSG, presents it to the Executive Director. At that point the Executive Director takes a VVSG and presents it to the Executive Board, the Standards Board, and the Board of Advisors. So, in theory, that could be a separate VVSG. That'd be crazy talk, but it could be a separate.

So what has been done in the past is that VVSG that's been passed has then been taken by the Executive Director to those boards. Then it's issued for public comment, and the Executive Director, through staff but then eventually must adjudicate those comments and recommend which comments to accept to the Commission, which then can say, hey, that's great, you've done these four, we agree, we don't like that one, that kind of thing.

So what we try and do is filter it some, but we're going to have to explain to the Commission at some level some of the strike issues. You know, let's just suggest wireless is a strike issue. We chose to do it this way because of this, and let them make the final decision is to whether that was a good idea or not. So that's kind of the process. And it would be the same process for the Requirements because, technically, they're part of VVSG.

CHAIRMAN COPAN:

Thank you very much, Mr. Newby. That's great clarification.

I think we've heard around the table this morning the importance of maintaining the momentum on this effort to ensure that the Requirements in the VVSG are reviewed on a regular basis, at least annually going forward, and that we utilize the process that's just been recapped for us to ensure that the appropriate bodies connected with the EAC can take action to ultimately ratify those changes.

How are we doing for time?

MS. BRADY:

I think we're right on time.

CHAIRMAN COPAN:

Yeah, wonderful.

MR. CHOATE:

I have another couple of questions. I'm -- so this is Judd.

I'm curious. Is there any chance that we can see the legal opinion that was drafted about the need for separate documents or separate evaluations?

MR. TATUM:

The -- once I -- excuse me. Once I receive direction from the Commission as to the acceptance of the legal opinion, then that's a possibility. Until that point, no, we would not release the legal opinion.

MR. CHOATE:

Second question, this is, again, Judd. So the -- 93 percent of the comments were about issues which frankly are issues we know the answers to. I am curious about the 7 percent. Is there any chance that during the course of today we could see those 7 percent and just sort of walk through the 200-ish comments that might have some substantive relevance to the work that we're trying to do?

MR. LOVATO:

Well, I guess we're talking about Requirements today -- this meeting or the VVSG Principles and Guidelines document?

MR. CHOATE:

I -- I'm interested in the comments you received that pertain to the questions that we've all been discussing. And it seems to me that they are public comments and that they would be public. I mean, that's my very broad legal analysis of the word public.

[Laughter]

MR. CHOATE:

And so it seems like we should be able to see those. And I don't really care about the 93 percent because, as you've already pointed out, they're sort of done issues. But I am interested in those 7 percent.

MR. TATUM:

And this is Cliff Tatum. The -- to the extent that those comments to the Principles and Guidelines go into a -- into suggestions of what the technicals may look like, you are addressing the technicals as they have been proposed by NIST and the development committee at this point in time. Those comments to any technical requirements are technically irrelevant because those were comments made to the Principles and Guidelines that did not apply to the Principles and Guidelines. So you are focusing on the requirements as they are proposed by NIST today, and those same comments that may have been submitted for the Principles and Guidelines may be submitted to these requirements, which we would then consider in presenting to the board. I think they are irrelevant, Judd. I really do.

And to the extent that staff has taken a look at those and NIST has taken a look at those and determined that they do not require a revision to the Principles and Guidelines, I don't know how they're helpful. I mean, I don't -- I can't -- they may be helpful to you, but I don't see how they're helpful to the discussion on the technical requirements as presented to you today.

MR. CHOATE:

It seems like -- with all respect, it seems like that would be a decision that we would make as opposed to, you know, counsel for the EAC because they -- what may appear to one eye to be

irrelevant could very well be relevant to others that are involved in the same sort of occupation and perhaps, you know, work a little deeper in the sauce than others. So --

MR. TATUM:

And point made, and I would then look to NIST -- to the NIST team, as I think they previously indicated, that their technical -- that the comments that they saw did not raise or rise to the level of making significant substantive changes to the Principles and Guidelines. Might they consider those for the technical requirements today? Perhaps they did. But I think the question's been answered. And I'm not attempting to insert my legal analysis here, but we've had NIST and EAC take a look at what those are and determined they aren't -- they do not impact the Principles and Guidelines to any substantive nature.

MR. NEWBY:

I think there are -- this is Brian Newby again. I think there are -- your question is at least two questions and maybe three. So the VVSG from a TGDC standpoint is baked, so that -- the -- the high level. Then that's gone out and received comments, and now to the extent that they are made or not made, that was done with NIST and Jerome and others, and I was on those calls. So those decisions, at least how they're going to be recommended to the Commissioners, is the staff, Executive Director now.

The -- I can't speak to the legal part. It would -- if they're public comments, if they're public record, I don't know that. And that -- Cliff would have to say that.

But I also think then it's fair to think there's value in knowing what those are so that that could inform if your requirements are proper that you're looking at. I see that logic. I just don't know the legal thing. But I want to make sure that it's looked at separate. Like the way it was done with VVSG, that's kind of done. That's not to say that these comments are irrelevant and shouldn't be made aware to you. I just don't know how that's allowed.

MR. CHOATE:

And then so I have a follow-up that sort of speaks to one of the points that you just brought up. And with all respect because I know that this is a little touchy, but let's say that we live in a future where we don't have an Executive Director and then what our -- what's happening to those comments and what's happening when we don't have the infrastructure that will allow for those to go forward? I mean, are we limited in some way based on that?

MR. NEWBY:

So I'm -- and I don't know that that's a bad question at all actually, or touchy. The -- HAVA speaks to the role of an Executive Director, so I think if there's not an Executive Director, that is -- that's an issue. I don't know how that plays into -- if there's a -- let's

just play it all out. If there's a different Executive Director, would the Executive Director make the same conclusions of what's being recommended with regards to what we've done so far? I would think so because that was done -- I mean, there's public comments. I don't know -- they could make some decision that would be a little different, but it's going to be up to the Commissioners.

What happens in the process of the Requirements, how they're taken, that's a different thing because HAVA is very clear about an Executive Director carries that out.

MR. GILES:

This is Bob Giles. Just back to Judd's earlier point about the public comments, one of the most important words we use as election officials is transparency, and I'm not getting that today. You guys seem to be dancing around us seeing these public comments, and I don't understand why. If, as a committee, we want to review those because we think it's important, I don't understand what the pushback is on that. And maybe somebody can answer that, not just say, well, blah, blah, blah.

MR. LOVATO:

Well, real quick, can I just ask just a question? Logistically, when it comes to public comment and review, Bob and Judd, are you both recommending or suggesting that TGDC should be involved in the public comment review? Like before this meeting,

would you all have liked to have been a part of our discussions with NIST in reviewing the public comments? Is that what I'm hearing? Like because that would have been more beneficial than to say let's look at all the comments today because that's just not possible to do today, right? Like to review all of the public comments we received and review them today, I mean, it's just not possible.

So is the thinking that like going forward like for the Requirements we're going to put them out for public comment, we're going to, after the comment period ends, start reviewing -- taking that deep dive into the comments. Are you suggesting then that TGDC be involved in those discussions in reviewing the comments? Is that what I'm hearing correctly?

MR. CHOATE:

This is Judd. No. And in fact your deliberations are not something I'm asking for. So I'm certainly not asking for --

MR. LOVATO:

Okay.

MR. CHOATE:

-- email interplay or to be involved in the conversation. I don't need to be in the meetings with NIST. I'm just curious what the public has said. It seems like they might have a couple of good ideas, and I'm curious what those might be.

CHAIRMAN COPAN:

Would it be appropriate for us to consider a resolution with regard to the 7 percent comments? And I understand that it would be perhaps most appropriate to anonymize the comments that have been received just to ensure that any issues of confidentiality could be protected. But certainly from my perspective I would have no issue with seeing those comments being made available in an appropriate fashion to the point of transparency but also with regard to privacy considerations and have them duly anonymized.

It would be a reference tool really for consideration by this body, but I know from my discussions with the colleagues at NIST and EAC that they -- all those comments were very thoughtfully taken into consideration with regard to both the principles elements that represented the 93 percent that we talked about before, as well as the 7 percent that are more broadly applicable.

MALE SPEAKER:

I can't get my mic to work.

[Laughter]

MALE SPEAKER:

I know.

FEMALE SPEAKER:

You talk too much.

[Laughter]

MR. CHOATE:

So, yeah, my limit --

FEMALE SPEAKER:

Yeah.

MR. CHOATE:

I've met my limit. So, you know, I would oppose anonymity, and the reason why is because they're public comments. I mean, they are not private comments; they're public. People have said, hey, these are my thoughts and I'm willing to put myself out there. Well, okay, great. I have the right to look at those, I would think. I would think anybody would have the right to look at those. I mean, people in the audience, people sitting at home. So it seems like this, from my perspective, just as a member but also as a lawyer that likes to dabble occasionally, this seems like a pretty easy one. I mean, just -- you know, we want to see the 7 percent. Can you just let us see it?.

MS. SAUNDERS:

This is Mary Saunders. Not to prolong the discussion, but just speaking from my general understanding, pretty extensive understanding of public comment -- the public comment process, I don't know how these came in, if they went directly to the EAC or Regulations.gov. It doesn't really matter. But public comments, there's a docket somewhere. And when a commenter comments, they can choose to comment anonymously or they can choose to

be identified. But once the comment is submitted, it's submitted.
So there -- I'm -- there should be a docket somewhere.

And typically from my experience when I was at the Department of Commerce what staff did was to summarize the comments, identify high-level themes and identify, you know, commonalities. That's also typically public.

So I think what Mr. Choate and others are asking for is maybe look at the 200 comments, perhaps look at the summary of what was intended in the comments. But they are public, correct? They came in on a docket, so they're sitting somewhere.

MS. GOLDEN:

I'm going to -- okay, maybe. Okay. I don't -- they went to an email.

MS. SAUNDERS:

Well, that's fine.

MS. GOLDEN:

So part of this to -- for me again -- and I'm coming from the -- I am used to, you know, the rule -- the, yeah, Comment.gov, and every -- those are public comments. And yes, you can be anonymous or you can upload, you know, with your Social Security number if you're so inclined, you know?

[Laughter]

MS. GOLDEN:

And they're available. You can -- if I go in and comment, then I can go in and read everybody else's comments. And if I'm commenting on something -- because I do that a lot because other people have -- dang, I never thought about that. I needed to include that comment, too. That's public comments. I would just really suggest the EAC look at a really formalized public comment process that -- and I think you guys did this in the past because I kind of remember this with either the VVSG 1.1 where I did look at other people's comments and I did change my comments based on their comments. So you guys used to have an online truly public comment process where it was all transparent. And I don't know where it went, but I would just suggest finding it again.

[Laughter]

COMMISSIONER HOVLAND:

I like that idea.

MR. CHOATE:

I have one more. Can I get back to -- so Ben sort of laid out what could be an alternative process, which sounds great to me. I mean, the alternative process of the once-a-year review, that -- if we're in a situation, regardless of whether we have Commissioners or not, if we have a way to have a systematic review, that sounds very important to me, and I'd love to dive deeper into that. And can I do that now or will there be other opportunities to do that?

CHAIRMAN COPAN:

We're a little bit over time now, but I recapped that exact sentiment a little bit earlier in my comments that I believe that it's the intention of this -- of the TGDC to continue on its efforts and to have at the very least an annual formalized review of updates to the Requirements.

COMMISSIONER HOVLAND:

And I could be not remembering HAVA correctly, but, I mean, that feels like, again, what the EAC does with that is a different question, but, I mean, that feels a little bit like a TGDC agenda item.

MR. CHOATE:

Okay. So that's my follow-up question. So now I'm going to dive in. So would these then be the kinds of requirement changes that would necessitate a 90-day public comment period and then a review by the Commissioners and a vote by the Commissioners?

COMMISSIONER HOVLAND:

I would say that I have a trustee copy of the Help America Vote Act here --

[Laughter]

COMMISSIONER HOVLAND:

-- and it notes that, you know, an adoption of a new set of the Voluntary Voting System Guidelines or any modification thereof

require a process. And that process, as we sort of alluded to earlier, involves this body making a recommendation to the Executive Director, the Executive Director forwarding that to the other boards, and then what it describes only really limits us as Commissioners, which is we can't vote until the boards have had it for 90 days. We must have a public comment period, and we must have a public hearing.

So, you know, again, I think there have been practices historically where some of that -- one falls after the other, and I think that drags the time out maybe longer than is desirable. You know, I think we've had productive conversations that some of those things could happen in parallel or tandem. You know, the other advisory boards commenting during a 90-day public comment period, and you take all of those comments together and work through the process seems very logical to me, and that obviously saves huge amounts of time.

MS. AUGINO:

So that sounds logical. Lori Augino, Washington State. That sounds logical, but that -- and I would like to know how the rest of the Commissioners feel about that process because it -- oftentimes it has felt like these things are stretched out in order to stretch out the time in which these can be adopted. The work that we did is almost two years ago at this point, and so looking at a commitment

-- maybe we need to make a resolution suggesting a process so that you can consider that that would require that to be truncated because it -- like I said, it just hasn't been what we have seen in practice, and that adds to the frustration that I think you're hearing from my colleagues, and it adds to this kind of, I guess, distrust about how we're feeling about what you're going to do with the work that we do and what we recommend.

CHAIRMAN COPAN:

It would seem to me that such a resolution is in order for this group to consider and then to provide to the EAC.

And in view of our time now I would recommend that we take a break. We will come back to that point. And I would look forward to a formal resolution being prepared that we can address together. Thank you. We'll be taking a 10-minute break, back at 11:00 a.m. Eastern.

[The Committee recessed at 10:50 a.m. and reconvened at 11:10 a.m.]

CHAIRMAN COPAN:

We've been having a very lively conversation. Thank you for the engagement of this group, for the great recommendations that have come forward. I understand that Mr. Choate has been working on developing a draft of a resolution for the TGDC to

consider. And -- but I would suggest that we would consider that at the end of this next part of the agenda where Dr. Sharon Laskowski will be providing the update on the VVSG 2.0 human factors elements. So Dr. Laskowski please.

DR. LASKOWSKI:

Thank you. And thank you, Commissioners and TGDC members. So I'm going to be going over the human factors requirements. First, I'm going to give just kind of a -- an overview, talk about scope and assumptions and key points, and then I will go through principle by principle. And I've highlighted some requirements that had new content over what was in VVSG 1.1.

Feel free to ask questions at any time. I'm not going to go down into details. I only have about an hour if we're going to stay on time. So I'll go down into details if you have questions. So let's get started. And I apologize if you can't see clearly. I'll try to -- the screens are a little small. I've got a paper copy in front of me, so I'll make sure I say all the words I need to say.

So how did we get here? We obviously looked at VVSG 1.1 and the 2007 recommendations as a baseline for the usability and accessibility requirements. And then we looked -- stepped back and said, okay, what do we update and what do we need that's new? And we base this on over 10 years of voting and human factors research on user interfaces in general. And I'd like to call

out, for example, the Accessible Voting Technology Initiative that the EAC had a number of years ago, and it had about 20 projects. And out of that came a lot of good research on how to make things more accessible. So there's a requirement that now requires sans serif fonts. There was a little research project that actually validated that over the past 10 years. And we looked at what's current practice in voting systems and what's working and what's not working well and reports of problems with usability or accessibility in real elections.

And of course we relied heavily on the VVSG human factors public working group that NIST ran, and we got lots of great feedback and in general very good consensus from an array of experts both in human factors, user experience, in voting systems from both manufacturers and election officials. And that proved extremely useful.

Okay. Where are the human factors requirements? They are primarily Principles 5 through 8, and we've got a requirement under Principle 2.2 for user-centered design. The -- there's a few minor overlaps across the VVSG 2.0 Draft Requirements, and those are noted and discussion notes, et cetera. So we've got equivalent and consistent voter access; voter privacy; marked, verified, and cast as intended; and robust, safe, usable, and accessible; plus user-centered design under high-quality

implementation. And that's -- encompasses all basically principle-driven requirements.

So the scope for these requirements is voter and election worker interaction with the voting system, so that means usability, accessibility for people with disabilities or special requirements, and privacy while voting. And this basic assumption that all voting interfaces, electronic of course, must meet all applicable human factors requirements.

So in -- just for historical reasons, in 1.0 when we first wrote that, DREs -- there were two kinds of DREs, ones that had accessibility features and ones that didn't, and we had to split out those requirements. In this day and age, there's no reason that any electronic system can't be fully accessible, and we assume that in these requirements.

Okay. Quick overview, we of course harmonized with current Federal accessibility requirements such as Section 508 and the web content accessibility guidelines, also for wheelchair access, the ADA guidelines. And in the accessibility community, they developed this notion of the P-O-U-R, POUR principles of perceivable, operable, understandable, and robust, and we've adopted that organization in these guidelines -- in these requirements as well.

And we address all modes of interaction. What do I mean by modes? Because it's important to understand that as you read the requirements, the visual -- enhanced visual like enlarged text, audio, tactile, nonmanual, and limited dexterity control. We've only looked at paper as part of the voting system process, so that is, for example, if voters are expected to verify the paper record of their vote, that's got to be accessible. We didn't address paper ballot design per se because that's heavily subject to State laws and regulations.

Okay. Onto a detailed -- let's see. Okay. Onto a detailed description of the Principles and Guidelines. I'm going to go over each one with some examples as needed. I figured the overview is to -- well -- is the part I should emphasize so you have kind of a general understanding of the organization of the requirements.

So Principle 5 is equivalent and consistent voter access. All voters can access and use the voting system regardless of their abilities and without discrimination. There are 12 requirements in this category. The key here is to ensure that all voters have the ability to cast their votes easily and accurately regardless of the -- any disabilities they may have. By consistent, we mean that the same mode of presentation is used throughout the voting process, so if you're using the audio ballot, you have the expectation that

that kind of presentation is available to you throughout that voting process.

Equivalent across modes without bias means that whatever mode you're using you're getting the same information that someone else is getting in a different mode of presentation. And there's no bias inherent in the design.

MS. GOLDEN:

Sharon?

DR. LASKOWSKI:

Yes.

MS. GOLDEN:

Diane Golden. So I'm looking at the redline of the Principles and Guidelines, which changed the wording, deleting the term modes and replacing it with method.

DR. LASKOWSKI:

Yes, that's in the guideline --

MS. GOLDEN:

5.1.

DR. LASKOWSKI:

5.1.

MS. GOLDEN:

Yeah --

DR. LASKOWSKI:

Yes, and I -- so I'm going to talk about 5.1 in two slides,

but --

MS. GOLDEN:

Okay. Well --

DR. LASKOWSKI:

-- we can discuss it now if you wish.

MS. GOLDEN:

Yeah, well, it's just -- to me there is a difference between -- modes really do talk about, just as you described, the input/output.

That's the mode. Method to me is like vote-by-mail versus -- it -- the terminology is just different.

DR. LASKOWSKI:

Yeah.

MS. GOLDEN:

And the fact that the second statement uses modes suggests that you do mean something different between method and mode. And the only thing required of the input/output mode is that you get equivalent information, not that the experience is the same through all the sequences of voting. So I'm just saying I'm not sure if that was a -- if the, you know, term of art is de minimis change or an editorial. I'm not sure that was.

DR. LASKOWSKI:

So we thought about that in the discussion. So the Principles and Guidelines tends to be high-level, right? So mode is kind of a very specific term of art which is reflected in the requirements. So the public comments were such that they felt the more generic term should be used. But it could go either way. I didn't have a strong feeling either way, but --

MS. GOLDEN:

Mode's already there, so, anyway, it's in 5.2.

DR. LASKOWSKI:

We can reconsider that. As I said, I think the thinking was just to make it as generic as possible in the guidelines and not try to use technical terms in the Principles and Guidelines. But --

MS. GOLDEN:

Like I said, it's already there, so --

DR. LASKOWSKI:

Yeah.

MS. GOLDEN:

If you're taking it out in one place and not another just --

DR. LASKOWSKI:

Well, it's -- it's not meant -- the word mode, except for 5.1, is not used in the Principles and Guidelines. So it's a question do you introduce it in the guideline or do you introduce it in the requirement?

MS. GOLDEN:

The -- yeah, my statement is it's in 5.2, so either -- if you're going to take it out because there's a problem with that or it needs to be defined --

DR. LASKOWSKI:

Oh, yeah. Yeah.

MS. GOLDEN:

-- but it needs to be consistent. The change that was made clearly suggests you were talking about something different from mode because you changed one and not the other. So somewhere the wordsmithing logic --

DR. LASKOWSKI:

Well, okay. When it's --

MS. GOLDEN:

-- was lost.

DR. LASKOWSKI:

What -- 5.1 is consistent and 5.2 is equivalent, so you want the modes to be equivalent, but --

MS. GOLDEN:

I want the modes to be consistent. That's the point.

DR. LASKOWSKI:

Yeah.

MS. GOLDEN:

I think we lost --

DR. LASKOWSKI:

Well, it's --

MS. GOLDEN:

-- the concept.

DR. LASKOWSKI:

It's -- the mode you're using is consistently used.

MS. GOLDEN:

Consistently available. You can't force somebody to use one mode for generation of a ballot and a different mode to verify or cast. You can't force people -- yeah, that's the -- that was the whole point. So somehow I think this wordsmithing change was not de minimis or whatever --

DR. LASKOWSKI:

Um-hum.

MS. GOLDEN:

-- the term is you legal guys.

DR. LASKOWSKI:

So I believe there will be some resolution today about accepting these. We can certainly put in -- you should put in that comment for us to consider, easy enough to discuss once more and change it if necessary. Thank you.

Okay. I'm on Principle 5 continued. So I go back to the definitions again because there -- it's critical in this slide. All modes of interaction and presentation applied -- are applied throughout the voting process, fully supporting accessibilities for voters with a wide range disabilities. So what is a voting session? It's marking, reviewing, verifying, and casting. And the modes, again, visual, enhanced visual, audial, tactile, nonmanual, and limited text dexterity to control. So that's -- guides the -- how we wrote the requirements.

Guideline 5.1 that Diane had just referred to is now voters have a consistent experience throughout the voting process within any method of voting. And it was changed from mode. And the guidelines include specifics about the interaction modes, languages, vote records, accessibility features, reading paper ballots, and accessibility documentation. I -- what I've done now if I -- I've highlighted on my list of requirements for each guideline those that I have examples for because there were changes from 1.0.

So on the next slide under Guideline 5.1 I have two requirements called out. 5.1-A, which is all interaction modes including audio, tactile, enhanced visual, and nonmanual must have the same capabilities as the visual interaction mode, including ballot activation, voting verification, and casting. Some systems

have the voter activating their ballot as opposed to the poll worker. So you can see in the requirement we drilled down to be more detailed, and we made use of calling out those modes. And we do so throughout lots of requirements.

And 5.1-E, reading paper ballots is that if the voting system generates a paper record or some other durable human readable record that can be the official ballot or determinative vote record, then the voting system must allow the voter to verify that the paper record using the same access features that they used to mark the ballot, including audio, tactile, enhanced visual, and nonmanual. Okay. So, again, we're using the interaction modes to ensure accessibility of paper as well since that's now a requirement due to software independence.

Guideline 5.2 is that voters receive equivalent information and options in all modes of voting. And that means there's no bias in the presentation. The content is presented in all languages, as required by the Voting Rights Act. You get -- whatever information is available is available in all modes. The audio is synchronized with the visual. You make sure sound cues match any visual, and you preserve votes if you're switching between modes.

So in particular let me call out 5.2-C. All information in all modes is all instructions, warnings, messages, notifications of undervotes or overvotes, and contest options must be presented to

voters in all interaction modes for all functions. This includes ballot activation, voting verification, and casting. So we've tried to make sure we're comprehensive in our -- and very clear in our requirements here.

By the way, just as an aside, when -- sometimes you hear the term universal accessibility, universal usability, this is implemented in these requirements by saying you've got the full range of interaction modes that the technology allows to make this system available to the largest set of voters possible.

And let me talk a moment about sound cues because that was new. Any sound and visual cues must be coordinated so that if there's a sound cue, it's accompanied by visual cues unless you're in audio-only mode. So someone who's blind might shut off the video for privacy. And visual cues are accompanied by sound cues unless the system is in visual-only mode. So we clarified that.

Okay. Let me go on to Principle 6, voter privacy. That is voters can mark, verify, and cast their ballot privately and independently. There's five requirements in Principle 6. And I think I'm missing one. Oh, there it is. Okay. So for the purposes of the human factors requirements, we make a distinction between voter privacy and ballot secrecy. Privacy for voters refers to the property of a voting system that's designed and deployed to enable voters to obtain a ballot, mark, verify, and cast it without revealing their ballot

selections or selections of language display and interaction modes to anyone else, so, in other words, independent voting. Ballot secrecy is discussed in the security sections, so we've made this distinction here of the voter interaction and making that private.

Guideline 6.1 is that the voting process preserves the privacy of the voter's interaction with the ballot, modes of voting, and vote selections. I've listed them all in my slides here because there's only four of them, so let me just go to that slide. You have to preserve the privacy for voters during the entire voting session, including activation voting, verifying, and casting the ballot.

Warnings, any warnings have to preserve privacy for voters and the confidentiality of the ballot. Don't shout out a voter's choice as they're voting with a warning. The voter can independently enable, disable audio or video output for privacy purposes. And the audio during the voting session must be audible only to the voter.

Guideline 6.2 is voters can mark, verify, and cast their ballot or other associated cast vote record without assistance from others. And that's basically the requirement for this guideline. Not to --

MS. GOLDEN:

So --

DR. LASKOWSKI:

Yes.

MS. GOLDEN:

At the risk of asking another question, so let me --

DR. LASKOWSKI:

And that's Diane speaking.

[Laughter]

MS. GOLDEN:

Diane Golden. So -- and I'm going to do this at this point rather than waiting for you to get through all of the --

DR. LASKOWSKI:

Okay.

MS. GOLDEN:

-- accessibility sections --

DR. LASKOWSKI:

Sure.

MS. GOLDEN:

-- just because I -- the very first principle under 5 says "without discrimination." So where in these requirements do we have something that prevents the one ballot-marking device in a corner used by one person that's clearly segregated and clearly can't protect privacy and secrecy? What do we have in these requirements that says you can't do that?

DR. LASKOWSKI:

There's nothing in these requirements says --

MS. GOLDEN:

Bingo.

DR. LASKOWSKI:

-- as we both know, right?

[Laughter]

MS. GOLDEN:

Bingo.

DR. LASKOWSKI:

Because --

MS. GOLDEN:

So --

DR. LASKOWSKI:

-- the issue is these are technical requirements applying to just the voting system, not how it's deployed. But to really have --

MS. GOLDEN:

Well, that --

DR. LASKOWSKI:

You're absolutely right.

MS. GOLDEN:

How it's deployed is not the same as the numbers of deployed. And I -- I'm just reading this. I don't know how we can say that we're assuring that this is going to prevent discrimination

because it's not. That's going to happen. We don't have anything that addresses that clause without --

DR. LASKOWSKI:

Yeah.

MS. GOLDEN:

-- discrimination because that means without segregation.

That means -- you know, we do have a standard about ballot secrecy that I don't know how --

DR. LASKOWSKI:

Yeah.

MS. GOLDEN:

-- we're going to, you know, say we're meeting that. It's -- and my concern is -- and I get the scope issue. I mean, I get the fact that it's a -- we're talking about requirements for a system, and this is numbers of a system. But my concern is if we don't -- this -- if people who understand these issues don't do something even if it's not a requirement but it's guidance of some -- or it's a technical assistance document or something, then the courts are going to end up settling this right. And I guarantee you we're going to have a court say it's got to be 100 percent. Everything has to be. And then you're going to have somebody else's says no, de minimis. As long as it's more than one, then it's no longer -- if you have two machines in the corner, that's no longer, you know, discriminatory

and segregation. Well, you know, calm or more rational people I think need to weigh in on this.

You know, the Access Board, when they develop standards for accessible parking spaces, they don't just define the parking space itself, you know? It's X by X and there's a loading zone over here. They tell Walmart you got to have, you know, 50 of these because you have a parking lot for 800, you know, cars. If they didn't do that and said, well, this is an accessible parking place, you only have to have one of them, you know, furthest corner of the parking lot, that's not at all going to meet a reasonable accessibility standard. So I just think we've got to do something to --

DR. LASKOWSKI:

Yeah --

MS. GOLDEN:

Yeah.

DR. LASKOWSKI:

-- we've struggled with this for a while. I'm open to further discussion and any comments --

MS. GOLDEN:

Like I said, my --

DR. LASKOWSKI:

-- some of the elections officials have also here and --

MS. GOLDEN:

Yeah, my concern is the election officials. You guys are the ones that are going to be hung out to dry, and Linda has already sued. Step up to the plate --

DR. LASKOWSKI:

Yeah.

MS. GOLDEN:

-- Linda. She's already, you know, in litigation or will be on this issue.

DR. LASKOWSKI:

I mean, we could --

MS. GOLDEN:

I --

DR. LASKOWSKI:

-- for example, like you said, do a guidance document --

MS. GOLDEN:

Yeah.

DR. LASKOWSKI:

-- that refers to it with a "should" requirement. I -- because it's clearly important for both privacy and access. And we've struggled with this for a long time, so maybe we can talk more off-line about how we might write a little guidance document. I'm open to any other suggestions.

MR. KELLEY:

Neal Kelley. Diane's making a great point. I think the demand in each jurisdiction and the makeup of the jurisdictions certainly informs the election official on how many systems they're going to deploy, what they're going to put out. So I think the guidance document separate from the standards would really be helpful, but I don't think including it in these technical documents would be something that would be welcomed by election officials.

DR. LASKOWSKI:

Um-hum.

MR. KELLEY:

I'm just speaking frankly. But I just think we need to be cognizant of the fact that, you know, some States are going to vote centers, some States are still polling place, and that's very different in terms of how you deploy equipment and how many are put out for accessible use, so something to take into consideration.

DR. LASKOWSKI:

Yeah, yeah. And a guidance document can also call out, you know, the need for training of the poll workers so that they do said -- and their process and procedures are such that they set it up and make sure it's working. They encourage a few people -- other people to use it. There's a lot of stuff you can do in the polling place to encourage that, but maybe calling it out in a guidance document is the way to go?

MS. GOLDEN:

It would -- Diane again. It would be better than nothing. And just because, again, I was talking to Linda, and with nothing out -- I -- you know, a court is going to -- who the heck knows what they'll come up with. It could be way on one extreme or way on the other. And courts do look, you know, to guidance documents from, you know, Federal agencies to inform decisions, so yes, I think it would just be a wise thing to do, again, with people who kind of know the topic area rather than a judge who is not going to know. And who the heck knows what they'll come up with.

DR. LASKOWSKI:

And maybe the Access Board could help us a little bit with some of the wording on that.

CHAIRMAN COPAN:

Yes. It would -- it -- I think it's important as a point of record from today's conversation, and so let's ensure that that action item is appropriately captured to have this follow-on guidance. Thank you.

MS. AUGINO:

I'd add one thing that -- this is Lori Augino -- that you could add to that guidance document is potentially changes for -- changes in law that could be recommended to States that they could make that help provide requirements to local election officials,

having that -- so you can plug and play. And then also ensuring that States have the ability to go in and do some of those -- we have provisions where we can go in and do a county election review and ensure that local election officials are following those -- that guidance in an appropriate way. It just helps -- it helps with those, I think, checks and balances.

MR. KELLEY:

And one last thing, I'm sorry, if I could get on the record, Neal Kelley again. Keep in mind also State associations issue guidance documents as well, and just thinking about the conflict between the two or --

DR. LASKOWSKI:

Um-hum.

MR. KELLEY:

-- at least taking that into consideration. And the courts weigh heavily on those State association documents as well.

DR. LASKOWSKI:

Um-hum. So coordinate with NASED perhaps on the document, something like that?

CHAIRMAN COPAN:

Thank you. Those are very, very helpful insights.

DR. LASKOWSKI:

Yeah. We don't have the legal staff on call at NIST, so we have to go to appropriate -- so maybe NASED would be a good starting point for that aspect.

DR. LASKOWSKI:

Okay. So Principle 7, Principle 7 is marked, verified, and cast as intended. Ballots and vote selections are presented in a perceivable, operable, and understandable way and can be marked, verified, and cast by all voters. There are 50 requirements under this principle. This is the nuts and bolts, the core requirements of the voting interface. It's derived from Federal laws, including HAVA, 508, WCAG, the Voting Rights Act, and it includes updates to font size -- font/text size, audio, interaction control and navigation, scrolling, ballot selection review. It talks -- the requirements cover about presentation settings so that voters can adjust the voting system to meet their needs and preferences that -- which includes the use of color and contrast, adjusting font size, ensuring audio settings result in understandable speech.

The requirements cover navigation and control of the ballot during voting. We've updated the scrolling through the electronic ballot. We've included use of audio and touch controls and simple gestures. And it also includes the need for space to -- for accessibility if you're in a wheelchair and that both voters and election workers can use the controls accurately.

Continuing on with the overview of Principle 7, we have requirements that cover the ability of the voter to understand all information on the ballot as it is presented, including the instructions and messages from the system, preventing contest layouts that can cause confusion, making clear the maximum number of choices a voter has and notifying the voter of any errors on the ballot such as overvotes before it is cast, so that includes both in a ballot-marking device but also if you're submitting your ballot to an optical scan machine notifications. Letting the voter know when they've successfully voted when they cast and their ballot is deposited. And ensuring that instructions for election workers are understandable.

So it covers quite a bit. I know in general we've tried not to be too prescriptive in the requirements. However, as I noted earlier, there's a good 30-plus years of user interface design research out there. There's 15 years of voting research in the human factors arena. Technology changes, but humans don't change, you know? They like a large enough font so they can read it, for example. So these are somewhat prescriptive, but it's best practice and works for humans.

So let me go on to the guidelines. Guideline 7.1 is the default voting system, settings, present a ballot usable for the widest range of voters. And voters can adjust settings at

preferences to meet their needs. I'm not going to read through them. You have the document. I'm going to highlight a couple new things.

For example, we've revisited the text size for the electronic display, upping the default text size to at least 4.8 millimeters and the ability of the voter to increase and decrease the text size either through continuous scaling or providing at least four discrete text sizes ranging from around 12 points to 25 points, again, based on research.

Once you get enlargement of text to, say, up to -- above 200 percent, there are -- you run out of screen size, so we've got 7.1-H, which talks about scaling and zooming, so you increase text size, but that means you are -- the system is careful with any kind of icons, titles, buttons, and ballot-marking target areas so that they change proportionately to the scaling of the text size and to minimize scrolling or panning that's necessary.

DR. LASKOWSKI:

Yes?

MR. KELLEY:

I know this is probably really in the weeds, but this compared to 1.1, is this an actual zooming capability or are you selecting a font size or difference?

DR. LASKOWSKI:

You can have -- so the zooming is new.

MR. KELLEY:

Okay.

DR. LASKOWSKI:

And we've increased the text size range for the initial selection. But if you need a heavily enhanced visual, then you've got -- you run out of screen size, so we're trying to say, okay, let's do this gracefully. Don't enlarge the thing -- enlarge the text. You don't have to enlarge icons that are not necessarily helpful to understanding the text and --

MR. KELLEY:

Got it.

DR. LASKOWSKI:

-- the marking area.

MR. KELLEY:

So -- thank you. And part of my underlying reason for asking the question, it'd be really great to have -- maybe this has already been done -- a comparison between 1.1 and where we're at now and what changed at a high level. Do you know if that document exists?

DR. LASKOWSKI:

We have -- we have some of that. Yeah --

MR. KELLEY:

Oh.

DR. LASKOWSKI:

-- we've done that guidance document. Whitney

Quesenbery and I worked on that document.

MR. KELLEY:

Great.

DR. LASKOWSKI:

And I don't recall if it's in -- I don't know if -- Ben's here. Do we have that list of detailed changes in the VVSG itself?

MR. LONG:

I don't --

DR. LASKOWSKI:

No, I think it -- I don't think we have that in the VVSG itself, but we do have a document that we can make available as supplemental material maybe. I'm not sure quite -- otherwise, you start getting to a 500-page --

MR. KELLEY:

No, I understand.

DR. LASKOWSKI:

-- VVSG.

MR. KELLEY:

And if you could --

DR. LASKOWSKI:

Right.

MR. KELLEY:

-- provide that, that would be really helpful.

DR. LASKOWSKI:

Okay.

MR. KELLEY:

Yeah, thank you.

DR. LASKOWSKI:

When we started updating, we did a lot of tables and such.

MR. KELLEY:

Yeah, so that --

DR. LASKOWSKI:

And we needed --

MR. KELLEY:

-- action has been noted, yeah.

DR. LASKOWSKI:

Yeah. And we also --

MR. KELLEY:

Yeah.

DR. LASKOWSKI:

-- are working on just as an aside on test methods for this,
so we needed to -- and we had test methods for 1.1, so we wanted
to see what's changed so we know what to update in the test

methods, so -- but thanks for -- that's a good suggestion of making that available.

Okay. Continuing on with Guideline 7.1, we've -- I'm not going to go -- there's a lot of these, and I don't want to run out of time, so I'm not going to go in a lot of detail here. I will note on this slide that identifying controls was updated for clarity, so buttons and controls that perform different navigation or selection function must be distinguishable by both shape and color for tactile and visual perception. However, well-known arrangements of groups of keys may be used for their primary purpose. For example, a full alphabetic keyboard is acceptable for entering a write-in candidate name, but individual keys cannot be used for navigation or selection. So that's -- was an update because there was a lot of confusion on that requirement in 1.1.

On to Guideline 7.2, voters and election workers can use all controls accurately and voters have direct control of all ballot changes and selections. This talks a lot about the interaction, navigation between contests, how you display things, how -- things like preventing accidental activation, touch area sizes, response time. So, for example, 7.2-B is navigation between contests. The electronic ballot interface must provide navigation controls that allow the voter to advance to the next contest or go back to the previous contest before completing their vote.

7.2-C, we actually had a lot of discussion with the public working group on voter control. An electronic ballot interface must give voters direct control over making or changing vote selections within a contest. This is because you don't want to make a change that the voter might not be aware of, so if you're in a vote for one contest, will allow selecting a candidate if you change your mind, may deselect a previously selected candidate. But the system must announce the change in audio and visual display. Right. So you don't -- because it's -- it's sort of clear you're just making a change and you let the voter know, but if you've got a vote for N-of-M contest, the system must not deselect any candidate automatically because, for one thing, it might be on two pages. It's a long contest. The voter might not notice that, so it's -- would be not in their direct control on that, so bad in any user interface, not just voting.

And it goes on to -- in -- to describe clear feedback for straight party voting or for ranked choice voting methods, don't reorder the candidates except in response to the voter asking to reorder candidates, that notion.

We also revisited scrolling. Scrolling was never forbidden, but it couldn't be the only method of advancing through a long contest. That was often misunderstood in 1.1, and it was because if you just had a scrollbar, especially back in 2004, voters were not

used to scrollbars, and they sometimes wouldn't realize it could advance. So we updated this to say that if the contest doesn't fit on a single screen using the voter's visual display preferences, the voter -- the voting system must provide a way to navigate through the entire contest and -- so there's actually three slides on this, so I'm not going to read them. I'm going to summarize. But there's pagination into chunks. You can allow the scrolling but only through the content for that contest.

You have to have a fixed header and footer to maintain the context, and the voters have to always have access to navigational elements, the names of the current contest, the voting rules for that contest, good cues to show that there's another page, there's more information, and making sure there's an option for an audio format and visual presentation that sync during scrolling.

And any navigation has to meet all the requirements for providing feedback to the voter, accurately issuing all warnings of alerts, including notifications of undervotes, overvotes, requirements for control size and interaction, keeping all controls visible, and does not rely only on conventional platform scrollbars and an opportunity to review.

So we wanted to open the door for -- you know, people want to, for example, scroll by touching, but you want to make sure that

it's clear to any voter where they are and how they can navigate in that contest.

And in particular -- this is new -- we added touchscreen gestures. Voting systems with a touchscreen may use touchscreen gestures, which are physical movements like on your smartphone, right, with the user contact and the screen to activate controls if -- and there's six conditions that must be met. They're offered as another way of interacting, and in addition to all -- other alternatives to interaction modes, and they're limited to simple, well-known gestures. They don't allow you to navigate off the current contest. They don't create accidental activation through an unintended gesture, and they work consistently. And they don't require sequential timed or simultaneous actions. I've even done it on the electronic ballot marker, and you see many voters, and a lot of you -- of tests that they assume they could scroll and they start touching the screen, so we'll allow that under very controlled situations.

We also -- and I've been actually under discussion with this with the Access Board to revisit the physical dimensions, so we want the physical dimensions of the voting station to meet the Access Board's requirements. And I've actually become aware of two guidance documents for wheelchair access and also reachable, operable controls that we're going to make use of to improve the discussion section in these requirements.

We've also made it clear that control labels have to be visible on the surface of the voting systems. So that's going to be subject to some minor edits in discussion with the Access Board.

MR. COUTTS:

Sharon?

DR. LASKOWSKI:

Yes.

MR. COUTTS:

McDermot from Unisyn. A couple of questions. When we're talking about gestural controls, well-known by whom?

DR. LASKOWSKI:

Oh, that's a good question. So simple -- well, well-known by whom you mean in terms of the user or the operating system?

MR. COUTTS:

Right.

DR. LASKOWSKI:

So we put the option there. If you don't know about them, you don't have to use them because they're optional.

MR. COUTTS:

Right, because --

DR. LASKOWSKI:

But if you touch the screen and you expect the contest to scroll, it can scroll.

MR. COUTTS:

Right, because there are certain -- for the National Federation of the Blind, using a screen reader mode where it's simple left-right gestures that includes navigation to different content, including single finger up and down for volume, two fingers up and down for tempo, these are well-known to that group.

DR. LASKOWSKI:

Yes, so we're trying to restrict it to -- well, it's well-known given the six conditions.

MR. COUTTS:

Right.

DR. LASKOWSKI:

Right, so it's within the context, and they are simple gestures not requiring two fingers are sort of pinching or --

MR. COUTTS:

But I think that that might actually limit some control modes that -- there are a number of groups would -- that would really like it differently.

DR. LASKOWSKI:

Well, this will go up for public comment I'm assuming, so we'll get feedback from those groups --

MR. COUTTS:

All right. Thank you.

DR. LASKOWSKI:

-- presumably. We tried to keep it as simple as possible.

MR. COUTTS:

Right, I --

DR. LASKOWSKI:

And the thing is when -- for your smartphone and your everyday equipment and personal assistive technology --

MR. COUTTS:

Um-hum.

DR. LASKOWSKI:

-- you want lots of different kind of control with gestures to make it as easy as possible. With voting, I think to reduce confusion, you don't want to allow too many because it's a one-time use. You've never -- you know, you're not using that every day, so you want to limit it. But this might require a little bit more discussion as to the scope.

MR. COUTTS:

Right. Because one of the things that -- as -- from the vendor community what we're trying to do is to make it so that it is acting more like what they're doing at their home because that's what they're used to.

DR. LASKOWSKI:

Yeah.

MR. COUTTS:

And that's -- so that makes the vote -- because coming in and learning a new device for some people becomes very difficult, and I think that we might be putting a limitation on here that we don't want to.

DR. LASKOWSKI:

It's a large population, so we did have a lot of discussions in our public working group about this and with the philosophy of do no harm. Don't add too much stuff so that people get lost in the navigation, so it's a balance and certainly open to -- well, this goes out for public comment just to see if there's some things we missed.

Sachin?

MR. PAVITHRAN:

Yeah, this is Sachin from the Access Board. I agree with you, what you're saying, Sharon, because the more -- because every platform, whether it's, you know, within the blind community, they use different gestures no matter -- based on which platform they're working on, so there's not one set of gestures that fits the group, you know, if they're Android or Apple or whatever, so you're not going to please all -- the entire community. So the more complex you make it, the more confusing it's going to be. And when they walk up to the system, you want them to be able to learn the basics gesture and move onto the voting part and not trying to

figure out what the system does. So as simple as possible is -- to get the -- you know, to get the action done because the gestures are not, you know, universal across platforms.

MR. COUTTS:

I understand. I think that maybe we've limited it maybe just a little bit too much, but we'll see.

DR. LASKOWSKI:

We'll see. I'm assuming this is going to go out for public comment, so we'll see what we get.

I don't want to run out of time, so I'm going to be mindful of that.

MS. GOLDEN:

Sharon, can I --

DR. LASKOWSKI:

Yes.

MS. GOLDEN:

This is sort of going back but sort of not, and it's, I think, another question returning to the discussion about end-to-end systems and the whole -- some sort of back and verification.

DR. LASKOWSKI:

Um-hum.

MS. GOLDEN:

And I understand, you know, we've been through a lot of requirements already that talk about verification being accessible, but some of those requirements are very specific about a determinative vote record being verifiable, which that backend end-to-end thing is not the determinative vote record, so those requirements I don't think you can actually apply. I think the one that's closest to applying is 6.2 and 6.2-A, which just says voters must be able to mark, verify, and cast their ballot or other associated cast vote records, a.k.a., that --

DR. LASKOWSKI:

Um-hum.

MS. GOLDEN:

-- end-to-end -- all I know, piece of paper at the end, which of course is not accessible. I would just suggest that that discussion box for 6.2-A include a discussion about the fact that this applies to that wording "other associated cast vote record" applies to the end-to-end, whatever you call that thing, received or whatever, that somehow that's got to be accessible, and a printed piece of paper won't cut it. I have no idea how in the Sam Hill somebody's going to make that accessible, not my problem, but I think that's the place to say that --

DR. LASKOWSKI:

That's --

MS. GOLDEN:

-- so that it's clear.

DR. LASKOWSKI:

-- an excellent suggestion.

MS. GOLDEN:

Yeah. I

DR. LASKOWSKI:

I'm also thinking we need to look up the definition of verification to make sure if there's any kind of end-to-end verification that your vote was counted after you leave the polling place, that that's included as -- under the definition of verification.

MS. GOLDEN:

Yeah. And --

DR. LASKOWSKI:

Right. Excellent suggestion.

MS. GOLDEN:

Okay. Yeah. Perfect.

MR. COUTTS:

Very good. Thank you.

DR. LASKOWSKI:

Okay. So -- oh, 7.3 is voters can understand all information as it's presented, including instructions, messages from the system, and error messages. A lot of this is -- was in 1.1. I think what's

new is a clarification in 7.3-G for full ballot selections review to make sure that the -- as the voter reviews before they cast their ballot they can see all the contests, their selections, any notifications that they've under-voted, and an opportunity to change and return directly to their review screen, just to make that process as easy as possible.

And we've also simplified the plain language requirement, 7.3-B, which we're going to -- we have a guidance document about what is good guidance for plain language, and we've simplified saying that information and instructions for voters and election workers must be written clearly following best practices for plain language. And we have a guidance document for what that -- what is the best practice and where can you learn more.

Onto Principle 8, which is robust, safe, usable, and accessible. The voting system and voting processes provide a robust, safe, usable, and accessible experience. There's 14 requirements here that cover how the voting system forms in use, including physical safety, usability and accessibility of the complete voting system, and we also refer to Federal standards for accessibility and include a test -- testing for usability that's reported by the voting system manufacturer when it's submitted to the test lab.

So we've simplified the -- so I'm going to go over a few of those, again, mindful of the time. So we've simplified, for example, the flashing. If the voting system is lights and flashes, there must be no more than three flashes in any one-second period for people who have light-sensitive epilepsy, much simpler to -- and clear how to test that.

We've added 8.1, have discernible audio jacks, so if someone's going to be plugging in their headphone, the audio jack must be in a location that voters can easily discover and discernible by touch while sitting or standing in front of the unit and not located near a sharp edge.

We talk about requirements for hearing aids referring to a T4 rating. We talk about eliminating electrical hazards in accordance with Underwriter Lab 60950-1, which is kind of a standard accreditation. We don't want to electrocute the voters.

Guideline 8.2, the voting system meets currently accepted Federal standards for accessibility, so that's Section 508 and WCAG 2.0, so if there's any -- for example, this would appear -- appeal -- apply to end-to-end systems that the voter can check to see if their vote was cast on a website. That's got to be compliant with current accessibility requirements.

Guidelines 8.3 and 8.4 have to do with usability testing. Guideline 8.3 said the voting system is evaluated with a wide range

of representative voters, including those with and without disabilities and -- for effectiveness, efficiency, and satisfaction, which are standard usability metrics, ISO usability metrics, International Standard Organization. So the manufacturer must conduct usability tests on the voting system, including all voter activities in a voting session. And we have guidance documents that describe exactly what sets of population, including people with disabilities, that should be tested, and they submit a report in the ISO standard called the common industry format for reporting usability test results. And we've done -- modified that format specifically for voting systems to make that easy, and the test labs can verify that that testing was done and that no red flags were waved and the result of that testing that ought to be looked into more clearly -- more in-depth by the test labs.

And similarly, for voting -- for election workers, the voting system is evaluated for usability for election workers. We've done the same in terms of reporting and the tasks to be covered in that testing, which has set up an opening for voting and operation during voting. And the election worker understanding the use of assistive technology language options that are part of that voting system and shutdown.

MR. CHOATE:

Judd Choate with a question. Would you guys take some
wordsmithing notes or is it too --

DR. LASKOWSKI:

Certainly.

MR. CHOATE:

So --

DR. LASKOWSKI:

And this is a draft subject to any --

MR. CHOATE:

Okay.

DR. LASKOWSKI:

-- input that the TGDC has, so --

MR. CHOATE:

My very subtle wordsmithing on it should be -- is that should
say the voting system is evaluated "by" a wide range instead of
"with." And --

DR. LASKOWSKI:

Oh, okay. I guess we can't alter the guideline wording.

MR. CHOATE:

Ah, that's what --

DR. LASKOWSKI:

The requirements we can --

MR. CHOATE:

-- because those have been adopted, that's fine.

DR. LASKOWSKI:

-- but not the guidelines.

MR. CHOATE:

All right.

DR. LASKOWSKI:

And in fact -- so which one was the "by"? Was in 8.4?

MR. CHOATE:

8.3.

DR. LASKOWSKI:

8.3. It's evaluated with a wide range, so you were suggesting -- so we wordsmith this a lot.

MR. CHOATE:

Um-hum.

DR. LASKOWSKI:

So we're hoping it's clear from the requirement what that means.

MR. CHOATE:

Okay.

DR. LASKOWSKI:

But I think we're pretty much set on the --

MR. CHOATE:

Well, we'll do it on 3.0. How about that?

[Laughter]

DR. LASKOWSKI:

Yeah.

MR. CHOATE:

Thanks.

MALE SPEAKER:

Great.

MR. COUTTS:

Sharon, one -- McDermot from Unisyn one more time, sorry.

Who is the judge of reasonably easy?

DR. LASKOWSKI:

Oh, okay. So usability, user experience, and accessibility testing professionals sort of understand -- right. And we have guidance that says what's a major problem, what's a minor problem, so you -- so when you do testing, you don't -- and this is a final testing of the end system, right? So you wouldn't expect a lot of voter -- so we've tried in our guidance to outline sort of what is the seriousness of an error, so if you have voters that get lost in navigation, you know --

MR. COUTTS:

So it's mostly coming from the --

DR. LASKOWSKI:

So the --

MR. COUTTS:

-- accessibility pretest rather than coming from the lab?

DR. LASKOWSKI:

So in the report you would report your findings --

MR. COUTTS:

Right.

DR. LASKOWSKI:

-- and what the problems were. People in the usability, accessibility community who do a lot of these kinds of testing can easily recognize whether that testing was done and if there's a serious issue based on that data. But the test lab would have to make some judgment on that. But presumably, if you find a serious flaw in your system as you're -- and as I get to Principle 2, Guideline 2, you would have fixed it.

MR. COUTTS:

If you find it at the lab, you have already missed the boat?

DR. LASKOWSKI:

Yeah.

MR. COUTTS:

Yes, absolutely --

DR. LASKOWSKI:

Yes. Yes.

MR. COUTTS:

-- which is kind of my point here.

DR. LASKOWSKI:

Right. Right. So the -- it's not so much the -- that you did the test and reporting but that you've done a lot of testing, and when you submit this final report, there's no glaring flaw. You would have caught that already. So it's to keep the -- it's to inform the manufacturer that they need to pay attention to testing with users using best practice methodologies, which brings me to Principle 2, Guideline 2, under high-quality implementation.

MS. AUGINO:

Before we go on to Principle 2, can we come back --

DR. LASKOWSKI:

Yes.

MS. AUGINO:

-- to Principle 8?

DR. LASKOWSKI:

Yes.

MS. AUGINO:

So I'm -- I went back to the document, the redline version that you guys handed out. This is Lori Augino, sorry. I think when you adopted these changes, you actually changed the intent that this body was recommending, and I just want to make sure that that is highlighted. That may be what you wanted to do, but I think our

intent was that the voting system would be evaluated by a wide representation of voters, voters living with disabilities with and --

DR. LASKOWSKI:

So you're talking about --

MS. AUGINO:

-- without disabilities. This --

FEMALE SPEAKER:

Which one are you -- 8.3?

MS. AUGINO:

This is 8.3 and 8.4.

DR. LASKOWSKI:

Yeah. Yeah.

MS. AUGINO:

And then we changed -- it appears that the effect of the change means that someone else is going to do those evaluations with these folks in mind --

MALE SPEAKER:

Yeah, that's --

MS. AUGINO:

-- voters and election officials. That's how I think it reads now, 8.3 and 8.4. So that may be the intent, but I think that our intent when we adopted -- or when we recommended these was

that voters would be providing evaluations, and we would be providing evaluations.

DR. LASKOWSKI:

Oh, the --

MS. AUGINO:

Unless I'm missing something.

DR. LASKOWSKI:

No, the voters -- oh, okay. Our intention was not that the voters provide you out -- that you test with the voters, so you run a usability test with your users who are the set of voters.

MALE SPEAKER:

Right.

MS. AUGINO:

That was my intention.

DR. LASKOWSKI:

Okay. So I think it's evaluated, so a usability person would be evaluated -- would evaluate the system with a wide range of test participants who are representative voters. So that's why it's worded that way.

MR. LUX:

Sharon, this is Paul. So -- and -- but what she's saying is like 8.4 where we have changed the word "by" to "for," there's a big difference between a voting system that is evaluated for usability

for election workers and a voting system evaluated for usability by election workers. One of those could be anyone we grab off the street to evaluate it for the election workers versus let's have actual election workers come in and do the evaluation.

DR. LASKOWSKI:

Oh, okay. So you have -- you run the usability test, and that would be run by --

MR. LUX:

Actual -- I mean, so let's --

DR. LASKOWSKI:

-- a usability expert observing election workers. So our usability test protocol specifies exactly what demographics for the individuals that are representing the election workers, and they don't self-evaluate. You have -- you run a best practice usability test observing the use to then identify any usability problems that --

MR. LUX:

Well, and --

DR. LASKOWSKI:

-- the election workers have.

MR. LUX:

-- I mean even the -- even just the workers themselves having the ability to --

DR. LASKOWSKI:

Well, part of that is --

MR. LUX:

-- to do that as part of a supervised --

DR. LASKOWSKI:

-- so one metric is satisfaction. So part of the metric is you look at can they do it effectively, can they do it with minimal -- can they do it in a timely way, and you collect satisfaction, right? So you interview them and you ask them what their view of their experience is.

CHAIRMAN COPAN:

Thank you very much, Sharon. That was excellent. This is Walt Copan speaking. I think that with these changes in wording and then the reference to the other documents about how the testing will be done, observing the workers and the users, together with professionals, I think that was very good clarifying guidance at the very least from me.

I know we're coming to the end of our --

DR. LASKOWSKI:

Yeah, I'd just like to point out that --

CHAIRMAN COPAN:

Yep.

DR. LASKOWSKI:

-- the last one because that's critical --

CHAIRMAN COPAN:

Yep.

DR. LASKOWSKI:

-- is that it's -- the onus is on the manufacturer to follow, as they develop their system, what's called a user-centered design method and report on that so that, as we were discussing with McDermot, you do some iterative testing. So by the time you do your usability tests, the major flaws are out.

MALE SPEAKER:

Yeah.

MR. COUTTS:

Right. And then one of the benefits of that is that when we submit that report to the labs, it's kind of -- the labs say, yes, there was no -- or we look at the report and there's no remaining confusion.

DR. LASKOWSKI:

Yes, and the lab -- and -- yes, they actually did these tests.

MALE SPEAKER:

Yeah.

DR. LASKOWSKI:

Here was their user-centered design process. Here's what they fixed, and here's what --

MALE SPEAKER:

Yeah.

DR. LASKOWSKI:

-- the final -- and it's clearly fixed. Look at their last report.

MR. COUTTS:

Right. And that way we can give a positive yes or no on accessibility requirements, which is what we're really trying to get to.

MALE SPEAKER:

Yeah.

DR. LASKOWSKI:

So thank you very much and --

CHAIRMAN COPAN:

Very good. Thank you.

DR. LASKOWSKI:

-- any other questions or comments, please see me or email me at Sharon.Laskowski@NIST.gov or call me.

CHAIRMAN COPAN:

Great. Thank you very much, Sharon. That was -- and it's a very impressive series of things that have been outlined here regarding all these elements of accessibility and usability. Thank you for that great work.

Mr. Choate, I know that when we were discussing a potential resolution earlier that you were working on preparing that. Is now an appropriate time for us to consider what you've prepared?

MR. CHOATE:

You know, I think we have sort of come up with some loose language, but I think we would like to take the day and talk it over.

CHAIRMAN COPAN:

Yeah.

MR. CHOATE:

And then maybe it's a good first-thing-in-the-morning kind of event. It'll spice up the beginning of the day tomorrow.

[Laughter]

CHAIRMAN COPAN:

Very good. So we'll then consider that resolution as part of the voting and other deliberations tomorrow morning. Thank you all very much.

I believe we are now at a good time for our planned luncheon break. And we have one hour allocated to -- in the schedule for this. So I look forward to seeing people back here promptly at 1:15 for the remainder of the afternoon program. Thank you.

[The Committee recessed at 12:15 a.m. and reconvened at 1:15 p.m.]

COMMISSIONER HOVLAND:

I know we're a little behind the start, but it looks like there were a couple people still getting through security. Sorry, I just wanted to do that. All right. I think --

MALE SPEAKER:

You are the man.

COMMISSIONER HOVLAND:

Yes. So I've got that going for me.

MALE SPEAKER:

Is that what the Dalai Lama said?

COMMISSIONER HOVLAND:

Yes.

MALE SPEAKER:

And fired up for the afternoon just so you know, Ben.

COMMISSIONER HOVLAND:

All right.

MALE SPEAKER:

He's ready to go.

FEMALE SPEAKER:

He's ready.

COMMISSIONER HOVLAND:

We'll make sure that we've got the audiovisual ready to resume our session after our break here. Great. And I don't know if -- Mary, do you want to say anything to kick off this section or should we just jump in?

MS. BRADY:

Just jump right in.

COMMISSIONER HOVLAND:

All right. So we are back. I hope everyone had a good lunch break. For those of you on the webcast, I hope you are still enjoying our programming.

[Laughter]

COMMISSIONER HOVLAND:

We are going to jump right back into it talking about core requirements. We've got Ben Long and John Wack from NIST, and so welcome, and we look forward to hearing from you.

MR. LONG:

Wonderful. Thank you very much, Commissioner Hovland. My name is Benjamin Long. As he said, I'll be presenting with John Wack. And in core we are going to cover several principles today. And we'll be tag-teaming on a few of them.

So just to get started, I thought we'd start with a little bit of overview of how we got here. In terms of our update and review, we referred back, as Sharon Laskowski also mentioned, to previous

standards 1011 and the 2007 recommendations. There is some new material particularly in interoperability and common data formats and -- thank you -- and some reworkings for accuracy and reliability. And we've had extensive feedback and conversation through the working groups, particularly the interoperability and testing working groups.

And so in terms of finding the core requirements, you'll see those in four principles today. Principles 1, 2, 3, and 4 are what we're covering. That's high-quality design, high-quality implementation, transparency, and interoperability. Most of the core is in 1 and 2. Documentation for users is in 3. And there are some requirements, namely a couple in human factors and security, that link out to other areas from the core. And we'll highlight those where they occur.

So, as Dr. Laskowski did, in each case we'll just do a quick thematic overview and then do a principle and a guideline requirements for each one. So with Principle 1, high-quality design, the voting system is designed to accurately, completely, and robustly carryout election processes, so this has three guidelines. It's essentially about specifying the processes and evaluating those based on those specifications. So it focuses on three things, what's necessary for a good specification of those processes, ensuring that they're accurate, that they handle realistic volumes and well-

defined limits as per the manufacturer limit declarations, and that they're testable.

We have 146 total requirements for Principle 1, and we'll look at what those mean together. So the first guideline in Principle 1, Guideline 1.1, it's about process functions and logic. The guideline states a voting system is designed according to commonly accepted election process specifications. So here we're talking about the process, the functions, and the logic, the rules that should stay true when those things execute. And so an engineering specification is usually the first step you do. You describe what you're going to build for you can build and test it. And so we're just stating that upfront.

This material is largely drawn from our investigations from previous VVSGs, as well as the extensive process modeling work from the process working groups, as well as informed by some of the EAC analysis, the analysis in election modeling and CDF.

And, John, would you like to speak to some of this section?

MR. WACK:

Yeah. I -- oops. I've met most of you. My name is John Wack.

So the requirements here, like Ben said, started out in 1.0. They're the requirements that have to do with, you know, the functions that the voting system is supposed to do, election

definition, prepare ballots, cast, tabulate, things of those sorts. And in this draft we have organized the requirements in 1.0 so that they're mainly in one place and so that we think that the standard itself is going to be more usable as a result. And we've added a number of things to these requirements where necessary.

So, for example, election definition, there's requirements in there to say that a voting system has to be capable of importing election definition data using a common data format. In casting, for example, cast vote records have to also be in a common data format, but they have to have certain fields within them that's going to make it possible to do risk-limiting audits, you know, to be able to -- the voting system has to be capable or has to have some means for linking a cast vote record to its physical counterpart so you can do ballot matching. Most of these do require capability to use a common data format. There is one sort of encompassing requirement that devices log -- you know, have an election log and they put it in this common data format.

So I consider these requirements to be, you know, the ones that election officials really need to weigh in on because they're the ones that, you know, that specify what the systems should do and how usable that should be. If people don't like the way certain functions operate, then I think this is a good opportunity in the

public review to talk about that because we -- and our aim here is to be complete but also for the voting systems to be easier to use.

So with that I think we can move on.

MR. LONG:

Okay. Moving on to Guideline 1.2. So having defined these processes in 1.1 and basing our systems around that, then our next concern is ensuring -- the guideline states voting system is designed to function correctly under real-world operating conditions. And so in this case we're talking about accuracy. We're talking about -- that when these are built and tested by the manufacturer, as well as in the certification, that it's dealing with realistic election volumes and that it's exercising defined limits. So these should be things that are familiar from the past. They seem like good things to carry forward. And so this also includes -- so this involves volume testing, which is based on a medium complexity election. Originally, this was modeled after some of the California volume testing, and accuracy and reliability concerns also fall here.

John, would you like to say something about those?

MR. WACK:

So we've been having meetings with this VVSG testing working group, and we discussed these benchmark-related requirements there. and included manufacturers but also the two

test labs. And McDermot helped tremendously in just coming out with basic questions such as do the existing 1.0 requirements for reliability and accuracy, do they really have the desired effect? Do they really accomplish the job?

And, as a result, we made some changes. Accuracy and reliability is not -- they are no longer just specific tests, but they apply as well to the entire test campaign and test process. The mean time between failure testing and 1.0 was criticized as not being sufficient by extending it to encompass the entire test campaign. You increase, you know, the amount of time without necessarily increasing the cost of testing.

We've -- we are also, as VVSG 1.1 does, requiring that reliability be kind of baked in so that there be some formal analysis of reliability during the design phase. And one formal technique is FMAE, fault mode and effect analysis. We aren't sure if that's the best to use. We still have to kind of figure that out to some extent in conjunction with the test labs and the vendors because it's going to require somebody know that formal method and somebody can test it and that -- you know, that it can be done efficiently. But those are the big changes there.

MR. CHOATE:

Okay. This is Judd. I have a quick question. So in 2, the principle is high-quality implementation, and then this lead sentence

also talks about implemented. And then in each one or many of the ones below use that word. When -- in a testing world, what does that mean when -- what does it mean to implement something in the voting system context? Is that about use? Is that about design? What is implementation?

MR. WACK:

A voting system is implemented using high-quality best practices. Well, the requirements we have, as I just said, some apply to the design phase, so there has to be some report of a formal method used so that you don't end up with a system in testing that, you know, has some major issues. So there's attention, you know, paid to the design phase. But, in general, the requirements examine, you know, the functional behavior of a system and, you know, these sets of requirements, the functional behavior of a system. So I'm not sure I totally understand, but that's kind of what we've done in response to that.

MR. WALLACH:

So -- Dan Wallach. Could you characterize this as hardware engineering or hardware and software engineering or something else?

MR. WACK:

It's both, yeah. There are requirements in here that we'll get to that have a lot to do with software quality. There are -- the

requirements I just went over that have to do with what functions voting systems must do and, you know, what standards they must use. But there are also requirements that have to do with hardware, with identifying where the hardware came from, with testing, you know, of the hardware and electrical emanations and resistance and battery backup and things of that sort.

So it's -- we used to describe core previously in previous VVSG efforts as all the requirements except security and usability and accessibility, so you can think of it as -- you know, in those terms.

MR. WALLACH:

Thank you.

MR. LONG:

Okay. Great. Okay. So moving on to Guideline #1.3. This is about testability, the conformance clause, and the implementation clause. It states the voting system design supports evaluation methods enabling testers to clearly distinguish systems that correctly implement the properties from those that do not. So this is essentially about testability. In previous standards, you know, good things we wanted to carry forward, when a manufacturer designs and implements a standard and says yes, I've implemented to this, I want to submit it to certification and they say I am stating that I have implemented these things and that

these things are implementations of aspects of the standard and the testing and certification side says yes, okay, this is how I know what to look at in order to examine this, this is the essence of what we're talking about, about ensuring that there is a way to make that mapping. And also a manufacturer not only designs and implements but also tests. And so when all that information is transferred to a tester, to a certifying testing lab and so forth, that they have sufficient information to make those determinations.

And so this section is just really carrying that forward from previous standards and emphasizing, you know, these essential questions of so I have an implementation. How do I recognize the functions that are in it, how they're realized, how they will observe them, and so forth. So a lot of this information is in the TDP, in the technical documentation.

And in former standards there was usually a separate volume with a lot of specific testing guidance. We've had some discussion about actually trying to keep the VVSG 2.0 focused on the system itself and moving testing-specific guidance to the EAC manuals. So that's just the primary difference there. But that's the intent of this piece.

So moving to the next principle now, Principle 2, high-quality implementation, so Principle 1 is essentially you're stating what is it that I'm building, the essence of it, and Principle 2 you're saying I'm

building these things using best practices.. And so this is an intent to stay technology-relevant but also technology-neutral in the sense of being able to provide to manufacturers the guidance necessary to keep pace with technology, the best and state-of-the-art.

We've got seven guidelines in this section, 85 total requirements. Let's jump into Guideline 2.1. So Guideline 2.1 is about implemented systems using high-quality materials and software development best practices. This is essentially about the engineering piece. We basically provide guidance in sort of two forms here. Again, with the priority the goal of tech-neutrality. The requirements and guidelines you'll find here are things that seem to be generally true across changes in technology.

And then there are some things that you'll find in these sections when you consider, for example, how much technology has changed in the last 10 years, for example, and what kinds of technology have changed, that specifying all those things doesn't lend itself necessarily to tech neutrality, so formulating the things that should be generally true and then, for example, things like what languages are you using to implement your systems and stuff, we're asking manufacturers to identify those in their TDPs and stuff and justify their decisions. And so in this case focus on acceptable programming languages and coding conventions.

Where -- we're asking that it's credible, that it's a public specification, so it's fairly widely known. We're keeping a balance between what's in the stated practice of engineering, as well as what will lend itself to efficient and effective testing. Conventions help do that not only by providing more uniformity in the code base but also kind of reinforcing a lot of the guidance that you would normally have more detail on.

So some changes from the past, many of you remember there were a number of requirements in past standards that specified everything you should document in your code commentary, your headers and stuff. And we believe that that can be taken care of through following good conventions according to the languages you're using and that the focus should be on the logic that's actually executed and the quality of that. And so that's been the emphasis in the requirements here.

In terms of general build quality, these carry forward good ideas from the last standards, statements about high-quality products and parts, we're basically requiring things that should make sense. They shouldn't have defects. They should -- if you're using COTS, for example, you use a printer, you use some software package. It should not violate any of the things that we're trying to test in the VVSG. So the parts should be conformant in that they should fit together well.

Durability-wise both in terms of the system, things like paper -- excuse me, things that paper and stuff, we want them to last for the duration of their use. You don't want paper deteriorating before it might be used for a recount, for example. And certainly the same is true for things like hardware.

Maintainability, we're talking about, for example, with hardware components and circuits, that you have test points. And this kind of reaches an arm back to the testability piece. So when a tester gets this or anyone needs to evaluate what's going on, it has been engineered so it can be maintained. So that's the essence of Guideline 2.1.

MR. HALE:

Ben, Geoff Hale. The 2.1 reads currently as the voting system software, but you described a lot of nested requirements dealing with hardware build and hardware requirements that -- is that an unintentional change?

MR. LONG:

Thank you, Geoff. I -- so I think it's a true statement that when you build a system, it's got to have hardware and software. Like we could not build an only-software system, right? Yeah. Well, I'm sorry? What did you say?

MR. COUTTS:

We keep trying, and it's possible.

MR. LONG:

Yeah. Well, I guess we could get into discussions on the semantics of what that means, but, ultimately, practically speaking, however -- we need something physical and something logical for this to run on. The statement of that there I think is a result of the focus of when those guidelines were formulated, but practically speaking, to implement them you have to have both, so I think that that's my understanding of that. So it wasn't an oversight. It's just the reality that software has to run on something, so --

MR. HALE:

Completely agree that the hardware is understandably within there. It's just the overarching requirement for the voting system, it went from "and its software" --

MR. LONG:

Right.

MR. HALE:

-- which allows you a little more clarity.

MR. LONG:

Right.

MR. HALE:

But I don't know where the judgment was made.

MR. LONG:

Right. I think earlier incarnations of this did say system,
which includes both.

MR. HALE:

Yeah.

MR. LONG:

So --

MS. BRADY:

So Mary Brady. So you're sort of referencing changes to the
Principles and Guidelines that we thought perhaps we were solving
a problem but may have introduced another that --

MR. LONG:

Yeah.

MS. BRADY:

-- because the original wording in the guideline was the
voting system and its software, and here it has been changed to the
voting system software, so it's --

MR. LONG:

Right.

MS. BRADY:

-- you know --

MR. LONG:

Right.

MS. BRADY:

Yeah, I noted we should come back around to discuss some of these issues.

MR. LONG:

Thank you.

MS. BRADY:

I'm not sure, you know, given where the Principles and Guidelines are in the process and if there's an opportunity to fix any problems that we uncover today, but I've noted it.

MR. LONG:

I appreciate it. Okay. Moving to Guideline 2.2, thank you. Oh, yes, Guideline 2.2 was covered by Dr. Laskowski. And this is listed in this section simply because, as best practice for human factors, user-centered design-based testing for manufacturers belongs in this section. But since she covered it, we'll move to 2.3, please.

So Guideline 2.3, it's about implementing the system logic, the software in a hardware, firmware, software using logic development and best practices, and so the -- it states that voting system logic is clear, meaningful, and well-structured. So, as we mentioned before, this states generally good guidance that scales well across technology changes. Some of the specific things that are mentioned here such as block structured, exception handling, wrapping legacy code, and so forth.

Essentially, when we talk about meaningfulness relative to the software and the logic, one way of thinking of it is not just from designer's point of view but from anyone who might have to look at that again, a tester, an evaluator, a maintainer. And when that individual or that tool looks at it, can they discern what the parts are clearly? Can they follow the control flow? This step should happen before this step. If there's a case where an error, an exception occurs, is that clear what should happen and what's going to happen next? So these are trying to reinforce practices that will ensure that, by following these, code will be more organized in a meaningful way.

Now, on some of our review calls, Dave Wagner and others have brought up some considerations that had occurred in previous areas relative to, for example, exception handling. And so on many of these technical topics sometimes there are trade-offs, and there are many different ways that people can look at it. Ultimately speaking, in previous standards, 1.0, for example, there wasn't an explicit callout that you should have structured exception handling, and -- but there was a need to identify errors wherever they occur. So if you identify errors wherever they occur and you don't have some guidance like this, you can end up with code that's hard to interpret. And so our feeling was that this could actually help that situation.

If there are additional concerns or considerations on this, we can -- we would love to hear comments in the comment period. We do feel like it's fairly sound guidance. Things like wrapping legacy code, it provides a uniform interface to other code to the system so it's easy to maintain and change if you need to. Separating code and data, one of the common attack vectors is to present something to the system as data where it's actually code. We want to prevent that. So hopefully from an engineering point of view this is fairly common sense. Yeah.

So moving on to Guideline 2.4, so on Guideline 2.4 we say -- we're talking about the system structure, so the voting system structure is modular, scalable, and robust. So, again, a common way of thinking about a system is a set of components that work together to perform functions or processes to achieve goals. Certainly we do that in voting. We see it's modular when the way the pieces have been organized and designed they can be interchanged with things that are equivalent. If I have a particular component for doing a certain function, maybe it's counting, maybe it's auditing, and so forth, then I can easily swap something out that does that function differently without hurting the system. I can do it fairly easily. When I have a modular system, it's easier to scale it if I need to deal with things of a larger size, a larger scale.

Robustness deals with -- that the system isn't -- it doesn't easily fail if I change the inputs, the things that it is exposed to, that it's designed around well-considered patterns for input. And so it can deal with reasonable variations. Module size identification, again, things that are bigger and more complex, they're harder to evaluate. They're more error-prone. So, again, we hope that to those who do engineering, that they'd say this is generally decent guidance.

Onto Guideline 2.5, so in Guideline 2.5 we're talking about implementing the system with high-integrity best practices. In this case we state that the system supports system processes and data with integrity. So here you will see another guideline insecurity that has the word integrity in it. And the way you will differentiate these -- you'd say what we're talking about here is how things are built, right? So we're saying the data that we have, the components we have, the processes we build, do those have integrity? And then the integrity that's talked about in the security -- system integrity principle is about operational integrity. Can I change up something that's installed or configured? So here we're talking about building.

And in this case you can see in the requirements that, again, we're offering recommendations that you would suggest to somebody to say, yeah, how do you know that your code is of high integrity? Well, it shouldn't change itself, right? So if I build and I

install code and I run it the first time and I run it some other time, it shouldn't have changed itself, no self-modifying code. If I have to run some processes at the same time as one another, they should be able to coordinate with each other effectively. They shouldn't interrupt each other in a way that causes the system to fail, so safe concurrency.

And these others, you can generally see the theme of protecting the process integrity. Do the inputs have integrity? Are they well-defined? Do the outputs have integrity? And a lot of -- for the security issues that you'll see and some of the protections in the later security talk deal more specifically with specific cases in inputs, outputs, and these things. But what we offer here are general good practices for how do I know I've got good inputs? How have I maintained my construction in my process, and how do I have good outputs and how do those fit together?

We deal with specific, well-known error cases here that have integrity implications such as overflow. In engineering, this is well-known to be -- you know, these are some of the main things to look out for. On one of the calls when we reviewed this section David Wagner brought up a consideration of memory-safe languages, so there are different languages that have different properties. And some contingents both in security and engineering might say, hey, this is the way to go.

So if you're building from scratch and you say, yeah, gee, maybe I want to use Java or Rust or one of these other things, you might start from that say -- and you might say I'm going to let the language itself take care of that. But if you have an existing code base or you're implementing in different devices, you might not always have as many options. So the standard is organized to help you in either case. If you don't have it built into the language, it guides you in what you should do to ensure that things that are in memory have integrity, that you're not corrupting your data when you're processing. So we considered that feedback. We looked at what we had, and we felt pretty confident that this covers both cases.

MR. WALLACH:

So a quick question --

MR. LONG:

Yeah.

MR. WALLACH:

-- closely related to what's in Section 2.5 but not here, hot topic in software engineering these days is reproducible builds --

MR. LONG:

Okay.

MR. WALLACH:

-- so that way the thing that I compile on my computer is the same that you compile on your computer.

MR. LONG:

Right.

MR. WALLACH:

Should that -- would that belong here? Would that seem appropriate?

MR. LONG:

Certainly there -- that would be consistent with this section. If you would like to recommend that in the comment period, I see no contradiction. I think one thing to keep in mind when we consider things is -- so one of the things we had to juggle as we were doing this is there's good ideas, and then there's how do you maintain this tech neutrality and how do you scale smoothly over time? So as we tried to think about that balance, whenever we would think about putting something here in these requirements, we'd say how will this do over time?

And if -- so when you consider how much variety there are and ways to solve that problem, you say is this going to be good for everybody? And if you say, well, it's a good idea but we want to make sure that we -- if somebody does that, we know how they did it and they justify it. So that's -- that second piece is how we're attacking the variety in technology. And so if you think there's

something that we need to say here to ensure that, maybe we could say it.

But for things like language and stuff where you might have a lot of things you could say about a language, what we're asking people to do in those cases is document it in your TDP, justify it, and bring it forward instead of having us detail it for you. So if you feel like there's something more, we can think about what goes there. If you feel like that could be something that could safely be put in the manufacturers, here's how I engineered and justified it, we can talk about maybe what that looks like. Does that seem fair?

MS. BRADY:

So, Dan, this is Mary Brady. So let me just sort of explore that a little bit with you. So to reproduce builds is implying that when you compile it, it compiles the same regardless of platform or on the same platform? Because I think when we're talking about voting systems, we're talking about the combination of, you know, the software plus the hardware platform that it's on.

MR. WALLACH:

Right. So the broad topic simply means that you -- okay. Let me tell you what wouldn't be a reproducible build. We have one machine that we use to make the builds, and we have one person who knows how to make the build happen. And if we lose that machine or that person, boy, we're in trouble, right? So the notion

of reproducible builds is that any developer on any machine types "make" and they get out the same exact resulting program, so that way this -- when you pass it over the wall to a tester, you can tell the tester the thing that you make from our code is the same exact that we make from our code and there's no worry that somehow there's some weird environmental dependency that nobody expected. So --

MR. COUTTS:

That's --

MR. WALLACH:

-- this is a broad, aspirational goal --

MS. BRADY:

Sure.

MR. WALLACH:

-- without giving any particular idea of how you might

accomplish that goal.

MR. COUTTS:

That's currently built into the -- at least the current process because the builds are done by the labs, so the official build gets done by the lab and then they kick it back to us and say here's your build. You can go ahead and verify it. So in order to make that -- and it's always done on a virtual machine to specifications that are documented. So, by definition, the way the 1.0 is currently set up

and the concept of the trusted witness build, that sort of thing is built-in. So -- but I think making it explicit is not a bad idea.

MR. LONG:

Okay.

MR. LUX:

Dan, this is Paul over here. So isn't that kind of sort of what it's talking about if I'm reading 2.5.1-A correctly? I mean, it basically says if a compiled code is used, it must only be compiled using a COTS compiler. To me that says that anyone should be able to take the same code, put it into the same compiler, and produce the same output. Or am I just oversimplifying it?

MR. WALLACH:

So without getting lost in engineering details, part of producing -- part of what makes a reproducible build reproducible is what version of the compiler, what version of the libraries, what version of like the entire -- the entirety of the environment in which you do the build. And, again, there are 20 different ways of making builds reproducible, and so --

MS. BRADY:

Here we go again.

MR. WALLACH:

But the broad aspirational goal is simply to make sure that -- yeah, well, I guess we'll just keep going with the dim lights. The

broad aspirational goal is to make sure that you have the ability for somebody else like a testing lab to be able to produce exactly the same thing that you produced. And this is -- I mean, the phrase reproducible builds is a hot topic in software engineering, but it's a classic idea.

MR. COUTTS:

And the way it's currently set up, the instructions go to the point of we can document where to download the compiler, where to download the libraries. All that gets put together so that we don't provide that to the labs. The lab pulls it off of common source so that we always know we're doing exactly the same thing and it is eminently repeatable every single time. It will always be the same. That's been -- it's worked out well for us despite the headaches and pain involved.

MS. BRADY:

So, Ben, to what extent is some of this covered in the QACM portions that were discussed to move into the EAC manuals?

MR. LONG:

This is completely what is covered there.

MALE SPEAKER:

Um-hum.

MR. LONG:

So the trusted build concept is -- that is exactly where that happens.

MALE SPEAKER:

Okay.

MR. LONG:

Yeah.

MR. WALLACH:

So then to the extent that we might ask for changes, there should be a reference here that says, oh, by the way, you need to that, too, and it's see section-something?

MR. LONG:

Agreed. Thank you.

COMMISSIONER HOVLAND:

For those of you who have heard concerns about the EAC's funding, you can see we are having challenges keeping the lights on.

[Laughter]

MR. LONG:

So --

MR. LUX:

And that's completely reproducible almost every time.

[Laughter]

MR. LONG:

So with that, moving to 2.6 -- so -- and I just -- okay. So Guideline 2.6 is about implemented systems with robust error handling and graceful failure recovery. The guideline states the voting system handles errors robustly and gracefully recovers from failure. So this is dealing with just the traditional and necessary and important aspect of when you design your system, of course you design it both in terms of what it should do and also what to do when things go as they -- when the unexpected happens. This draws on areas of engineering dealing with reliability and in software particular error handling failure processing and so forth, error detection and correction.

And so in this case we have requirements like surviving device failure that we're not going to compromise the voting process or the data, whether it's a voting data or the audit data, that that should not be compromised or changed during failure, that if a certain component fails, that we put in place means for the system to continue. Controlled recovery, can we get back to a known operating state following a failure, a recoverable failure?

So these are the kinds of things that were put into this section mostly drawn on good guidance from former standards. Are there any particular questions here before we move on or -- no?

Okay. So moving on to Guideline 2.7, so in Guideline 2.7, so as we think about everything that we've talked about here, so Principle 1 we said we have our processes, they need to be accurate, they need to operate in realistic collection sizes, respect the limits of the design, they need to be reliable and stuff, and so all of that had to do with what does it do. And then we talked about best practices for how to make it, how to engineer things that do that. And in this case we're saying, all right, these systems, they live in a physical environment. What's the temperature and so forth, the handling when it's in storage, when you're -- when it's in transit, when it's in operation?

And so in this case I'm going to turn it over to John to talk about the different stresses that the system should endure in these cases.

MR. WACK:

So this section has I guess two major areas. One is electrical requirements. And the big change there is that there were complaints from the manufacturers -- and test labs agreed -- that the electrical requirements I think were probably inherited from the 1992 version, and they just, you know, have continued to be in the standard. So we simplified this a great deal by simply requiring, you know, common standards, FCC, class A, class B. And given that COTS components are, you know, being used more frequently

and may be so in the future, you know, that those are the standards that they have to adhere to.

The other area is in kind of stress testing, and that sort of in a sense forms the volume testing. So the big change there is that, well, we're trying to save money. So in 1.0, systems have to be put in a special test chamber, and the humidity and temperature has to be raised and lowered. And I think that goes on for roughly seven days, so you have to employ lab personnel who are going to be, you know, working around-the-clock, and it's expensive.

It turns out that, generally, that's only needed for the first 24 or 48 hours, so we're trying to find a way we can divide these -- well, we've done it thus far, and I hope we did the right thing in dividing that up such that you rent the special chamber for as long as you need it, and you do the rest of the testing, you know, under lab conditions.

I think that's about it. That's about it for this section.

MR. KELLEY:

John?

MR. WACK:

Yes.

MR. KELLEY:

Neal Kelley. I -- so I have a couple of questions related to this, 2.7-A through C. So there are I think admittedly different

storage challenges in the Southwest versus, you know, the Northeast, et cetera. And one of the -- two of the ones that I have faced over the last decade is dust and vibration. And I'm just wondering in these other reference documents that you are referencing here, the tolerances that are set are industry standards and electronics or -- I'm trying to figure what that is because the dust issue has been a problem, and I'm not sure the labs are --

MR. WACK:

Yeah.

MR. KELLEY:

-- perhaps testing to that.

MR. WACK:

Well, I'm glad you raise that. So it's referencing a MIL Standard 810D, and -- actually, I'm getting ahead of myself. I think -- 810D, I'm not positive that is the most recent version, so there's another standard that is referenced frequently here as well for environmental testing that's MIL Standard 83. So these are revisions from some time ago, and there have been newer revisions. I didn't want to make the updates at this particular point in time because I want to have a better idea of what the real changes are. But I would like to talk to you, you know, at some point about this and -- because what you're saying is important. So --

MR. KELLEY:

Thank you, and I would, too. And just to kind of -- back to the Commissioner's statement earlier about updating these little nuances throughout the requirements over time, as those types of standards change, do they automatically get updated in the requirements without any action?

MR. WACK:

Well, thus far, they have not been updated. What's been done -- and I'm, you know, not faulting anybody because actually we were the ones that did it to a certain extent, we just continued to use those standards. But I went back and looked at like MIL Standard 83, and you can't get a copy of it. You know, more or less what you find is a Xeroxed standard and, you know, clearly well out of date. So it just behooves us to take a look at the changes and update them.

MS. AUGINO:

Lori Augino. I think that is another case in point for the fact that I'm hearing you're saying what we're looking at today and potentially being expected to vote on is already out of date.

MR. WACK:

No, it's a -- I won't say it's out of date. It's --

MS. AUGINO:

Or has already been superseded.

MR. WACK:

It's -- there are -- so we're saying like for MIL Standard 83, we're saying that your overall environmental testing has to conform to this particular standard. The standard that is being referenced is out of date, that is true, and we need to use the most recent version. But I don't expect there we're going to have big changes. So, you know, you could say, yeah, we're using an out-of-date reference, but I don't expect that it's going to be a big deal. It's just that I don't -- at this particular time we have to carefully go through what those changes are with the test labs to make sure that we're not adding a requirement that, you know, just dramatically increases costs or things of that sort. So I wouldn't put it -- there's some truth in what you're saying, but I'm not sure I would say it that way.

MS. AUGINO:

So I guess -- Lori Augino again. I guess maybe there could be a case made for those kinds of things that need to be updated more frequently that are, yeah, noncontroversial. If -- is there a way that those can be put into an EAC test manual then, for instance, so that they can be updated on a more frequent basis without having to go through this big process for ensuring that that kind of change can be made? Just a thought.

MR. WACK:

Well, in my experience you have a standards maintenance process and -- where if the standard references and relies on other standards when updates to those standards come about, then as part of your standards maintenance process, you take a look at what the changes are and update things accordingly. So how that process is going to work in this particular case is sort of outside of my control, so I don't have any specific requirements around it, but that's generally what you do when you're maintaining a standard.

COMMISSIONER HOVLAND:

Just out of curiosity since we're in this moment, what would you say from, I guess, other areas is a regular update process?

MR. WACK:

I'm going to -- I was just thinking Mary Saunders probably could -- has better words of wisdom than me, so --

MS. SAUNDERS:

I don't know about better words of wisdom talk, but thanks.

So in a typical -- in most STL procedures and I think ANSI requirements recommend at least every five years. Now, some standards will be on a more frequent update basis cycle depending on the technology, so it really is -- depends -- you have to look at it at least once every five years, every -- at a five-year timetable you -- the STL may decide nothing has changed and it's

reconfirmed, but you need to look at it and update it at least every five years.

I'd just note the MIL standard -- I was looking it up. This one DOD is maintaining, and they're on 810H now -- was just updated in 2019 is the latest version. But to go on about that, the MIL standard -- and it does talk about sand and dust and salt, fog, and fungus, and lots of other things because it's a MIL standard and the equipment needs to operate everywhere in the world. On the other hand, a MIL standard would likely go well beyond some of the requirements that you might -- might be practical for a voting system.

MR. TATUM:

Mary, would you go a little further with the reference to some other standards and how they update and how we would want to consider those updates? Thank you.

MS. SAUNDERS:

Sure. So -- and this is general practice related to -- well, referencing standards in other standards or encodes and then more specifically referencing standards and regulations. Referencing standards and regulations, best practice requires a dated reference, so you generally -- agencies are not -- it is not recommended that an agency include an undated reference for some of the reasons that John was talking about. You -- that

leaves an open-ended -- I mean, there may be changes to the standard which do not meet the requirements of a particular application, and the agency or the owning organization will want to review whether those updates are relevant. It's also true that dated references are used in -- when they're embedded in other standards, so as the host standard or code is updated, another look will be taken at the dated references as well. But best practice generally is to use dated references.

MS. AUGINO:

Lori Augino again. Does anyone ever say the most recent standard for blah, blah, blah so that way this doesn't have to be updated but it automatically assumes that you're working to the most current standard?

MS. SAUNDERS:

Yes, there are specific cases where they -- either the host -- the larger document, either a regulation or standard, will be latest reference, but that is the -- that's the decision of the owning organization. As I said, there is -- particularly in the regulatory context, there is always the risk associated with not -- the unknown updates to the standard.

MS. GOLDEN:

And I was just going to say, again, the -- on -- in the disability world, you usually see those in statutory references to the ADA, as

amended. You know, if you're referencing another statute, then that statute changes, it's the most recent one. You don't go back to an older version of a statute, you know? So that's really common versus what she's talking about, but I am going to say because I see Sachin smirking over there because the Access Board has about killed themselves with the 508, you know, update because they needed to harmonize with WCAG. And WCAG, because it's not regulatory, is moving very, very fast in updates. And you talk about a five-year cycle? Oh, heck no. I mean, web accessibility standards, that's in 12 months, 18 months.

MS. SAUNDERS:

I said it depends on the technology.

MS. GOLDEN:

Yeah. I mean, you have got to keep redoing that very, very quickly because it's obviously changing. And I think that's the push-pull problem we've got here. This stuff, a five-year cycle is probably not wise, and I know you got a problem referencing external standards even though these are voluntary and not rules. But if you don't and then you have a cumbersome process to update it, the minute we vote these out, we're into yet another two decades of no change, you know?

So I don't know what the answer is, but this is not unique. The Access Board, when it finally got the 508 rules out, yes, they

referenced WCAG as it stood on that day, and it's already outdated again, you know, which leaves, you know, governments in the position of do I do that or do I do what's current? And, anyway, so it's a mess with technology that changes quickly.

MS. SAUNDERS:

So --

MR. LOVATO:

Well --

MS. SAUNDERS:

-- this is Mary Saunders again. Just one more thought is an approach that was taken by some organizations, another approach, which is that as a standard is updated, the owning agency or the using agency or entity is -- gives itself or is given a certain period of time in which to go thumbs down. If they don't make a negative determination, no, we don't like the way -- this version, the latest version becomes the operative version. That's something --

MS. GOLDEN:

So you've got --

MS. SAUNDERS:

-- to think about.

MS. GOLDEN:

You've got a veto right.

FEMALE SPEAKER:

You have a veto right.

MR. LOVATO:

And one other thing to consider in that regard is that we have to consider the -- our other stakeholders, the manufacturing community because we'll have to -- we will have to put dates on --

FEMALE SPEAKER:

Yeah.

MR. LOVATO:

-- these standards in order for them to -- if there is an accessibility standard that's constantly changing, there's no way they could keep up with the changes once the voting system gets into testing and certification cycle. So there will have to be -- we will have to think about how we date things and what that period looks like. But that's just something we have to consider. We can't just say the latest whatever, external standard, but there will have to be some compromise there as to not have it every five years but then also not have it the latest and greatest either. But that -- I think that's a discussion for another time but something to consider.

MR. COUTTS:

One other point that -- would you decertify a system that had gone through certification and then the standard behind the supporting standard changed even though it had already gone through the certification process?

MS. BRADY:

That's never happened.

MR. COUTTS:

It hasn't yet, but --

MS. BRADY:

I don't think anything's ever --

MR. LUX:

Well, and that would be my concern as well, McDermot -- this is Paul Lux -- just for that reason because you have equipment that is in the field that is being used, and now, you know, the MIL spec 810-whatever, add a new letter at the end of it, changes, which changes things. Does that make that equipment no longer able to be certified or, you know, you got to stop, drop, and roll and bring it back in or, I mean, it just adds a layer of complexity to the local officials and to the States that are, in some cases, paying the bills for that.

MR. COUTTS:

Especially when that update occurs on November 1st, right?

MR. LUX:

That never happens.

MS. BRADY:

So, I mean -- this is Mary Brady. But normally when you make those kinds of changes, it would be a -- you would move like

from 2.0 to 2.1 and to -- there would be a suite of changes that would be encapsulated in your annual review, for instance. So you would be -- like, McDermot, your system would be certified to 2.0, so you would still be good as long as, you know, it's okay to have 2.0 systems, and new systems coming in would be certified to 2.1.

MR. COUTTS:

It seems like common sense, but I really, really like having it on record.

MR. LUX:

Mary, I'm glad you used --

MS. BRADY:

Noted. --

MR. LUX:

-- the word -- I'm glad you used the word "typically."

MS. BRADY:

Yes.

MR. LUX:

That would be how it happens.

MR. WACK:

So Lori asking that question was a good thing.

[Laughter]

MR. WACK:

And we're running this VVSG testing working group. The next meeting is actually this Monday. And that's the forum where I want to go through, you know, and -- because I think we at NIST can do it on our own and talk with the manufacturers and the test labs about the ramifications of changes, so we'll look for you there.

We've got about 20 minutes left, and I want to cover the next two principles. I like to think of them as the fun core requirements. I don't think you'll have too many issues with them. The first one, transparency, so transparency is -- oh, thank you. Let me move that. So we have requirements in here that deal primarily with documentation and setup inspection, but there are other requirements in the VVSG that have to do with transparency as well. For instance, auditing, you know, base requirements have to do with transparency. So in many ways, you know, it's a systemwide kind of thing. It's -- you know, it's tough to define in some respects. We have chosen to define it here or to satisfy it by putting in documentation requirements.

So the first one, the first guideline is essentially saying that you have to completely document the voting system in a way using clear language that it can be easily read and understood. And I have heard from election officials over the years unhappiness about the quality of the documentation. I'm sure it's improved since then, but there is -- you know, manufacturers are required to provide, for

example, training documentation, and so people don't, you know, want to necessarily have to rewrite that but be able to use it as-is.

So this section has a lot of requirements. They are largely from the 2005 VVSG 1.0 with additions, additions largely due to security, things that weren't there before, documenting audit procedures, a number of things like that. But a lot of requirements we could have gone down the route of specifying that this be organized in a certain way with, you know, like a system overview document and so on and so forth or templates, but it just seemed like we might be imposing a requirement that inhibits people from producing really good documentation. So the goal there is to have complete, good documentation, well-written.

Any -- do you have a question or -- oh, okay. I thought you were looking at me like you're going to --

[Laughter]

FEMALE SPEAKER:

You never know. I think she was.

MR. WACK:

As you know, I'm retiring from NIST, and so Bob Giles said any of the hard questions go to Ben here, so I'll just -- so --

[Laughter]

MS. BRADY:

I don't think you're retired this week.

[Laughter]

MR. WACK:

So 3.2 is processes both physical and digital associated with a voting system are readily available for inspection so we dealt with that mainly with setup inspection-related requirements. And those include items such as if you're going to use barcodes, there has to be some method to inspect whether indeed those barcodes are being created properly, that they do indeed hold the voter's selections, you know, things of that sort. So auditing and barcodes, you know, have kind of introduced some additional requirements into that.

And 3, the public can understand and verify the operations of the voting system. We're -- in here we're addressing this mainly through using a common data format for voting system event logging. There is -- there are other requirements that have to do with barcodes such as, you know, barcodes have to be following a -- you know, a well-used existing standard. If there is an encoding of the data, you know, like packing the data before you put it into the barcode, that packing method has to be made available.

So the idea is is that somebody, John Q. Public, can decide I want to do an audit on -- I want to see if this stuff is really being created properly, they can. You know, that information will be

available and has to be made -- you know, made -- also, audit-related documentation, so that's Principle 3.

Principle 4 is interoperability. So the EAC for a long time has pushed component certification, the idea being that it's very expensive for States to make changes to their certified voting system, and they don't want to break the certification necessarily. So if you could swap in devices and swap them out with a new one, there's a better accessibility device than, you know, we're using now. We'd like to use this different one. It would be good if things were more interoperable and it would be possible to test this particular device and verify that it can work just fine so you don't break the certification.

So what we've done here is develop common data formats as a method for making the data interoperable. So common data formats have to be used in a variety of different places, and I've gone over some of those already in the functional requirements back under Principle 1. But the idea being that, for example, a voter registration database that contains ballot data, that contains, you know, data you need to set up an election, that there be an interoperable format so that you buy a new system, you don't have to go through a process of dealing with proprietary methods and, you know, changing that.

Cast vote records, that cast vote records, it be possible to export cast vote records from election management systems or scanners so that they could be tabulated by a different device. We have one example where the Ranked Choice Voting Resource Center has produced a ranked choice voting tabulation module, which I think is now part of an ES&S system. It needs to have cast vote records, and so it uses the NIST common data formats for that. So that's -- that is 4.1.

4.2 says if there's not a common data format available, you know, to the extent possible, the manufacturer should document then what that format is, what's the format they're using so it would be possible for someone to still perhaps integrate another device into it. However, you know, not having common data format, that's obviously going to be less interoperable.

4.3, same goes with hardware protocols, standards.

Nonproprietary hardware interfaces, I think everybody does that now. This is just putting it into practice.

And 4.4, COTS, devices can be used. They are being used, they will continue to be used as long as their use doesn't break any existing VVSG requirements. And then in other areas software quality deals with, you know, I think requirements that have to do with when COTS has been modified, how much more testing is

required. But here, we're just -- we just got a requirement saying
Yep, you can use COTS.

I wanted to talk very briefly about the common data formats
stuff. So there are I'd say three, four different aspects of these. So
there are four CDF specifications, one having to do with election
results reporting, but the data that goes into election results
reporting is in -- except for the tabulated votes is the same sort of
data that can be used for election setup, so election results
reported maybe isn't the best name.

But election event logging, the EAC asked for this years ago,
having difficulties auditing and getting a hold of the election event
logs from different manufacturers' voting devices, so this is simply a
simple format that logs need to be in. So I should make it clear that
these -- the -- there's capability required for these formats, but a
manufacturer is still free to offer and use their own format as well,
so it's not saying do away with the manufacturer's own format, but
it's saying have the capability to use the interoperable one.

Cast vote records, obviously cast vote records, that one was
quite interesting because, you know, we approach to thinking what
could be more simple than a cast vote record but --

[Laughter]

MR. WACK:

But it got very complicated depending on what voting variation you're using or voting method. But the important thing I'll point out is that we paid attention to the cybersecurity working group and made sure that there were fields in there that assisted in audits. So, you know, I already talked about linking the cast vote record to its paper ballot counterpart, support for batching and auditing in batches.

Voting -- oh, I'm sorry. Last one is voter records interchange. That was originally written to kind of address voter registration portals -- perhaps you might have one at MVA -- and interchanges between that and the voter registration database. And it was decided it would be a lot more useful if it also supported maintenance of records, lookups, changing aspects of records, cancelation of records, and things of that sort.

So three other things, we had an election modeling group, which started off using the process models I think developed originally by Bob and Lori and some others and then got very much into the weeds very rigorously formally defining election processes. This was largely funded by the Democracy Fund. They have a wealth of data available. I think they have plans to make it available in a format that, you know, people can readily use and better understand elections. That went hand-in-hand with a glossary that we also worked very hard on, you know, the idea

being that the VVSG, common data formats, other documents all ought to be using the same vocabulary and as best as possible, you know, stick to that.

The last is a voting method specification, another working group that's producing a document that documents the voting variations in use in the United States and does a very good job of documenting them and how they should be tabulated. And one of the goals is that you don't want to put voting methods into legislation, for example. Some States have -- it is my understanding that some States have ranked choice voting and how it operates in legislation. And it's, you know, obviously better to have it in a standard where it can be more -- you know, there's a formal process for maintaining it and updating it. In legislation, it's more difficult and could be implemented incorrectly.

So who's using the CDFs? So three of them are actually getting a fair amount of use. The election results reporting was used in 2016/2018. Google started using it, which was wonderful. They've been using it nationally, as well as internationally. It's been wonderful because they've had a lot of good feedback, and we actually put out a second version with some updates. There are some other States using it, L.A. County. I understand some States are putting in RFPs and some vendors are starting to support it, but I didn't want to put specifics in here at this point. Voter records

interchange used in a couple of States. A number of States are starting to require it when they're doing voter registration database modernizations and updates. Cast vote records, a number of projects are committed to using it. I talked about the ranked choice voting module that uses it. A number of other States are starting to use it, some other organizations, both government and nongovernment.

So at this point -- well, it's 2:41. My original plan was to finish 15 minutes early.

[Laughter]

MR. WACK:

And I've got slides that go into the formats themselves, but I'm not really sure it's -- you pretty much heard everything at this particular point.

The one thing I just wanted to say was I wanted to offer thanks to one individual who ES&S made available who's been practically at every working group meeting we've held. We've held a lot of working groups in different areas. Herb Deutsch, who's been around in elections for a long time and well understands how things are done in different States and different counties, different cities. And, you know, I don't want to get into thinking more because then I'll leave people out, but I especially wanted to thank Herb. So thank you, Herb, if you're listening.

Any questions that we could answer?

MR. WAGNER:

David Wagner. I wanted to propose an addition or a change to the barcode requirements. So with barcodes, there's a requirement to make public the encoding. And I think with barcodes there's two issues. One is the symbology. Like it's a QR code or it's, you know, mode 2 or whatever, which describes like the visual look of the thing. And then the second is the format and meaning of the data that's stored in the barcode. And I want to make sure -- I want to suggest that we have requirements that require both of those be public.

And I think it's very clear in the standards right now that the first is required to be made public, but the second one, it seems a little ambiguous. So I'm looking at 3.3-D, which requires specifying encodings of data used on ballots, including how data may be compressed prior to encoding. And I find that a little ambiguous. And then I look at the discussion. The discussion calls out the standard use for barcodes, so I think that's symbology, the first one, and how the data may be packed or compressed. Well, compression is important to know, but that doesn't really good at what the format of the data is once you uncompressed it.

So I wanted to suggest that we perhaps make that a little clearer or more unambiguous to say not just encodings of data but

I'm thinking something like encodings and format and meaning of the data.

And to give you a concrete example, the kind of thing I'm thinking of is we might have a ballot that has a barcode on it that encodes voter selections, and maybe the data inside that's stored in the barcode turns out when you decode it to be something like Q:7 comma, you know, other stuff, and then to interpret that you need to -- might need to know that Q indicates which contest and 7 indicates which candidate was selected. And then if you wanted to build an accessible device to help for accessibility scan and provide alternate format, you would need to know the format of that data if you wanted to do an audit, an independent audit. You'd need to know the format of the data. So that's why I think it's not enough to have just the symbology, but you also need to know the format. So that was the first thing I wanted to propose, and I thought I'd open that up for discussion and reactions.

MS. AUGINO:

Yeah, I have a question for you. So I'm trying to get -- so the information that you want is from the manufacturer so that everyone has transparency and information about what that means. Are you also proposing that you would be dictating that you would be able to access that on a voter level so that you would be able to identify

-- making publicly available those voter's choices on that ballot? Is that what you're asking for?

MR. WAGNER:

No, I'm not talking anything about making public voters' choices. What I'm talking about is, as a matter of transparency, publishing how the data is stored and the meaning of the data that's stored. So the reasons why you might care about this, as a voter who cares about transparency, if there is a QR code on my ballot, I might want to be able to scan it and know what's stored in there and be able to make sense of what's there and verify for myself that what's there, there's nothing -- you know, I don't know. It's not like hiding my identity. So, as a voter, voters might care about that from a transparency perspective.

Auditors, it might be potential useful for auditors to be able to use the barcodes for auditing and then would like to support third-party auditing solutions and support. And then for accessibility I can imagine there might be scenarios where if there's a barcode on the ballot, then it might be opportunities to provide better accessibility and the folks who are making those third-party apps or whatever to better support accessibility I think would need this kind of information. So I'm proposing that it -- the vendor has to make public how that data is represented and formatted and the meaning of it and interpreted.

MR. GILES:

So this is Bob Giles. So does that go to I guess the concern that some advocates have with the use of barcodes, that you're not quite sure what it's reading? Would that address that concern?

MR. WAGNER:

Dave Wagner. I think that for some of them it might partly help. I don't think that it's going to make the concern go away. I think there is a significant camp out there that is flat-out opposed to barcodes on ballots and won't be satisfied by this. But I -- for me, I think it takes a step towards addressing some of those concerns. It won't make everyone happy for sure.

MR. WALLACH:

This is Dan Wallach. I'm going to support what Dave is saying and I'm just going to say just -- we don't necessarily want voters whipping out their phone and taking a picture of their ballot. There are privacy issues there. But you can imagine in a recount or a post-election audit scenario that the -- having those -- in order for there to be third-party tools that can process ballots, then we need to -- they need to be able to read and process the barcode. And there really are two stages here. One is converting from, you know, an image to a string of, you know, Unicode characters. And then as -- the second part is understanding that this -- the internal format is JSON or XML or whatever. And then what -- you know,

so there's multiple stages of decoding of barcodes. And what Dave is suggesting is that -- is not that there's any particular voter or auditor but rather that the process of doing that decoding is public, and I support that.

MR. KELLEY:

Not -- Neal Kelley, I'm sorry. Not that is necessary, but I want to go on public record and say I wholly -- wholeheartedly support David's suggestion. I think that's a great suggestion.

Thank you.

MR. LUX:

And this is Paul Lux and I'd like to chime in, too, because that's -- we've been fighting this battle in Florida over a specific company's specific product, and that was the concern was could the voters scan the barcode and would they be able to interpret what that means, which it can be important for people who actually care about that.

MR. WACK:

Thank you. I fully agree. That was sort of the intent, and I didn't state it very well, so that -- I fully agree with that.

MR. WAGNER:

Dave Wagner. How do we make -- move that forward? Would you like a resolution from me? Is that something that you

can take on your own and make the changes or what would be the best way to move forward?

MS. BRADY:

Well, I've captured it and along with a series of other suggestions that I -- I'm not sure that we need a resolution to do that. I think it perhaps depends on if tomorrow we're in the process -- if we're ready to vote, it depends on what that vote looks like because a vote could look like we vote to adopt the VVSG going forward, provided that you update these things in this way. So I -- so I guess eventually something will need to be said, but a separate resolution may not be necessary if that makes sense.

MR. GILES:

And I'm Bob Giles. I support it as well just so -- and I don't know, in general, it sounds like we do, so for tomorrow I'd like to see that added.

MS. GOLDEN:

The -- Diane Golden. Could I ask if there's a list, that would be really helpful to see to make sure because we've had a lot of ranging discussion. And I have three items at the top of my page --

MS. BRADY:

Oh.

MS. GOLDEN:

-- that I want to make sure. So, I mean -- and I'm guessing other people heard that, yeah, so it would be really helpful to have that. It's almost like we need a parking lot of issues that we can -- we all know are what we're -- if there's a conditional vote, we know what the conditions are very clearly. So thanks.

MR. GILES:

Yeah, I agree. I think if tomorrow, whether you put it on a side or something, would be helpful for the discussion.

MR. WAGNER:

Okay. Dave Wagner. Thanks, everyone, for your support on the barcodes. I want to continue on a second one that might be more controversial about barcodes. A second challenge with interpreting what is in the barcodes is the mapping of codes in the barcodes. So if the barcode contains something like Q:7 and we have a publicly documented format that says that that Q part identifies the contest and the 7 identifies the candidate, then there -- to really fully interpret that one needs a separate codebook that's election-specific that maps from -- a Q means County Commissioner and a 7 means John Smith. So, ideally, I think what we would like from a voting system would be for the voting system to be able to export that mapping, that codebook.

Whether or not any particular county decides to make that publicly available or not would be up to the county. That's not really

up to the standard, but I was going to suggest that we require that voting systems that are using barcodes have the ability to export that codebook.

MR. LUX:

Let me actually jump in because I don't want to say I've tinkered with it but I was involved in several projects where this was a reality. And the encoding that was used was very generic in nature. It literally was contest 1, you know, selection 1, 2, 3, 4, 5, however many there were. The next thing separated by a comma was, you know, contest 2 with a colon, a null space if they made no selection, or a 1 or a 2 or a 3 for selection 1, 2, or 3. So it didn't matter whether it was a candidate race. It wasn't keying in on like specific candidate names. It was literally race 1, you selected the first position. Race 2, you selected the fourth position, race 3, you know. So when you get down to constitutional amendments, again, they're just races in the list of -- there's 27 total contests on the ballot. The last five of them are constitutional amendments and there's only two choices, so your choices are going to be a null space, a 1 or a 2.

Most of the time -- most of the work I've seen with that was that generic. It was literally just contest 1, selection 1; contest 2, selection 2; contest 3, selection 3. There was no real down-in-the-weeds specific -- as I change the database, this changes. That

way it was probably really, really easy for the guys writing the code on the other side to not have to try to extract data database by database to make that happen. Now, that's not to say that this might not be something that happens in the future, but I think where I have seen most of the technology for this, that's kind of where it is.

MR. KELLEY:

Neal Kelley. I just wanted to add, I'm wondering if this is part of 1.1 already because in the documentation for our current voting system -- actually, it was before 1.1 -- that mapping is laid out in the documentation. So maybe that's just a best practice that the manufacturer is following, and you're looking for it to be a requirement.

MR. WACK:

Okay.

COMMISSIONER HOVLAND:

Unless there are objections or maybe we can revisit this in our recap time, to be cognizant of the fact that we're somewhat close to schedule. We are scheduled to have a break, and for those of you enjoying the webcast, you'll be pleased to know that by not being here in Silver Spring you don't have limited access to only one restroom.

[Laughter]

COMMISSIONER HOVLAND:

So I want to be conscious of that and make sure that we get through our break and keep on schedule. So let's say back here at 3:05. Thank you.

[The Committee recessed at 2:48 p.m. and reconvened at 3:05 p.m.]

COMMISSIONER HOVLAND:

We're back with our last section of requirements for the day, possibly the most exciting, so I hope everybody is ready to go. We've got Gema Howell hear from NIST to walk us through the cybersecurity requirements. That should be exciting, and we appreciate you being here.

[Laughter]

MS. HOWELL:

Thank you, Chairman Hovland. Yeah, I'm going to have to disagree with John Wack. I think my section is the fun section.

[Laughter]

MS. HOWELL:

For those of you who don't me, my name is Gema Howell. I am the lead for the cybersecurity work on the NIST voting team here to talk about the cybersecurity requirements, first, of course, starting off with how we got here.

So we referenced the VVSG 1.1, as well as the recommendations from the 2007 VVSG. We also kept in mind new innovations in security in general, as well as new innovations in the voting space. Sorry. I forgot my glasses. I was wondering why the slides were blurry. And then -- I'm sorry. And then last but definitely not least, you know, collaborating with the cybersecurity public working group, getting feedback from them and reviewing the requirements.

All right. Where to find these requirements, the majority of our requirements are in Sections 9 through 15, and we also have some in Principle 2. Ben Long went over those in the high-quality implementation. We helped out with some of the software security requirements there. And, as mentioned before, there's definitely some overlap in some of the other areas, and we collaborated with those -- with the other areas and the rest of the team to kind of address where some of those requirements should fall or maybe just point or reference some of the overlap or repeat requirements where you would get the core information for that.

All right. So I'm just going to jump right in. The format for reviewing the requirements that I'm going to do is basically talk about the high-level principle, what that's about, then step through each guideline, give a high-level overview about what that's about,

and then highlight some of the requirements in there, especially some of the significant updates or changes in those areas.

All right. Principle 9, this is all about auditability. This is a section dedicated and focused to machine support for post-election audits, and there's an overview of the number of guidelines and requirements in this section.

9.1 I think has the most requirements out of all of our sections. This one is specifically focused on software independence. In the actual guideline itself is the definition of software independence, so an error or fault in the voting system software or hardware cannot cause an undetectable change in the election results, very first requirement in there is the software-independent requirement.

Then the next one following talks about different options for how to accomplish software independence. We list the paper-based option, which folks are well aware of, and we also call out the cryptographic end-to-end verifiable option as well. The things that are important here are that they're the records there for voters to verify, as well as the auditor to verify. And with the end-to-end verifiable systems, they have an additional cryptographic verification option for voters to check their information after it's cast, and so we make sure we included that there.

All right. Now we're into 9.2. This is about making sure that the audit records are available. Towards the beginning we have the general post-election audit procedures, making sure that information is available for auditors so they know what information to look for and to use. Some common things that should be included here are the generation of CVRs and the number of ballots.

Moving on to 9.3, 9.3 has a single requirement that actually points to the data protections. This is about protecting the audit records. And it points to the data protection guidelines 13.1 and 13.2, which talk a little more in detail about specific ways to protect those types of documents -- I'm sorry, those type of records.

9.4, 9.4 is the last one in this section. This one is covering support for efficient audits, so making sure that you have the necessary material and information available to perform certain types of audits like risk-limiting audits, having unique ballot identifiers available to find a ballot that you may be looking for and support to handle multipage ballots as well.

That's it for the auditability section. Any questions before I go on to ballot secrecy? Gives me a chance to change my page.

Yes?

MR. WALLACH:

So a quick question about unique ballot identifiers --

MS. HOWELL:

Um-hum.

MR. WALLACH:

-- so like the State of Texas requires this ballot shall be numbered, whereas I believe California explicitly forbids this for -- how do you square that in a standard?

MS. HOWELL:

We have a requirement in the ballot secrecy section that says the aggregation and ordering of the ballots should not be able to allow -- I'm sorry, the -- it -- it's talking specifically about the identifiers and that you shouldn't be able to re-create the order the ballots were cast. Does that kind of address what you're talking about?

MR. WALLACH:

Well, I mean, I guess -- so for Texas this could be straightforward. You print a number on the ballot, you're done.

MS. HOWELL:

Um-hum.

MR. WALLACH:

To satisfy the California requirement, you would have to not print it on the ballot where the voter could see it. Then you'd have to add it in later somehow.

MS. HOWELL:

Oh.

MR. WALLACH:

So I'm just curious if the standard is contemplating the differences in State regulations --

MS. HOWELL:

The time and when that information is put on the ballot. I'm trying to think if we have a specific -- that exact question has come up on the -- on our working group call, and we discussed that and I'm trying to think if it was in a specific requirement. Nothing that says when the information is printed, I don't think we have anything specific on that, but let me make a note.

MR. KELLEY:

This is Neal Kelley. I'm assuming that, just reading this, it just has to have the capability to do that.

MS. HOWELL:

Right.

MR. KELLEY:

And you rely on your regulations and your State law to govern that.

MS. HOWELL:

Right.

MR. KELLEY:

Right?

MS. HOWELL:

Yeah. Yeah, that's the way -- I think it may be an external process that determines that, but, yeah, in these -- in the auditability requirements, it is specifically just that it has to have that capability.

MR. LUX:

Well, and, Dan, I think in 9.1.5-F, unique identifier, each paper ballot counted may contain a unique identifier which can be printed on the ballot or affixed by some external mechanism. I think that kind of addresses, I would presume, what you're talking about for both you and North Carolina. So may contain, and then how you do it would be a State-dependent issue or --

MR. WALLACH:

Well, exactly. I mean, Texas isn't going to purchase a system that doesn't do what they wanted to do, and this will give the people submitting it to the VSTLs the wherewithal to say, well, because we want to sell this system in Texas, this system is going to be able to turn this function on or off at their will.

MR. COUTTS:

McDermot from Unisyn. I just wanted to -- wonder if we talked about the fact that you're basically putting a ballot underneath the printhead either before or after it's scanned and left the voter's hands?

MS. HOWELL:

Kind of getting back to what he's saying, the timing and when that number is printed, is that what you're asking? Or maybe I don't understand.

MR. COUTTS:

No, because what's that printer doing? Are we sure is just putting a number on there?

MS. HOWELL:

Um-hum.

MR. COUTTS:

I would like to know. So you're basically -- you're -- I think you might be putting additional risks on the ballot by force -- by making them mark each ballot individually, and that may be a risk that some States don't want to take.

MR. WAGNER:

Dave Wagner here. McDermot, could you clarify for me which requirement you're referring to?

MR. COUTTS:

Sorry, the -- doing the risk-limiting audits, unique ballot identifiers -- that's 9.4-C -- and putting them on a paper ballot. And I know that we've had the discussion before about, in a risk-limiting audit, needing to come back to the physical ballot, but there are risks associated with that, too.

MS. HOWELL:

So looking back at this requirement, it's not that the voting system is printing -- it's printing an identifier during the audit. It's that there is a way -- I'm trying to think of how to describe it. It's that there is a unique identifier to allow them to -- I guess I'm wondering how they find -- how do they traditionally find the ballot now?

MR. COUTTS:

Sorry, it's a tough problem. You're basically, you know, damned if you do, damned if you don't.

MS. HOWELL:

Um-hum.

MR. COUTTS:

I'm not -- unfortunately, as much as it's against my policy, I am not actually putting out a solution in this one, just putting out a problem.

MR. GILES:

Hi. This is Bob Giles. So I guess the issue is if you want to do what's called a comparison audit, you want to compare the actual ballot to the cast vote record, you need a unique identifier on the ballot at the time in order to compare it to the cast vote record. So if you want to do that, then your system has to print something on the ballot at that time. That's -- so that is a huge discussion

going on right now nationally when you talk about risk-limiting audits is how can you do a comparison audit if the equipment doesn't identify the ballot so you can take that ballot and compare it to the cast vote record, so you have to just do -- you know, there's other types of audits, polling audits, stuff like that, but -- so I guess the discussion is do we just make it available, that if a jurisdiction wants to do that but the concern is -- and I get what you're saying, that if it's a ballot-marking device and you're putting it in after, could it add votes or could -- you know, to, say, a hand-marked paper ballot where there's ovals. Is it possible to then start filling in ovals because now you have a printhead in the scanner? I guess that's one of your concerns. So I guess it's a discussion item for sure.

MR. KELLEY:

So Neal Kelley, if I could just add, so we had to do a ballot pulling audit in Orange County when I did our 2018 risk-limiting audit pilots, and two million pieces of paper is a huge challenge to go down and try and find those ballots. You have to scan them in a specific order, you have to keep them in batches. It's a very organized process to do it, but you can. And I think there are a number of jurisdictions that are going to be on legacy systems that are still going to have to be doing ballot pulling audits if they're going to do RLAs. I mean, they're not going to be doing comparison audits.

So -- but to -- really quickly on the point of California, currently right now I still couldn't go in post-election and add that number to the ballot. You know, they've had -- they're working through the regulations right now for the RLAs in 2020, and I think hopefully they're going to sort that out. But I would like to have that capability.

MR. WAGNER:

Dave Wagner. McDermot, I agree that it is an issue. And I'm curious whether you would -- it sounds like you don't have a solution you propose. We did discuss it on the cybersecurity working group calls, and I remember having some discussion about it, and there were some folks who were arguing for requirements to address this like, for instance, required to ensure that the hardware can't place voter marks. Maybe the printhead is at a location that's not aligned with where the voter marks are or it's in a different color ink or, you know, people talked about candidate, you know, mechanisms one could envision, and I think there were some people who were advocating for a requirement -- adding a requirement to say the voting system has to be designed so that can't happen. Would you advocate or propose that we ought to add such a requirement? I think it would be possible.

MR. COUTTS:

I'm not sure I would advocate for that. As somebody who would actually have to build one of these, it's going to take a lot more thought. And basically any constraints on the design is going to be a problem.

MR. LUX:

Well, this is Paul Lux from Florida. And I can tell you that, you know, historically -- and I say this anecdotally because I saw a long time ago an old voting machine for sale, and it had a hand crank that you stuck your ballot in and you hand-cranked it, and then inside of that was a -- an inking mechanism so that each ballot that was officially put into the box was inked so that I guess, ergo, you couldn't like swap the box with another box or whatever.

I know that my current high-speed scanner has the ability for me to turn this on so that I can differentiate between this stack of ballots which has been through the tabulator and this stack of ballots which has not. Now, I do not use it that way, but I understand that it can do it if it chose to do so or we programmed it to do so. So it isn't that it doesn't exist, but in that case, again, it's leaving a very small -- I think it's red ink, which, you know, I mean, it's the same mark goes in the same place when the same blank ballot goes through so you know looking this is the only place it should be putting on a mark. So, I mean, it's not insurmountable certainly I would think, given our current technology.

MS. AUGINO:

I would add -- this is Lori Augino. I prefer the -- applying the unique number at the point you are tabulating or scanning because I like to avoid having unique numbers on ballots before they're voted. So I would want to not specify when so that we would still preserve the ability to do that. And I think scanners have had that kind of technology in place, and using something like red ink or orange ink to be able to do that and having it in a fixed location makes a lot of sense to me. In practice, I think that an election official would know where to go to look for that. So I would like to preserve the ability to do that at the point of scanning.

MR. GILES:

This is Bob Giles again. And I think we're heading down that road, so to -- kind of to Neal's point, it would change the way you do the risk-limiting audits. Instead of the system telling you to go pull the ballot, you would -- it would reverse it because you have the information in the cast vote record. Instead of pulling a specific ballot by number, you would -- it would say pick the third ballot. You could take the third ballot, enter that number in, and then that would go and grab the cast vote record instead of it going the other direction.

So we've been talking about that. So I think the ability to do that needs to be there in case we get to a point where people are

comfortable with some kind of randomized number that couldn't be tracked back to the voter at the -- I'm thinking this is a polling-place issue more than a central-count issue because there are -- the ballots are already randomized. They're opened up and just thrown into a big file, so you don't worry about it in a Colorado-type model.

So I definitely think it's a discussion because to me a comparison audit gives me a lot more valuable data than a polling audit because you're comparing it and saying, yep, the machine counted it the way it was supposed to because I can look at two different things, the paper and the cast vote record. So I think we need it in there but not to be so prescriptive that down the road if we come up with a way to do it that we can test to it but not, like you said before, after, I think we need that flexibility.

MS. BRADY:

So this is Mary. So where does that leave us? Are there proposed changes?

MS. HOWELL:

The current requirement doesn't say at what time it happens. It just says that that information needs to be made available, which may lean towards what Bob was saying.

MR. WALLACH:

So -- Dan Wallach here. So 9.1.5-F says that it may contain an identifier which can be printed, so the standard doesn't specify

when, nor does it mandate that it must. Merely it states that it can without saying when. Does that then satisfy different State requirements? I think it does. So maybe we're okay.

MS. GOLDEN:

Obviously, I don't have a dog in this fight, but just FYI from an external perspective, it seems to me like that standard you just read but then you put that next to 9.4-C where it says the voting system must, and the -- and it's not really that statement, but it's the title that says unique ballot identifiers. That seems to be a "shall," and the other one seems to be a "can/may." And they seem to be overlapping, and one's mandatory and one's an option. So to me just from an implementation that's the problem. Something needs to be clarified between those two.

MR. CHOATE:

This is Judd.

MS. GOLDEN:

Unless I'm misunderstanding.

MR. CHOATE:

So I read 9.4-C to require that 9.1.5-F be --

MS. GOLDEN:

An option?

MR. CHOATE:

-- you know, an option. So it may be that 9.4-C is unnecessary or duplicative, but 9.1.5-F is the important one.

MR. WAGNER:

Dave Wagner. I was interpreting a little differently, so I'll share with you my interpretation. My interpretation of 9.4-C might be a little clearer if it had a different title, was that 9.4-C was a technology-independent way of saying the system has to have this capability. Now, right now, the obvious way to meet that would be with an identifier printed on the ballot at some point, early, late, whenever, so that's the connection. I interpreted that as anticipating there might be other ways to achieve it.

And another example -- I'm not advocating is a great way to do it but another example way to do it would be to remember that was the seventh ballot in the stack without any identifier on the ballot. That's a pain to use for an election official. It's another way to achieve it. There might be others that we're not thinking of right now. I don't know. So that was what I -- I interpreted 9.4-C as a "shall" and saying you must have some capability, I don't care how you do it. And then the earlier one, the 9.1 whatever, was about that you're allowed to use ballot identifiers. Nothing should be treated to prohibit them.

MS. HOWELL:

Yes, this is Gema. I think it may just be a name -- I agree, it may just be a name change. That identifier is what's causing the confusion. But the actual requirement just says that they need to be able to uniquely address the individual, so how that's done could vary.

So I have a note to make --

MS. BRADY:

So you're suggesting a name change for 9.4-C?

MS. HOWELL:

Yes.

MS. BRADY:

To?

MS. HOWELL:

Uniquely address ballots? How are folks feeling about that?

Or --

FEMALE SPEAKER:

Or addressing individual ballots.

MR. LUX:

And this is Paul again. And let me ask Dan another question then about how Texas does it and the need for that identifier because as we get ready to roll into Principle 10 about ballot secrecy where there are all kinds of prohibitions against it, I note that these prohibitions are mainly against the voting system not

making that association with the voter, which of course, since I don't record any voter registration data into my voting system, mine couldn't possibly do that. Any association of a voter to a ballot is done externally to the voting system based on, you know, whatever number you preprint on the ballot that gets assigned to that voter and gets recorded somehow. To me, that's more a function of your voter registration system, which I don't think we're talking about here.

MR. WALLACH:

Well, I'm -- without getting lost in the details of how Texas works, I'll try to give a super brief summary. I believe it's in the Texas Constitution and it says ballots shall be numbered. And that has been interpreted to be very, very -- I mean, to allow for lever machines where there's no ballots per se. So the interpretation of that phrase is broad.

When you have bubble ballots, the interpretation is that voters -- like they'll have multiple blank ballots on the table that are the same, and then the voter -- they'll tell the voter take any one you want. And that way they don't know in advance which one the voter will select, and then they'll replace -- so there might be three on the table, might be five on the table, but you get the idea. So -- and that way there's no binding between a voter and an ID number. But the numbers are preprinted on the ballots like serial numbers.

And I'm -- I could contemplate that the State of Texas could -- because of a prior broad interpretations of the requirement could well allow for other styles, print the number later, et cetera. How's that for total vagueness?

MR. LUX:

Whereas with the North Carolina model, they actually have a requirement to associate the voter with the ballot number because if they later on determine you should not have voted, they will go get your ballot and remove your votes from the totals, which is a completely different animal than just about every other State. And so of course in that instance, again, that association probably is not being done by the voting system itself because the voting system doesn't require voter registration data necessarily beyond just numbers for statistical calculations that I'm aware of anyway.

MR. WAGNER:

Dave Wagner. If we're ready to switch topics a little bit --

MR. GILES:

I just -- I'm still a bit confused with 9.4-C. I mean, regardless of how you word it, the voting system, however you say, enable election auditors to uniquely address individual ballots, I'm just not quite sure if you don't put a number on it, then it's -- you're -- unless you're doing like just a random sampling kind of like -- you're not -- I don't get how you address an individual ballot if it's not uniquely

identified because it's -- you can't compare it to the cast vote record.

MR. WAGNER:

Dave Wagner here. One alternative that has been used, it's not great from an election administration perspective -- is to not have any numbers on the ballots but to remember this was the seventh in the stack. And if they're not shuffled or reordered, that can also be used to uniquely --

MR. GILES:

But --

MR. WAGNER:

-- address individual ballots.

MR. GILES:

But you're still never actually -- because that doesn't work at the precinct because they all drop in.

MR. WAGNER:

It doesn't work in a precinct.

MR. GILES:

You know, so the --

MR. WAGNER:

Without --

MR. GILES:

--I think the central count is fine. I think the issue we're having as those that do the precinct or polling level, how do -- do risk-limiting audits or comparison risk-limiting audit at the precinct level is the big debate. So if you don't put a number on it and they all just fall randomly into the container, there's no way to do -- to individualize those back to the cast vote record.

MR. WAGNER:

Dave Wagner. That's my understanding as well is that at the precinct level the only two options that I know of currently are either a unique number on the ballot at some point, printed at some point maybe preprinted, printed right after it's scanned, printed during tabulation, or rescan the ballot centrally.

MR. GILES:

And that's -- and we did some pilots in New Jersey, and we've rescanned them using a central count and putting the number on after and then we compared the record back, which does not work with two million ballots, to rescan two million ballots. So I'm just not quite sure what this particular section then means. If you can't tie it back, then it -- to me, it's just a ballot. There's no way to uniquely tie that back to anything.

MR. COUTTS:

Other than electronically.

MR. GILES:

But even then -- like there's just -- you're just -- then you're into the polling audit where you're just saying, well, we're going to do a random sampling of these, and if the result's kind of the same, then we say -- so that's not a -- you know, that's all we can do with that until we put it -- or if we put a unique identifier on.

MR. WAGNER:

Dave Wagner. I think, Bob, you're absolutely right to keep pushing on this and to highlight what the implications are because I think that the implication of this requirement is that to -- what we know how to achieve today from precinct-based systems require -- would effectively require unique numbers on the ballot. It's not -- it leaves open the possibility if we come up with some other way in the future, that would also be acceptable. But given what we know today, that's how we would know how to achieve it for the precinct-based system. So if we're uncomfortable with requiring that, then you should be uncomfortable with 9.4-C.

MS. AUGINO:

I think I heard a suggestion to remove 9.4-C because the language was sufficient in -- remind me what it was.

MALE SPEAKER:

9.1.5-F.

MS. AUGINO:

9.1.5-F.

MR. WAGNER:

Dave Wagner. It's certainly not duplicative. Removing 9.4-C would be a substantial change. The 9.1 is not redundant. It -- 9.1 doesn't require anything. So there's a big change here of whether or not to require this, which provides support for efficient risk-limiting audits, but presently would require unique numbers on the ballots for precinct-based systems or not require it and not require support for the efficient risk-limiting audits.

MR. KELLEY:

Neal Kelley. I'm not sure why this is even a big issue because you can turn that on or off in a system, right? And you again go back to State law or regulations that would allow you to do that or not. So what difference does it make whether we require it or not? Does it? Is someone afraid they're going to leave it on?

[Laughter]

MR. GILES:

You leave the lights on sometimes, don't you?

COMMISSIONER HOVLAND:

Or turn them off.

[Laughter]

MR. GILES:

But not here, clearly.

[Laughter]

MR. GILES:

I set you up. You're welcome.

COMMISSIONER HOVLAND:

Thank you.

MR. GILES:

So -- and -- well, yeah, I mean, we can leave it out. I just want to make sure it's broad enough that it gives manufacturers and jurisdictions the flexibility to either use it or not use it. But -- and I just had one other question going back to 9.1.5-F. When you say, "or affixed by some other external mechanism," what does that actually mean when you say -- like so you have the equipment. You run it through the scanner. What is external mechanism?

MS. HOWELL:

I think this -- oops, sorry. Okay. I think this -- I think some alternative methods were talked about as far as how this identifier would be added. I'm trying to think of -- and trying to think of one whether it's just writing on there or something like that, but that wouldn't be -- this is all voting system-focused, so each paper ballot that is counted may contain a unique identifier which can be printed on the ballot or affixed by some external --

MR. WALLACH:

So this is Dan Wallach. I can invent a bunch of crazy things that may or may not be practical. You could put a sticker on. You could --

MS. HOWELL:

Yeah.

MR. WALLACH:

-- like have a little stamp that's like a raised stamp so, you know, it changes the height without putting ink on it. We can invent all kinds of other ways of putting a number on a ballot. Whether it's good or bad is a whole other discussion. But there shall be a way of associating a number with. I mean, it's -- I hate passive voice like that, but maybe that's the right approach.

COMMISSIONER HOVLAND:

To try to tie these together, which I may miss the mark, and to Neal's point earlier, I mean, is the general piece of this that 9.4-C says a machine should be capable of this? And then, as Neal said, whether or not a jurisdiction utilizes that is up to them. And then the 9.1.5-F says this can be affixed at different parts of the process. So I guess I could see -- I mean, depending on the system you're using, you know, is that done in the scanner? Is that done earlier in the process, I mean, when you're taking in the whole system or you're not because your State law doesn't allow you to? I guess is this accomplishing the ability to have systems manufactured that if

your State law allows for a ballot comparison risk-limiting audit, that the excuse is not, well, the machine won't do it?

MR. GILES:

Yeah, and I guess my question is the way it -- and maybe I'm just not reading it right. The way it reads to me is -- and that is somewhat confusing is "which can be printed on the ballot or affixed by some other external mechanism," which to me means not the equipment that you're using. So if you're running it through a scanner and then you're saying the code or whatever, the number comes from some other external mechanism, that's where the verbiage to me sounds confusing.

MS. HOWELL:

Because it wouldn't be part of the voting machine.

MR. GILES:

Because it wouldn't be part of the voting machine.

MR. CHOATE:

Well, I don't like that.

MR. LUX:

Yeah.

MR. CHOATE:

So if Bob's version is right, I don't like that.

MR. LUX:

Well, but -- so 9.1.5 is just about the paper records, and I think this kind of speaks to what Neal was talking about, whereas 9.4 is about the voting system supporting efficient audits, which, as David said, may mean exterior software that should be able to go in and do something or it may be internal to the system but supporting the audit. So, again, I don't see them as needing to be -- I don't see them as redundant, and it looks like in the sections that they're in, they are mutually exclusive.

MR. GILES:

And I don't have an issue with that. It's the external mechanism. It sounds like it's something other than the voting machine itself is going to put this mark on, so it's -- it does -- go ahead. Maybe somebody else can clarify.

MR. WAGNER:

Dave Wagner. Let me make a proposal and see if it makes you feel more comfortable. What if we got rid of "or affixed by some other external mechanism"? I think that that has no effect, but I think it's causing us to go down a side path, so let's just get rid of it. This requirement is intended to say, hey, you're allowed to do something, and probably you don't even need that requirement.

MR. GILES:

Um-hum.

MR. WAGNER:

The standard doesn't prohibit it. Yeah, you're allowed to do it, but it's just clarifying just in case you were wondering, we really do mean you are allowed to do this. So we could just get rid of that part of the phrase that said "or affixed by some other external mechanism" if that made you feel more comfortable. Do you think that would be a good resolution?

MR. GILES:

That works for me. I don't know about the rest. We knew we brought you for a reason, David.

[Laughter]

MR. WAGNER:

Not just because I'm pretty.

MR. GILES:

No. Well, sitting next to Paul, it's pretty easy.

[Laughter]

MR. GILES:

And it's going downhill now. I'm sorry, Paul.

MALE SPEAKER:

It's past three o'clock, so --

MR. GILES:

Yeah, it's late.

[Laughter]

MR. GILES:

Sorry, Paul.

COMMISSIONER HOVLAND:

That was meaningless banging.

MR. LUX:

I don't take it personal.

MS. GOLDEN:

So I don't know if I can suggest this if it's reasonable to do this or not, but you guys know my concern about the whole software independence is going to be read as paper and, you know, you've laid out that, yeah, it's paper ballots or it's end-to-end -- the mystery of end-to-end. Is it possible to write, as you say that at the very end of that discussion section, note "see accessibility requirements related to paper" so that, I mean, you know, you had 93 percent of your comments which were hand-marked paper, banning codes, you know, blah, blah, blah. I mean, that's going to be the first thing that's seen in here. This is a paper mandate finally. And nobody's going to go look at the accessibility part.

So, you know, you're -- you've done a nice job laying out what software independence means, and right now, that's paper ballot, but that doesn't mean you can slap a paper ballot and forget the accessibility. That's not going to fly.

MS. BRADY:

So --

MS. GOLDEN:

As it has for --

MS. BRADY:

So perhaps by just using the related requirements clause
and then pointing over?

MS. GOLDEN:

Yeah, just saying --

MS. BRADY:

Okay.

MS. GOLDEN:

-- see accessibility requirements, whatever, whatever, six
and -- yeah. Yeah. Or please note, really important to see this
stuff, yeah.

MS. HOWELL:

I like that. That was a good point. Any other questions in
this area? Yes.

MR. WAGNER:

Dave Wagner. You're probably tired of hearing for me. I
wanted to highlight two other issues that I think members of the
cybersecurity working group would like to see raised here or for
your awareness, so I feel -- Gema can't really bring them up, but I

would like to. The first is regarding -- or I don't know if Gema can, but it's kind of outside of her scope.

The first is -- I interpret as outside of the scope of the standard, but there were many people on the cybersecurity working group who really would like to see an efficient, fast way to do security patches to -- up -- when there's some security problem found in the system or in the -- maybe some COTS software the system is using, we're used to on our own personal machines in our phones that we get updates all the time, like it to be feasible to prepare a security update and get that certified in a reasonable amount of time.

And I know that this is really a matter for the EAC's process. I know the EAC already has a process. I think there was a lot of concern that could this be made even lighter weight so that we could, you know, kind of reduce the burden on manufacturers and the time for election officials to get these updates. So I wanted to highlight that for -- to convey to the EAC as something to look at that we think would help with security.

COMMISSIONER HOVLAND:

I would say I appreciate that. I know that in sort of respect for our time if that seems applicable somewhere to the requirements here, I'm happy to discuss. If that is more of a

practice and process, I have taken note of that, and I'm hopeful that we are going to improve those things.

MR. WAGNER:

The second that I wanted to highlight was there's been recently a lot of discussion in the working group about this technical issue related to presentation attacks on ballot-marking devices. And it's a -- kind of a tricky thing. It's related to something McDermot brought up earlier, which is on a ballot-marking device, depending on how the design of the ballot-marking device works, it might be that you are given a chance to inspect the ballot after it's been printed, confirm everything looks right, stick it in the machine, and depending on how the paper path works, it might go past the printhead again a second time. And so the concern was that the -- if there's some malware or something's gone wrong, the machine -- you know, you could potentially change the marks that are on the ballot after it's been seen by the voter.

And so there were some folks in the working group who would've really like to see requirements in there -- I don't believe we have them currently -- that would mandate something about how the paper path works so that the hardware design prevents that from happening so that after the voter has inspected and accepted the ballot and submits it, that it doesn't pass by a printhead that could change the marks or add new marks or modify it, given what

the voter has seen. That's -- it's a little bit of a can of worms, but I did see a bunch of discussion.

MR. GILES:

This is Bob Giles. Yeah, and we've heard that as well, that that is a concern, so I'm open to discussing that definitely because then that takes away one of the concerns with ballot-marking devices or even any -- yeah, any kind of system -- I mean, it could be oval system. It could just be, you know, human readable, however, but if it passes through that printhead a second time, it does open that theory up. So, you know, I'm definitely open to a discussion on that.

MS. GOLDEN:

This is Diane. And my concern is, as I'm listening to this, I think we've -- trying to address that is going to somehow complicate, again, the paper-handling mechanism, which is, quite frankly, a bigger problem than the verification of print, you know, the fact that you've got to take print in either -- out of the QR code content or out of OCR out of text or whatever, then convert that back into some accessible form so somebody can accessibly verify the print on the official ballot. I mean, that's challenging enough.

But when you introduce the whole paper handling, when you realize you can't ask somebody that has quadriplegia to handle a ballot, they can't be asked to pull it in and push it out and move it

from this tray to this tray to this one's marking so now I'm going to scan it over here so it's a separate from -- and all of that. That has to be automatic paper handling. And if you introduce that, it -- I mean, it's complicated enough to make the automatic paper handling more -- without complicating it yet again.

So, I mean, that's -- and I've said to people all along what's -- what breaks most often inevitably on a printer, it's the paper jams, it's the paper handling. It's not going to be -- I -- that is so complicated when you're worried about the same box hardware holding different things and having to segregate and marking from verification from casting when you're talking about accessible paper movement.

MR. GILES:

And I understand that, but the flipside is the theory that some -- so we're kind of caught in this security versus accessibility discussion, again, that we keep kind of finding ourselves in. And I don't know if it's -- again, it's the pathway that comes out of the printer, but when it goes back, it goes a different pathway. And I kind of defer to McDermot on these kinds of questions to say how feasible is something like that to build?

MR. COUTTS:

Oh, it can be done, but if it moves, it'll jam.

FEMALE SPEAKER:

Yeah.

MR. GILES:

But, I mean, it's obviously moving already. It's just you're adding -- instead of going back up past one, it would have to just follow a different path to drop into the bin, so it never goes past the printhead again. And I get that. And I think that it's an important thing to get rid of that whole, you know, theory that if -- whether -- if it's an oval ballot that is being done and you don't vote all the races, you send it back through, and now it's going to fill in those races if there is some kind of malware on there to tell it to do that. But if it doesn't pass the printhead again, that can't happen, so that gets that argument off the table.

MS. GOLDEN:

And, again, I mean, if it can be done without creating yet, you know, a right turn for the paper handling mechanism, you know, kind of thing, and my theory is the folks who are really worried about that, if they can't see it and know it's separate, they are not going to buy it anyway, you know, because typically when that argument -- what, what, how, what -- I mean, it was the whole -- literally, the verification had to be separate hardware, separate. It had to be physically moved from one box to another because they had to be physically separated, not internally separated like you're saying the, you know, printer had to shield it

from -- if they can't see it, then it's separate, then that's not going to, you know, float. So, I mean, I don't know. It going to be -- it's hard enough to just deal with the paper-handling issue, so --

MR. WALLACH:

So Dan Wallach here. We needed to break the discussion into two classes of ballot-marking devices, so one class is where the ballot-marking device and the ballot box are in the same station. So the other class is where the ballot box is physically somewhere separate. So in the former case is where this is a much more pressing concern because paper path engineering might mean multiple passes past the printhead. In the latter case, this really -- you know, we have an accessibility concern, but we lose the security concern, you know, because now the ballot box has a scanner on top, et cetera. So whatever -- I don't think we can make one-size-fits-all considerations here. We need to talk about these two classes of machines separately.

MS. GOLDEN:

It's actually in addition to because that's like step one and three but there's verification in the middle, so that's another -- so it's not just a separate ballot cast box. It's the fact that to verify the printed ballot literally it has to shift from the printer head that marked it now to some sort of scanning system that's re-displaying and rereading, so it's a second step. And, you know, the

arguments I've always heard is that's got to be separate, too. It's that you have to separate all three functions so that once it's marked, it can never pass through again, so that's, again, paper handling from marking to verifying. And if that has to be in a separate system, that's -- or somehow the printer is shielded, I don't -- you know, so it's actually three steps. So just separating the cast ballot, you know, a precinct counter, which, again, that's -- which goes back to that whole issue if you do have a precinct counter and that is where everybody else's ballots are going and the only one accessible machine is the one where it's being cast there, then you've got a whole other set of issues with privacy and, you know, because -- yeah, so --

COMMISSIONER HOVLAND:

I might just jump in real quick. Gema, I'm not exactly sure where you are in the scope of your presentation.

[Laughter]

COMMISSIONER HOVLAND:

We have about an hour left, which includes some time for wrap-up. In your presentation we have about a half hour if we were going to stick to schedule. And so, you know, some of this may be either conversation for the latter half or tomorrow or afterward. I just want to make sure that we get through your presentation before we go down very long rabbit holes.

MS. HOWELL:

Okay. I have about five more principles to go through and then the open areas, which I'm sure will be -- there will be a lot of discussion there, so I'll get through these.

So Principle -- I'm sorry, already down to 15.

[Laughter]

MS. HOWELL:

I'm trying to jump ahead. We're going to run out of time.

Principle 10 is ballot secrecy, two guidelines here, 20 requirements.

This section, as -- similar to what Sharon mentioned, this is the section that distinguishes ballot secrecy from voter privacy, so voter privacy is in Sharon's section. This section is focused on ballot secrecy, which is about maintaining the secrecy of how a voter voted.

10.1 is very straightforward, the no voter identifying information is accepted, processed, stored, or reported, only requirement that we have in there.

10.2, this is all about preventing the association of a voter to their ballot selections. Something that I want to highlight here that we'll talk about more in the open area is the indirect voter association requirement. This is a requirement that is geared towards -- that is written specifically for paperless systems, and it is how a paperless system would handle a provisional ballot. So an

indirect voter association would be assigned to that provisional ballot, and once eligibility is determined, that indirect voter association would be removed.

Any identifiers used for audits would not be able to link a voter to their selections. This is the requirement that I mentioned earlier, aggregating -- 10.2.2 is aggregating and ordering, so ensuring that you can't re-create the order in which ballots were cast.

The last one I want to highlight here is specific to an end-to-end verifiable system, so the voter receives some type of information that they can use later -- I hear we call it receipts -- to verify their selections after they cast and just ensuring that those sheets don't contain any voter-identifying information, as well as does not allow a voter to prove how they voted. That was it for ballot secrecy.

MR. GILES:

And just to be clear, so that was --

MS. HOWELL:

Sure.

MR. GILES:

-- all paperless or --

MS. HOWELL:

No, no, no.

MR. GILES:

So --

MS. HOWELL:

Just 10.2.1-B, anything on a direct voter associations --

MR. GILES:

So --

MS. HOWELL:

-- is talking about a paperless system.

MR. GILES:

So I guess this is where the conflict will -- so in --

MS. HOWELL:

Um-hum.

MR. GILES:

-- 10.2.2-E, must not be able to re-create the order in which the ballots were cast, so then if we are putting a unique identifier on there, it has to be randomized so you can't identify that -- I can't go back and say -- figure out that that was using some formula or if I can hack into it and say, okay, now I know that's the seventh voter. Now I can go back and I have somebody at the polling place checking the order of voters on that machine. So this is the theory. I'm watching and I know what number you were at the machine. If I can get into this software and figure out that unique identifier, that was the seventh one generated, the eighth one generated, the

ninth one generated, are we saying -- is that -- is there a capability of doing that where you can't get in and do that, that as far as keeping it completely random?

MR. WAGNER:

Dave Wagner. Which requirement again?

MR. GILES:

So --

MS. HOWELL:

10.2.2-E.

MR. GILES:

So 10.2.2-E, must not be able to re-create the order in which the ballots were cast.

MR. WAGNER:

Dave Wagner. My understanding is that talks -- that's talking only about aggregating and final totals.

MR. GILES:

And what?

MR. WAGNER:

So information may --

MR. GILES:

So if you're going to use this for auditing purposes and you're putting a unique identifier on the ballot, if there's any way -- and it's just randomly generating this number throughout the day, if

there's any way to go in and figure out that formula and say now I know this was the seventh number generated and I tracked the voters going up to the machine, I can say I know you're the seventh voter. If I can figure out that that was the seventh number generated, then I know how you voted?

MR. WAGNER:

So your question is whether that's prohibited?

MR. GILES:

Well, no, is that possible to -- are -- that we can create a number that can't be traced back to the order?

MR. WAGNER:

I would have --

MR. GILES:

Is it --

MR. WAGNER:

Dave Wagner. I'd have to --

MR. GILES:

Yeah.

MR. WAGNER:

-- dive through the requirements again to know exactly what they say about this, but I would certainly suggest as a good design principle that if there's unique identifiers, they should be random. And if they're random, then it takes this issue off the table.

MR. GILES:

Well, I guess my question is when you say random, it's an algorithm that's creating the random number.

MR. WAGNER:

Ah, so --

MR. GILES:

So if I can figure out the algorithm, I can figure out the -- what is supposed to be the random number. Is that --

MR. WAGNER:

So it turns out that there's different kinds of algorithms for generating random numbers. And some of them are the way you described.

MR. GILES:

Um-hum.

MR. WAGNER:

They're more or less like a disguised serial number. You can reconstruct the order, and some of them aren't. So true random number generators or cryptographic random number generators, you won't be able to reconstruct the sequence in which the random numbers were constructed. You won't be able to predict future ones.

MR. GILES:

So I guess then -- and maybe we needed to be more detailed because that is the concern of putting a unique identifier at the precinct level, that you could in theory with a little bit of work do that. So I don't know if we have to call it out specifically that it must be a certain type of randomized number in order to protect that because then I think people are more comfortable using it at the precinct level, and then we can get into comparison audits and using it for risk-limiting audits. If the -- you know, the computer scientists say there is no way to re-create that number or find that order and we're not going to go and do this and have somebody come up with the conspiracy theory to say, well, now I can figure out how everybody voted. So that's the -- because if you can't, then that's in conflict with the auditing style.

MS. HOWELL:

Yes, this is Gema. And it may be a good point to point back to a requirement in the audit section. So in the audit section in 9.1.7-C we talk about the random number generation, and we require the documentation for how that's used. And in the discussion section we talk about what David Wagner mentioned, you know, those true random number -- sorry, to -- true random number generators and the cryptographically secure pseudorandom number generator. So it might be helpful from this requirement to point back to that.

MR. GILES:

Just pointing to the discussion or actually putting something a little more prescriptive in the requirement.

MS. HOWELL:

Sorry, I'm going to go back to the requirement because I know we list a few things talking about date and time and voter information. Must not be able to create -- so maybe a third bullet there for 10.2.2 would be referencing the random number generation.

MR. WAGNER:

Dave Wagner. Bob, you raise a good point. I'm actually not seeing any requirement in there to address this, so I don't know if I'm just missing it, but maybe we do need to be --

MR. GILES:

I'm relying on you for this one, David.

MR. WAGNER:

-- more prescriptive --

MR. GILES:

Yeah.

MR. WAGNER:

-- to state that -- I'm not sure exactly what we would want, but the stored cast vote records don't record the order in which --

MALE SPEAKER:

Basically, they'd be scored in the order in which they were cast.

MR. WAGNER:

Yeah.

MR. GILES:

Yeah, well, the concern is just -- yeah, again, getting back to that random-generated number, not being able to crack that algorithm and figure that out.

MR. LUX:

Well, I mean, I remember from my old Diebold TSx's, you know, when you pulled up the audit screen that had all of the different votes that were cast when you're doing the check from the L&A testing, you know, yeah, it had -- you know, it was all randomized on the screen, but then you could sort the screen and you could change the serial number or whatever it was. And then it would put them all in order, and you could go down and see, yes, it marked, you know, one ballot all in the first position, two ballots all in the second position, three all in the third, et cetera, whatever the random -- not random -- whatever the generated -- you know, generated ballots for me program ran, you could re-sort those things. And so, I mean, even when you used it for live voting sessions, you could still go back in and hit the -- put them back in that order, but -- and then they're going to put them in the order of,

you know, John Smith used them first, Mary Smith used it second. You know, if you had a way to corroborate those two things, you'd be able to piece it back together. And so having a way for it to randomize what it's talking about would be fairly important I would think.

MALE SPEAKER:

The electronic records are doing that, so we already do that.

What we're talking about in paper is already done electronically and behind-the-scenes for all individual cast vote records.

MALE SPEAKER:

That's a 1.0 requirement.

MALE SPEAKER:

This isn't over. This isn't a new thing.

COMMISSIONER HOVLAND:

I'm sorry. Just in honor of time and probably proper protocol, if we can keep that within the Technical Guidelines Development Committee. Thank you.

MR. WAGNER:

Dave Wagner. Bob, I think you raised a good point. I want to correct what I misspoke. We do have a requirement related to ordering and the cast vote records. 10.2.2-B anticipates this for the cast vote records and the ballot image files, and I think you raise a good point that perhaps we should add to that saying that any

unique identifiers also cannot be used to determine the order in which votes are cast.

MR. GILES:

Yeah, I think that would be helpful.

MS. GOLDEN:

Yeah.

MR. WALLACH:

Dan Wallach. Isn't that included by the data or metadata?

And 10.2.2-B says, "must not contain data or metadata." Those numbers sound like metadata.

MR. WAGNER:

They're -- Dave Wagner. They're -- if they're printed on the ballot, I don't know whether that would be considered metadata associated with the cast vote records or ballot image files, so perhaps it would be clearer to call it out explicitly.

MR. GILES:

Yeah, I'd be more comfortable calling it out --

MR. WALLACH:

So "shall not contain data, metadata, or identifiers."

MR. WAGNER:

Dave Wagner. I would propose something a little different, which is that this is not limited to the scope of associated with a cast vote record and ballot image files. Must not -- perhaps must

not contain data or metadata associated with the cast vote records, ballot image files, or unique identifiers that can be used to -- I don't know. I don't want to do the wording on the fly, but --

MR. WALLACH:

Right. So Dan Wallach. Part of the challenge here is we have an aspirational goal, which is that you can't bind the voter to how he or she voted. And that's the aspirational goal. And the gory details get complicated with regular ballots, never mind end-to-end crypto where things get even more complicated. So maybe we just need to say it's very -- you cannot bind the voter to their vote. And maybe we should be less prescriptive and more aspirational.

MR. GILES:

I guess the concern is you're not -- the system's not tying it to the voter, but through a manual process of me sitting in the polling place and checking everybody who voted on that particular machine, if I can then go and tie that to a number on the machine, it has nothing to do with the voter and the equipment, but I'm plugging in the piece of my manual work on that to then -- and, again, that's my concern. If I can crack that algorithm and figure out how, I think we just need to really call it out that you -- there's -- you can't tie it back to the ordering because once you tie it back to the order, you then could tie it back to a voter -- to a manual --

MR. WALLACH:

Right. Right.

MR. GILES:

-- process.

MR. WALLACH:

So maybe we want -- so maybe the solution here is that the regulation says there shall not exist any way that this binding can be done, and then that can be expanded out later in the regulation to cover each specific voting system and all the gory details perhaps.

MS. AUGINO:

I think that is 10.2.

MR. WAGNER:

Dave Wagner here. I make a proposal, which is my proposal is we ask NIST to go back and revise 10.2.2-B to clarify the point Bob made about ensuring that this also applies to any unique identifiers that are present.

MS. BRADY:

We accept your proposal. I was getting ready to offer it.

MR. WAGNER:

Thank you.

MS. HOWELL:

All right. Heading over to Principle 11, this is all about access control. We had significant updates in this area

surrounding, you know, strengthening the monitoring of access and also ensuring critical operations are performed by authorized users.

11.1 is all about logging of access to the voting system, so just making sure that that logging is performed, and also something else I want to highlight here is in 11.1-C is that the logging cannot be disabled.

11.2, 11.2 is about managing access, specifically the access control that's applied. Some things that I want to highlight here is that in 11.2.1-C we identified that access control may be maintained or a provision based on the voting stage, so pre-voting, activated state, suspended state, or post-voting, different capabilities may be allowed at different times.

11.2.1-E talks about the administrator having the ability to modify permissions. And then 11.2.2-A, role-based access control is not made mandatory by the requirements but is definitely acknowledged as an option. And 11.2.2-C gets into some of the specifics around the minimum permissions for each group or role.

MR. KELLEY:

It's Neal Kelley. I have a quick question on the logging activities. Is there something that allows the deletion of logs or prevents the deletion of logs through some sort of password configuration or access control?

MS. HOWELL:

So we have a requirement later on in the detection and monitoring section that I think talks about -- let me go back. And we may -- I seem to remember that we highlighted something on that, but -- actually, I can double-check in the critical operations. But we --

MR. CHOATE:

And -- oh, I'm sorry.

MS. HOWELL:

Sorry.

MR. CHOATE:

This is Judd. Wouldn't that fall under the log entries being modified? Deleted would be modified, right?

MR. KELLEY:

Yeah, I thought so, Judd. I just wondered if it needed to be more specific.

MR. CHOATE:

Yeah.

MR. KELLEY:

But, yeah, you're right.

MR. CHOATE:

Well, if we wanted to, we could add a 3 there to say it can't be deleted. That would be more specific.

MR. KELLEY:

I like that.

MS. HOWELL:

And I guess one concern I have is around -- maybe it's not deleted but removing the files. You know, if you -- if you're trying to maintain space on the voting system, I'm thinking that may have been one reason why we didn't include -- specifically call out delete because that may be handled differently. I don't know if anyone has additional thoughts on that, but I think that's why we left it at modify.

MR. COUTTS:

I know that we put a limit -- this is McDermot again. We put a limit at 22 months because can we put the limit that you can't delete before 22 months?

MR. GILES:

I guess the concern would be if State law requires you to keep certain records longer than 22 months, that you can run into a problem there.

MR. CHOATE:

If it said that they cannot be deleted --

MALE SPEAKER:

Minimum.

MR. CHOATE:

-- a minimum of 22 months.

MR. GILES:

Maybe if you put minimum, something --

MR. CHOATE:

Yeah.

MR. GILES:

-- like that, yeah, so State law is 24 months --

MR. CHOATE:

Right. Ours is 25.

MR. GILES:

Yeah, so -- and with the system, just put like a timestamp on it? Is that kind of how you're suggesting -- when you're saying that you can't delete it, how would that work?

MR. COUTTS:

Generally speaking, what you're doing is you're writing out log files on a periodic basis and they're rotating, so once they get to a certain size, they create another file. And at that point you would -- you could delete anything that was over 22 months that had that time frame of when it was -- the last entry was more than 22 months so when that rotate occurred.

MR. GILES:

And would you think then -- would that be something the State could say, all right, if you're selling in my State, you have to change that 22 to 24, 28, and that's --

MR. COUTTS:

That's -- yeah.

MR. GILES:

You would be able to --

MR. COUTTS:

That's a configuration within the operating system --

MR. GILES:

Okay.

MR. COUTTS:

-- that you can set up.

MR. KELLEY:

I don't want to stall this. Could we suggest adding some language and --

MS. HOWELL:

So I guess I'm -- I was just about to ask what's the specific language? Is it a modification to 11.2.1-E, or was it an additional requirement that we think -- were thinking should be added?

MR. KELLEY:

I was thinking it was in 11.1-C. And going back to Judd's point, just adding a #3.

MS. BRADY:

That's what I have as well.

MR. GILES:

Should we change the heading then to no disabling logging?

MR. KELLEY:

Yes.

MR. GILES:

-- if we're adding deleting into no disabling or deleting logging?

MR. KELLEY:

Mary, do you guys have --

MS. BRADY:

I think that makes sense. I think that makes sense.

MS. GOLDEN:

Would it make sense to say preserving logging? I mean, that's --

MS. BRADY:

Right. We'll find some word that -- that's appropriate. Um-hum.

MS. GOLDEN:

That's actually what you're trying to do is preserve it --

MR. CHOATE:

Yeah.

MS. GOLDEN:

-- for not, you know, that changes --

MR. CHOATE:

Exactly. Whether it's modifying --

MS. GOLDEN:

-- it to the positive, what you're --

MR. CHOATE:

-- or deleting --

MS. GOLDEN:

Yeah.

MR. CHOATE:

-- we don't want to just say --

MS. GOLDEN:

Yeah, you want to preserve it intact --

MR. CHOATE:

Yeah.

MS. GOLDEN:

-- for so long, yeah.

MR. CHOATE:

Just a new heading I guess.

MS. HOWELL:

All right. We get to move on to 11.3. This is about authentication mechanisms. So I want to draw everyone's attention to 11.3.1-B and C, the multifactor authentication requirements, which highlight that multifactor authentication is required for critical operations. And then there you'll see a list of the -- sorry, the

critical operations that we have, which I'll read out loud, are software updates to the certified voting system; aggregation and tabulation; enabling network functions, wireless, and use of telecommunications; changing device states, including open and closing the polls; deleting or modifying the audit trail; and modifying authentication mechanisms. Any questions?

MS. AUGINO:

I feel like we talked about this on one of the calls.

MALE SPEAKER:

Yeah, we did.

MS. AUGINO:

And I'm not sure we captured what we were hoping to capture is that, basically, any of these -- I mean, any operations within the voting system should be subject to multifactor authentication because they're all critical? We were trying -- we were really struggling to identify something that wasn't critical.

MR. CHOATE:

I think the -- so this is Judd. I think that the -- this was -- Paul mentioned his concerns about the poll worker issue of you've got a problem, you need to, you know, do something with the machine, and you're requiring somebody who's perhaps not as sophisticated or has that level of security -- you know, security needs in your organization that might be in a situation where they

are logging into that machine. I'm looking at those. I'm thinking changing device states, including opening and closing polls, that maybe that group of people who you're talking about.

But I don't really know -- I'm sort of on the other camp. I'm in the camp of the, gosh, it seems like every time you're playing with that machine, you should really be using two factors. But I welcome your thoughts on it.

MR. LUX:

Well, I mean, so when you're saying -- so obviously, by voting systems we're including in this down to the precinct level tabulation equipment. And this says then that you're going to require multifactor authentication for opening and closing the polls, which is a very common operation for every single polling place, to include if it starts acting wonky, you know, the old tried-and-true "have you tried turning it off and back on again" would then require additional authentication factors beyond just the control password that we currently set up in it to keep your average schmo out of the admin menus on the system.

And I think -- I mean, not that we couldn't provide them with whatever -- and I-dot or, you know, whatever, to have that authentication, that second piece of authentication. It's just, again, you know, we're not talking about for your average poll worker. You know, we're not talking about millennials who eat, sleep, and

breathe computers for a living. We're talking about people who to a certain extent are terrified of iPads. So, I mean, the more complicated you make this process, the more you assure we will have a harder time recruiting and keeping poll workers.

MR. COUTTS:

This is McDermot. To your point, the opening and closing needs to be as automatic and easy as possible. I've seen it -- I've seen too many examples where it has not gone to plan, even as simple as you can make it to the point where there are some systems where, as long as it's Election Day and the system knows it when you turn it on, it says, okay, I'm -- it's Election Day. We're moving on and we've started.

MR. LUX:

Well, and, I mean, just to -- I mean, just to provide examples, so with my current system, we configure it so that when it is plugged into the wall, when they open the top screen, it automatically starts up and it opens the polls. It's a function that we have built into it. But if you close that in the middle of the day or like during early voting you shut the machine down, you lock it up and then you wheel back out the next day and turn it on, it doesn't behave that way anymore. Now you've got to have the admin password to go in and tell it, turn yourself back on again.

Conveniently, like most things, they put the power button behind the same locked door with the memory compartment, so that makes it nice and convenient for people to turn things on and off without breaking seals. And so -- but, I mean, you -- you know, as -- are there creative ways to turn them off? Sure there are. Enter the password wrong three times and the machine will shut itself off. Great. So that's all you got to do is just fat-finger the password and then the machine will shut itself down and you don't have to worry about it.

So, I mean, there's -- I mean, it just really -- like I said, I mean, if we need to have -- I mean, I know that there are already certified systems in my State that, you know, have the little I-button thing that you can't get into without using it, which -- so, I mean -- and they certainly are clearly able to train their poll workers to do it, so it's -- it's just -- you know, the more complicated we make it, the harder it will be for poll workers in the case of performing fairly simple tasks that you would think would be standard.

You know, I mean, my old system, once the machine was shut down, there was no way for the poll workers to turn it back on. I had the admin password, me and my troubleshooters. We could go turn the machines back on, but we never, ever made sure that that password ever left our possession so that if somebody wanted to try to -- you know, we're going to close the election, well, great,

you close the election, but one of us can come back along and turn it back on. We just didn't leave that power in the hands of the poll workers.

So, I mean -- and that's -- even then, we were using a card that had to be fed through the machine to tell it turn yourself off and then close yourself down, which in and of itself was sort of a second-factor authentication because in addition to the shutting-it-down commands, you had to have the physical card that told it to do that. So, I mean, there's a myriad of ways for this to happen, just a matter of concern for, you know, the way the poll workers have to do basic operations.

MR. COUTTS:

Well, I actually agree with this list of everything to be two-factor authentication except for the opening and closing of polls unless date is counted as a -- one of those factors. And I'm not sure that it is.

MR. GILES:

Bob Giles. And I guess just the world we live in today is going to be part of driving, making everything critical in the system. And I -- believe me, I have polling places and poll workers, and I get there's that line, that fine line of we don't want to make it too complicated, but it's nice to be able to say that anybody who touches the machine has to go through multifactor authentication. I

just -- I think in the world we live in -- and again, the -- you know, we're talking years before these machines are built to these, but I think we're headed in that direction. And the people that are used to it now, your banking -- like almost everything you do is requiring multifactor authentication.

So I think if we're putting requirements together for the future and for the world we live in today, I think almost everything that touches a machine -- I can't think -- to Lori's point, I can't think of something that wouldn't be critical that wouldn't need that kind of multifactor authentication anymore.

MS. BRADY:

Okay. So if I could just sum up what I've heard -- this is Mary -- we have some who say perhaps we should relax what we currently have to -- by deleting opening and closing polls from the list of critical operations. We have others that say perhaps we don't need this section at all. We can simplify this section by saying everyone who accesses this -- these systems needs multifactor authentication.

MALE SPEAKER:

You're right.

MS. BRADY:

Have I got it? Okay.

MALE SPEAKER:

Yes, we can put it on your list --

MS. BRADY:

So where do we go from here? So where do we go from here? The list is getting long.

MS. HOWELL:

So I know I have about two minutes left. Am I good to keep going?

[Laughter]

MS. HOWELL:

Okay.

MS. BRADY:

I got it.

MS. HOWELL:

And the last one that I had highlighted there was around that password complexity is defined by the administrator such as things like the minimum length.

11.4 -- I've got two more in this section. 11.4 is pretty straightforward, that first one being apply the principle of least privilege and provide -- sorry, for the access policies. And then 11.4-B is for the voting system documentation to include guidance for separation of duties.

11.5 is about revoking logical access. The -- these are all applied by the administrator, applied and defined by the

administrator, so you -- the access time period for each user and how to handle lockouts for things like failed attempts. And that's it for 11.

MS. AUGINO:

In 11.4-B --

MS. HOWELL:

Yes.

MS. AUGINO:

-- on the separation of duties, I don't know, maybe it's appropriate to just include it in the discussion, but I think there's a -- it's scalable or it should be. Those recommendations should be scalable so that there are recommendations for a two- or three-person shop and recommendations for a 50-plus person shop. I think that's definitely a reality nationwide.

MR. GILES:

And just on 11.3.2-B, password complexity, should we take a stronger stance on that, the way we did with multifactor, must allow but should -- should we require a stronger standard because, unfortunately, people a lot of times will take the path of least resistance and put a simple password in there. And, again, if we're talking about protecting the systems, you know, instead of "must allow," maybe we just follow, you know, the -- you know, must follow the minimum password strength per the NIST 800-63B. It's

just a suggestion, but if we're going one way with the multifactor, wouldn't the password be just as important and not just say, you know, Bob123?

MS. HOWELL:

Yeah.

MALE SPEAKER:

Like your luggage --

MR. GILES:

Dammit, I just gave out my password. No.

[Laughter]

MALE SPEAKER:

It's the same as what's on your luggage, right?

MR. GILES:

Yeah, that's on my luggage.

[Laughter]

MR. GILES:

I'm an idiot with that.

[Laughter]

MS. HOWELL:

So for that one we do point to the NIST standard. Are you saying --

MR. GILES:

But must allow --

MS. HOWELL:

-- includes -- oh. Oh, okay.

MR. GILES:

I'm just saying --

MS. HOWELL:

I see what you're saying.

MR. GILES:

-- should we say must meet or -- the standard or required to

meet that standard?

MS. HOWELL:

So don't allow an administrator to override it?

MR. GILES:

Yeah, we don't want an administrator to just put 12345.

MR. LUX:

Well, I mean -- and this is Paul. I mean, essentially, what it's

saying is allow the administrator to specify password strength per

NIST guidelines. And what Bob is saying is it should require the

administrator to make the password to that NIST --

MR. GILES:

And a system can't do --

MR. LUX:

-- guideline.

MR. GILES:

-- anything less than the NIST standard.

MR. LUX:

Right, whatever that may be.

MS. BRADY:

I just want to note that we've come a long way.

MALE SPEAKER:

Definitely.

MS. HOWELL:

Anything else in this section? It looks like we're all good. So Principle -- Principle 12 is physical security. This remained mostly unchanged focusing on the external tamper-evident and as well as the physical ports on the voting system. In 12.1 I just want to highlight a few things. We have the logging of physical connections or disconnections to the voting system. We also have physical evidence of any unauthorized access to the containers storing things like voting system records. And the last one there, backup power, talks about backup power supply for physical security measures. This includes like a notification that the -- notification of when the power went off and a logging of that event as well.

12.2 is around physical ports, so restricting access to ports that accommodate things like removable media, so CDs, thumb drives, and floppy disks, and then also logging enabled or disabled ports.

MR. CHOATE:

Can we outlaw floppy disks?

[Laughter]

MR. CHOATE:

Just as a principal argument.

MS. HOWELL:

No floppy disks.

MALE SPEAKER:

We're going to go back to that actually.

[Laughter]

MALE SPEAKER:

No millennial would know what it was or figure out --

MS. HOWELL:

I'm a millennial. I definitely know what it is.

[Laughter]

MS. HOWELL:

I was trying to show that we know what they are.

MALE SPEAKER:

Have you ever seen a WORM disk?

[Laughter]

MS. HOWELL:

All right. Anything in 12?

Heading on to 13, Principle 13 is focused on data protection, so protection of election artifacts. Something that I want to highlight here that I think was recommended in the 2007 VVSG recommendations was that this one does not make hardware security requirements mandatory, so things like TPMs, trusted platform modules.

All right. Heading into 13.1, this focuses on preventing unauthorized access to voting system data. So only authenticated system administrators can access and modify configuration logs and files. And this section also notes that the integrity protection should be applied to election records for things like CVRs.

And this is covered further in the next section, which is 13.2. This covers this source and integrity protection. 13.2-A talks about digitally signing election records, things like tabulation reports. And 13.2-C highlights cryptographically verifying those signatures, so ensuring that we're not just signing them, that we're actually checking the integrity and that there's been no unauthorized modification of that data.

13.3 focuses on the cryptographic algorithms that are used, so 13.3-A calls out requiring FIPS 140-2 validated cryptographic modules with the exception of E2E and 13.3-B, so definitely recognizing that those would require a different type of cryptographic method for validation.

13.4, this section covers the protection of transmitted data with that first one, mutual authentication, ensuring authentication at both ends of the transmission. Also the confidentiality of that data, so encrypting the data and then also checking the integrity of the data -- the data that's transmitted. That's it for 13.

Principle 14 -- oops, I went a little bit too far. So this is a new section that we included in the VVSG, and what we wanted to do here was includes strategies and techniques for protecting the voting system as a whole. And I'll get into that as we talk through the different sections -- sorry, guidelines under this section.

So 14.1, identifying the necessary security controls. In 14.1-A we require risk assessment recommendation to be provided, identifying any risks that were -- any risks that are address and also any accepted risk with an explanation of why those risks were accepted. Sorry, I think I went too -- oh, no, I'm sorry.

14.2, 14.2 focuses on applying those security controls to limit the attack surface, things like preventing extraneous processes or services from being installed and executed, providing documentation for secure configuration and system hardening. 14.2-G is the removal of unused code. And in the last few there, restricting access to physical ports and ensuring the system is free of any known vulnerabilities.

14.3 covers maintaining and verifying the integrity of hardware, software, and other critical components. Here we worked a lot with the NIST supply chain team, as well as attending their supply chain forum to develop the requirements. So that first one there is a supply -- requires documentation of a supply-chain risk management strategy, that a critical analysis be performed that defines the critical components through that criticality analysis, and also providing a bill of materials for the hardware and software of those critical components. Just a few other things that we have here, so cryptographic boot verification of the system, as well as software verification for installation, prior to installation.

And then the last section here, 14.4 just says that any updates must be authorized by an administrator, including operating system, application, and firmware updates.

Any questions in 14? All right.

We're at the last section, Principle 15, detection and monitoring. This was moderately updated. We added some event log types and also updated -- ensured that we include updated and configurable detection and monitoring systems.

So 15.1 is all about the event logging, ensuring that that's done, and then 15.1-D is where I mentioned we made those updates. We added some additional event types to the chart. We have a full chart there that shows all the event types to be logged.

15.2, 15.2 is about handling errors as they occur, so making sure that those errors are presented, you get immediate notification of an issue or an error to allow for prompt recovery and remediation, and also that those errors are logged.

15.3 focuses on protection against malware, having the malware protection mechanisms identified and also that those malware mechanisms are updatable, and ensuring that any malware detection is logged.

And then last section here is 15.4. 15.4 is focused on protecting against network-based attacks through the detection and monitoring requirements that first when they are in network architecture documentation, making sure that you have awareness of all components within the network. 15.4-C, secure configuration documentation is provided for security-relevant configurations that are accompanied by things like network best practices. And 15.4-D, must have a firewall and intrusion-detection system to apply things like least privileged access between devices, as well as the different rules and policies for the network.

That's it for the requirements. Now, we're heading over to the open areas. Let me switch. Okay. The first open area I mentioned earlier is the indirect voter associations. The decision point I have here, you know, are these indirect voter associations necessary for certain voting systems? In particular, this was -- is

talking about paperless systems. The primary concern here is that this violates ballot -- the principle of ballot secrecy with the potential that an indirect voter association would allow -- would potentially allow a voter to be associated with their selections.

And some of the potential mitigations that were discussed is that provisional -- I'm sorry, something that I left out was that this -- these indirect voter associations are only for provisional ballots -- are only provided for the provisional use case. Some potential mitigations are that, you know, you wouldn't use these indirect voter associations. You would have to handle provisional ballots through an external paper process. That type of requirement wouldn't be included in the VVSG because it's external to the voting system. Another option that was discussed was that the provisional machine would be -- that had these indirect voter associations would be air-gapped from the rest of the voting system. That of course brought in some additional concerns about voter privacy.

And then this last option, the indirect voter associations would be stored within the voting system. And the ballot would be encrypted until eligibility is determined, kind of mimicking that external paper process when the paper goes in the envelope. And then once the eligibility is confirmed, the ballot is decrypted. The indirect voter association is removed, and that ballot would be then included in tabulation.

One of the potential benefits that was discussed was if this is allowed to happen within the voting system, it would just be a matter of switching the voting mode to a provisional state, not requiring the voter to go through an external paper process or use a separate machine, so they would vote just as any other voter would. So they would have some additional voter privacy -- increased voter privacy through that process.

Any questions on this open area?

COMMISSIONER HOVLAND:

I was just going to chime in. Mary and I were discussing, I think taking this and looking at tomorrow's agenda, I think there's a lot that we do need to talk about. And so as far as discussing the NIST cybersecurity framework effort and likely the CISA update, I think we will likely move those off the agenda in favor of a broader discussion of both the outstanding issues that have been identified today and maybe the best way to use a handful of the few minutes that remain are for Gema to walk through the remainder of these but then we table broader discussion into the morning.

MS. HOWELL:

Tomorrow, okay. All right. I'll push on through. Next open area I have up is barcodes, barcodes and encoding systems. Two decision points here, what information can be encoded or stored in barcodes, and what does the voting system use to count the votes?

In addition to that first point around what information can be encoded, something that's also discussed is what is included under this definition? For example, would timing marks be included as a type of barcode or encoding scheme?

The concerns around barcodes are the lack of transparency, you know, not knowing what's within that barcode, the -- and the potential violation of ballot secrecy. Does this barcode contain any voter-identifying information? The voter isn't able to see that inherently from looking at the barcode, and so there's concern about what the barcode is doing.

Interoperability, so any proprietary style barcode or the inability to be able to confirm what the barcode is doing if they are not using an open and available standard.

And then auditability, if these barcodes are used to capture ballot selections and with that lack of transparency, if you're unable to verify the information within the barcode, then you -- then the actual voting system may be capturing different ballot selections than what the voter actually submitted.

Some of the various use cases that were discussed were for ballot activation, so putting in the ballot style, also applying -- I think it says usability -- I mean accessibility configurations, so just scanning the barcode and directly applying the necessary accessibility information, storing ballot selections, as I mentioned

before, transferring tabulation results to the central count, pre-voting. And that is in reference to the voter being able to vote at home and print their ballot selections through a QR code, bring that in, scan that in the polling place, and then have that populate their selections and then go through the review process at the polling place. That -- in that use case allowing voters with different accessibility needs to vote in the comfort of their home using their own tools and then being able to just come into the polling place and verify those votes. And that last one there, storing identifiers or digital signatures to maybe potentially check the information or used for audits.

Potential mitigations, I think we talked about this a little earlier, but, you know, having the requirements state that the barcode that's used -- and John also has some of this in his requirements. The barcodes that are used are provided but also a reference implementation information included. This is to allow for external review of the barcode creation and content, so ensuring that there's no data leakage through the barcode and no misinformation and that the barcode is actually working the way that it's described.

Another option is, in addition to the barcode, including human-readable information for the voter and the auditor to verify. This certainly doesn't apply to all voters who may not -- who may

have low -- who may have no sight or low vision. And then, lastly, ensuring that audits only reference the human-readable information when they're performed. That would be external to the requirements but a process that would be highlighted.

And, lastly there, some of the potential benefits, applying -- having the ability to apply accessibility settings could assist voters. Secondly there, allowing voters to vote from home, as I mentioned earlier, using their own tools. Thirdly, support -- oh, I'm sorry. I mentioned -- I'm repeating some of what I said before. Support for voters with disabilities such as lack of sight or low vision because they have this barcode to then read the information on their ballot. And then another that was listed there is faster input of election data instead of having to manually input or type information into the voting system.

Next up we have wireless. And in particular this section is talking about things like Wi-Fi, Bluetooth, and near-field communication or NFC. It's could also potentially include cellular, but I like to leave that to the internet connectivity section. But here we have the decision points as is wireless technology appropriate for use within the voting system? So do we need wireless? And then second is the presence of the wireless hardware appropriate within the voting system?

Primary concerns here are the potential for modification of voter choices, so any wireless activity kind of allows for a bit of remote access to a device, and so if one is able to intercept any information that's transferred through the wireless, they may be able to modify that information, so modify a voter's choices, modify of the total election results, just eavesdropping, just being able to obtain that information, also being able to inject malware into the voting system through the wireless technology.

And that last concern there is that, you know, if wireless technology is allowed, it requires a certain level of technical expertise to apply the proper security configurations that are necessary. And the concern there is that may be certain -- this -- this would require that, you know, election workers or the folks that are setting up these systems have that technical expertise to maintain this technology.

Some of the use cases that were described were printing the ballots from a printer, activation card or some kind of token used for authentication through NFC, also maybe assistive technology or other peripheral devices, so Bluetooth headset, mouse, or a keyboard.

Potential mitigations that were discussed in the working group is no wireless hardware, only physical connections only. That sub dot states these -- calls out the Senate Intelligence

Committee report. And I quote part of it that says, "At minimum, any machine purchase going forward should have a voter-verified paper trail and remove or render inert any wireless networking capability." Another suggestion was maybe that this capability is just something that's able to be enabled or disabled, so you can turn the wireless on and off as you need it. And then, lastly, ensuring that you have the sophisticated awareness and ongoing secure configuration management for this technology.

The potential benefits, the core that were highlighted was just automation and efficiency, just being able to use less hardware, potentially less physical set up, but that's not to say that some wireless technologies don't require a lot of set up. As I mentioned earlier, the technical expertise that may be required to handle these -- or to perform the secure configurations, and then the second one there, being able to configure and update multiple systems at the same time rather than manually doing it for each one. And all of these mitigations -- or, sorry, benefits aren't necessarily stating that this is the only way -- wireless technology is the only way for these to be done. These are just some of the highlights for this particular open area.

Internet connectivity, pretty much the same as far as the decision points. You know, is it appropriate within the voting

system? Is the presence of this type of technology appropriate?
So do you need that cellular capability enabled?

Primary concerns here, internet connectivity expands the attack surface far wider than just the closer proximity that usually is considered for the other wireless technologies, so you have the concerns of remote attacks, not necessarily just from a different State but maybe even nation-state attacks, being able to modify election results, eavesdrop, so just be able to capture that information, inject malware, some of the same concerns as mentioned before, and also just that the technical expertise there required to apply the security configurations is a big concern.

The use cases for internet connectivity that we know of are remote access software for troubleshooting, transmitting election results, providing software updates and potentially remote ballot marking.

Potential mitigations here are no internet connectivity, so for things like transmitting election results, you could use a sneakernet process or something like telephone communication call or text to send the information over. And that would be for unofficial election results. That's what that one was discussed as. And then that second bullet there is air-gapped at both ends of communication, meaning both from the local to the central -- I'm sorry, so on the --

from the polling place it would -- sorry, let me go back. I'm losing my train of thought. The end of the day is hitting me.

Okay. So air-gapped from the election worker sending the results, so the voting system itself would not be connected to the internet. Those election results would then -- would be taken from the voting system and manually transferred over to the system to transmit the election results. And on the receiving end at the central office, that system that actually receives the results would also be separate from the rest of the tabulation system. And that plus the sophisticated security awareness to kind of make that happen, right, make sure that you have that ongoing secure configuration management there.

The potential -- primary potential benefits that were -- that was listed there is that -- sorry, with geographical restrictions, so needing to send the information, but it may take longer than expected in mountainous or rural areas. That was the potential benefit there.

And then I think this is my last one here. Yes. So cryptographic end-to-end verifiable systems. The -- these systems are not widely available right now, and so we wrote these requirements based on, you know, what we know about E2E systems and the different examples that we have. And so the core -- the first one there is what's the right level of detail? You know,

we want these requirements to be clear but also allow for innovation because we know that there is active research in this area.

And then the second decision point is what does the certification process look like for these systems? With consideration of these -- of the different types of requirements around them, it's unclear whether -- oh, sorry, I'll get into that in the concerns.

So primary concerns, you know, as I mentioned, it's unclear if the current requirements are sufficient due to there not being too many of these systems deployed. Secondly, the assessment criteria and adequate testing with the uncertainty of whether these requirements are sufficient, it's unclear if we have enough information to properly test these systems and also how those systems would be tested.

Dispute resolution, so these systems have a unique property where externally if they -- voters have the opportunity to verify their selections based on the public posting and kind of the dispute resolution concern is what happens if a voter says that their information is incorrect? How is that handled? And then forward secrecy, if a flaw is found later in an E2E system, then that could potentially reveal the voter's -- the voters themselves and their selections, so there's some concerns about that.

The bottom bullets there just talk about some of the -- just some background information about E2E systems, that they can be paper-based or paperless. They also allow voters to verify their ballot selections are correctly recorded and tabulated without revealing their selections. And then I name a few examples of some previous E2E systems.

Potential mitigations that were discussed were additional documentation to be provided within the requirements, so insuring that the coverage of the E2E properties are included, so the properties include that the votes are cast as intended, recorded as cast, that the E2E system preserves ballot secrecy, and it's also able to show that it's tallied as recorded.

And so one of the mitigations is that we ensure that we have all the documentation and information around the artifacts that need to be produced to meet those principles. The second one there, that the E2E system utilize an open standard and provide a reference implementation, including a sample identifier to allow folks to kind of, you know, review and analyze how this E2E system is actually meeting those principles -- I'm sorry, those properties mentioned above and just to review the system in general.

And in that last one there, it's certainly understood by the working group that this requires some external experts to evaluate E2E systems. It wouldn't be something that the VSTL labs would

be able to go through all of this on their own, especially with its unique properties and so -- that a report be provided within the requirements that comes from an external expert evaluation, including cryptographers or folks that are familiar with end-to-end systems, kind of using the artifacts mentioned in the first two bullets, and the information from the -- I'm sorry, artifacts mentioned in the first bullet, the open standard and reference implementation in the second one, having -- making sure that this is reviewed. So just because that information is provided doesn't mean anyone is actually looking at it, and so we want to make sure someone is actually reviewing it, so that's why we want to receive that report from an external expert evaluation group.

The potential benefits that were talked about, so, as mentioned before, this is another software-independent option. This has an additional public verification feature, so typically there's a public posting of the results, allowing the general public to kind of tally the results themselves, and also potentially some accessibility benefits for this paperless E2E option. It's definitely unclear right now how real that looks or if that is a true benefit. I think it's definitely going to take some testing and review of these systems as they come out, and that's why these are all strategically listed as potential benefits for these different open areas.

All right. That's it.

COMMISSIONER HOVLAND:

Thank you, Gema. I know that was a lot at the end. Gema, you're here tomorrow, right?

MS. HOWELL:

Oh, yeah.

COMMISSIONER HOVLAND:

Okay, good. So, you know, to be respectful of the time here, we've got 30 minutes that were allotted for recap and day two setup and minus four minutes to get that done, so we will travel back in time briefly.

[Laughter]

COMMISSIONER HOVLAND:

I think the recap was there was a lot for us to talk about today. And thank you all for experiencing this. Thanks to the NIST team for walking us through that. Obviously, there were a lot more to talk about, which is why I think we made the adjustment to tomorrow's schedule to build in that extra hour at the front end to talk about both the issues that Gema just highlighted because obviously they don't -- they need to be discussed. And so I think we'll do that. Mary has an impressive list of items that were raised today that I have no doubt that she will be consolidating into a productive manner to lead us through in the morning. And so we will be here bright and early at 9:00.

For anyone still watching the webcast, Mom, I will explain cryptographic pseudorandom number generators this weekend.

[Laughter]

COMMISSIONER HOVLAND:

Other than that, I think, you know, we've got some homework to do, but we will see you at 9:00. Thank you again to everyone for making it through this day. I know it is hard, but it is important and we appreciate it. Thank you.

[The Technical Guidelines Development Committee Meeting of the United States Election Assistance Commission recessed at 5:05 p.m. on September 19, 2019.]

DRAFT

[The Technical Guidelines Development Committee Meeting of the United States Election Assistance Commission reconvened at 9:00 a.m. on September 20, 2019.]

CHAIRMAN COPAN:

Good morning, everyone. Thank you for joining us on day two of our TGDC deliberations. Let's make our way to our seats, please, and resume our proceedings.

Let me first turn it over to Ben Hovland for a brief synopsis of what was covered yesterday during the morning and the afternoon.

Ben?

COMMISSIONER HOVLAND:

Thank you, Dr. Copan. So yesterday was obviously an action-packed day, pretty busy, particularly discussing the requirements. I think that we identified a number of issues that warranted additional conversation. And I think in the afternoon we recognized that part of today's agenda should be scrapped in favor of continuing that conversation because it was going in a very productive direction.

So I think what we're going to do this morning is, again, revisit some of those issues that I know we noted for further conversation and see if we can get to a resolution on those. There

were some broad open issues that we were going to also discuss, and then I know there are some resolutions that have been shared that also should be considered.

CHAIRMAN COPAN:

Excellent. Thank you so much. Would it be appropriate for us now to review and act on the three resolutions that are before us that have been submitted as a result of yesterday morning's deliberations? Mr. Choate, please.

MR. CHOATE:

This is Judd Choate. So we drafted up three resolutions. Why don't I read them off one at a time, and then feel free to comment or wordsmith. There's no pride in authorship here. Number one, Resolution #1, we recommend EAC Commissioners formally adopt a yearly VVSG review process where proposed changes are considered by the TGDC and determinations are sent to the EAC Executive Director or a person operating in that capacity to begin the adoption process and that, whenever possible, processes overlap to ensure timely adoption of changes.

Do we want to maybe discuss that one?

CHAIRMAN COPAN:

Let's open the floor for discussion and any points of clarification or recommended edits, please. The floor is open.

MR. LUX:

So, Judd, just for the record, explain where you talk about the processes overlapping, what you mean by that.

MR. CHOATE:

Um-hum. So that was Lori's addition to that, so I'm going to turn over the mic to Lori.

MS. AUGINO:

So, wherever possible, to truncate the time that it takes to get these changes in front of our EAC Commissioners. If possible and in accordance with law we'd like to see the Standards Board have an opportunity to review them concurrently with the Board of Advisors and then, if possible, have public comment overlapping those at the same time, which then can reduce the amount of time overall that you're collecting that feedback and then getting to Commissioners for consideration.

CHAIRMAN COPAN:

I think that point is clear here, but it may not be clear to someone reading this without the benefit of that context. And I'm just wondering whether looking at this whole concept of ensuring parallel or coincident processing if you will to ensure, you know, timely action and timely consideration of the changes.

Mary Saunders, please.

MS. SAUNDERS:

Mary Saunders. I had a suggestion on that note. Potentially review processes are run concurrently to ensure adoption, just a clarification.

CHAIRMAN COPAN:

Yeah.

MS. AUGINO:

Perfect.

MS. SAUNDERS:

You know, overlap has kind of a negative --

CHAIRMAN COPAN:

It does.

MS. SAUNDERS:

-- connotation to it. Concurrently is --

MS. AUGINO:

Oh, thank you.

CHAIRMAN COPAN:

Concurrently, yeah.

MS. SAUNDERS:

-- and just review processes or however it's described in the -- in HAVA. And just a quick question while I've got the mic. I strongly support this first resolution. My question related to Resolution 2, how are you differentiating between the types of

changes? Resolution one with a yearly review, are those substantive changes versus -- I mean, is that --

MR. CHOATE:

That's a good question. I'm going to -- Diane?

MS. GOLDEN:

Or I was going to say rather than substantive, it's the non-noncontroversial --

FEMALE SPEAKER:

Right.

MS. GOLDEN:

-- you know what I'm saying? It's anything that's not -- just do it, yeah. Yeah.

MALE SPEAKER:

Right. I think any --

MS. GOLDEN:

Because what's substantive and what's not I -- you know, so, yeah. But I think if you just say two is these de minimis, to use the word of the day yesterday. And these other ones need a more -- the annual, yeah.

MR. COUTTS:

Yeah. An example of this is Ben's favorite example about the 40 dBs for the sound is -- okay, no, this is wrong, we made a

mistake, let's fix it and move on as quickly as possible. So that's an example of one.

MR. CHOATE:

So do you guys have a recommendation on Resolution 1, like how we could rephrase it? I assume that's where the change would be if we made a change.

CHAIRMAN COPAN:

Mary, would you please summarize -- Mary Saunders, please, would you kindly summarize the change once again that you had proposed in Resolution 1.

MS. SAUNDERS:

Sure. Well, the -- sorry. Never mind. The change I had proposed was following the final comma, review processes are run -- or operate concurrently --

MR. CHOATE:

Yeah.

MS. SAUNDERS:

-- to ensure a timely adoption. With respect to your follow-on question as how to define the types of changes that would be --

MR. CHOATE:

Um-hum.

MS. SAUNDERS:

-- I mean, I -- would it be substantive or -- there has to be some modifier. I'm not wedded to a particular modifier, but --

MR. CHOATE:

So this particular resolution came from a conversation that Ben was leading. Do you -- Ben, do you have thoughts on how that could be changed to include more direct language?

COMMISSIONER HOVLAND:

Sorry, I was just looking to distinguish between the two, and I guess also I feel like it's a slightly odd role for me here, but I think one of the distinctions -- well, number one, for Resolution 1, I think you're possibly talking about -- I mean, you're both talking about certainly substantial modifications, but you're also talking about additions, so new requirements versus in 2 I would think you're talking only about relatively minor fixes, external technical standards, the example that McDermot gave. Sorry. I don't -- I definitely think noncontroversial is probably not the right word because I think you have the appeal process if it's controversial. But I don't know -- and -- oh, sorry. If, Paul, you have a good idea to bail me out, that would be amazing.

[Laughter]

MR. LUX:

Paul Lux. I just wondered, do we need to make a specification in Resolution 1? Because isn't the idea of Resolution

1 that we want an annual review? And does it matter what changes we're considering on an annual review basis, whether they be controversial or noncontroversial additions, et cetera? I think the annual review is the important part of Resolution 1, not so much what changes we're talking about, whereas Resolution 2 is differentiating to say, you know, if it's a, you know --

MS. BRADY:

An additional technical --

MR. LUX:

If it's a technical thing or, you know, some other standard that we are referring to changes, then that inherently changes it. And you can do that without dragging this out. And I think that's the difference between the two. I don't know that we need to specify in Resolution 1 because I think, again, the key point there is the annual review.

MR. KELLEY:

Neal Kelley. Paul kind of touched on it, but we had talked about this at the Board of Advisors, which is the -- and thank you for reminding me -- the policy versus technical, right? So if you just put those into those two silos and you do away with the controversial piece, doesn't that help split it up?

MS. AUGINO:

Okay. Can I read a couple of recommendations? So on the first resolution, we recommend EAC Commissioners formally adopt a yearly VVSG review process where proposed changes and/or additions are considered by the TGDC and determinations are sent to the EAC Executive Director or a person operating in that capacity to begin the adoption process and that, whenever possible, review processes such as Board of Advisor reviews, Standards Board review, and public comment periods run concurrently to ensure timely adoption of changes. And I'm going to say changes and/or additions.

And then in the second resolution, we recommend EAC Commissioners implement a process for EAC and NIST professional staff to make de minimis changes to the requirements in a timely manner, which includes an appeals process.

CHAIRMAN COPAN:

Would it be helpful, again, because of -- for the -- the interpretation if you will of de minimis, that perhaps it would be a more appropriate to say to make technical changes to the requirements in a timely manner, which include an appeals process?

MS. AUGINO:

I'm personally uncomfortable with --

CHAIRMAN COPAN:

Yeah.

MS. AUGINO:

-- technical changes because a technical change could be a pretty big stinking change --

CHAIRMAN COPAN:

Um-hum, sure.

MS. AUGINO:

-- and that worries me. So I think de minimis is pretty well-founded in -- at least in my State, but that -- and if there's an appeals process --

CHAIRMAN COPAN:

Yeah.

MS. AUGINO:

-- built into that as well, I would feel more comfortable.

CHAIRMAN COPAN:

Yeah.

MS. AUGINO:

I'm worried about just calling it a technical --

MR. GILES:

This is Bob Giles. Yeah, when we get reports back from the VSTLs, they reference de minimis changes, so we're able to maybe adopt those changes without a full hearing for voting equipment at the State level.

CHAIRMAN COPAN:

Yeah.

MR. GILES:

So I'm comfortable with de minimis.

CHAIRMAN COPAN:

Yeah. Any other discussion on that point?

COMMISSIONER HOVLAND:

The only flag I would make on de minimis is that it has an existing meaning in our Testing and Certification manuals, and so if we're creating something different here, I would be wary of that. And I would also just ask if it -- if 2 would be more appropriate to say -- obviously, theoretically, we would be implementing the process -- but a process for EAC professional staff in consultation with NIST staff? Again, I think that's more how the Testing and Cert Program currently works. I'm looking at the back of the room to our Director, but I don't know if anyone has thought or --

MR. CHOATE:

I like that last point. Neal, could you -- so I think I didn't quite catch your point earlier that these are sort of already defined terms that might be siloed nicely for us already.

MR. KELLEY:

Oh --

MR. CHOATE:

Could you repeat that?

MR. KELLEY:

-- right. Thanks, Judd. So I was just thinking, you know, and to Ben's point about -- the Commissioner's point about struggling where the Commission handles this and where staff might handle it, right? And so that's where I was saying that policy versus technical.

You're making a good point, Lori. I mean, technical could be a big bucket --

MS. AUGINO:

Yeah.

MR. KELLEY:

-- right? And I understand that. But certainly I don't think you want staff going down the path of policy, I'm guessing. That takes away that big chunk out of the VVSG that might offer you some great heartburn.

COMMISSIONER HOVLAND:

It looks like -- and I'm going to break the rules for a second here. I know we generally keep this to TGDC members, but it looks like that our Testing and Cert Director Mr. Lovato has some valuable insight in how the process works that will hopefully save us time.

MR. LOVATO:

I apologize. We ran out of room somehow between yesterday and today over in our little corner. The term de minimis I found I guess kind of the hard way just a few weeks ago when we had our security forum is even though it's defined in our manual, it's still a loaded term just because it still does mean something different to almost probably everybody here at this -- in this room. And so if there is even some other type of language, if it is technical, providing some kind of bounds around what is technical, but -- or something to that effect. But I think just using the term de minimis kind of floats us into that then policy realm of where we're supposed to be looking at a technical requirement and now it's like, well, is it or is it not? And then it just kind of goes kind of something beyond what we think it should be. And so I just -- I would -- I think I like the concept of the first resolution, but I think just a different term would be helpful. And I don't -- I just don't know what that would be.

MR. GILES:

So this is Bob Giles. Do you have your definition of de minimis? Because maybe if we agree that's -- and we can point to that particular definition of de minimis because you already have it written somewhere, that might be helpful if we --

MR. LOVATO:

Yeah.

MR. GILES:

-- agree that that's the --

MR. LOVATO:

Yeah, I'll pull it up now. I have it.

MS. AUGINO:

I could also offer minor technical changes.

MR. LOVATO:

Yeah, I think that -- I think that's more meaningful personally.

MR. GILES:

I guess my concern -- if you -- I'd still like to hear it because if you already have a definition of de minimis, minor, again, could be interpreted a lot of different ways, but if we have an actual definition we can point to, I think that might be helpful. And if it doesn't work, then we might just go with minor.

MR. LOVATO:

Right. And the other concern, too, is if that term changes in our manual. If we -- if it ends up being redefined, you know, somewhere along the line where nobody here would probably have input as to what that means. And so -- so that's just something to consider. And I'm having network issues, so once I'm able to pull up the definition, I can.

MR. LUX:

So, again, I would point out that Resolution 1 is talking about the VVSG review, and Resolution 2 is talking about the requirements.

MS. AUGINO:

Correct.

MR. LUX:

And the requirements are inherently more technical in nature or potentially more technical in nature, and so, again, you know, if from the VSTLs we are already using the term de minimis and there is a clear definition for what that means and we all understand that that's what we're talking about, I don't think we need to worry about actions being taken under Resolution 2 tipping over into policy because Resolution #2 is not talking about changing the VVSG, which would be the standards and the principles. It's talking about the actual requirements.

MS. GOLDEN:

I'll read you the -- I looked this up the other day because I was in a court case. I was doing special edits. It's a long story. Too trivial or minor to merit consideration, especially in law. It's used primarily in law and tax law about what's a de minimis something or other so you have to tax it or whatever, de minimis profit I guess, which is literally like .025 percent, so, yeah.

COMMISSIONER HOVLAND:

I will just flag that that is slightly different than the Testing and Certification manuals, which I'm about to get in trouble by going from memory, but essentially that it -- and -- oh, good.

MR. LOVATO:

I have it now. So our definition is it's -- a de minimis change is a change to voting system hardware that is so minor in nature in fact that it requires no additional testing and certification. Such changes, however, require VSTL review and endorsement, as well as EAC approval. But that's not a real technical definition. This is a PowerPoint.

COMMISSIONER HOVLAND:

And it's been updated to include software.

MR. LOVATO:

Right, and it includes software. But the idea is still the same where it's on -- it's in regards to -- like in our context it's to a certified voting system. I don't know if that matters at all in regards to requirements changes, but it might to some people.

COMMISSIONER HOVLAND:

I will -- one other possible addition since you are theoretically considering charging us with developing a process. I mean, you could plain-language this and say minor or something to that effect. But again, what this resolution is about is asking us to implement a process or consider developing a program, et cetera, so I would

guess that will lead to broader conversations that figure out the specifics of what that looks like.

MS. GOLDEN:

Does inconsequential and -- yeah, I'm just looking at synonyms, antonyms, you know, for de minimis. Inconsequential, insignificant, I don't know that that helps at all or not.

MR. HALE:

I think it is along the lines of where you want the requirements -- the minor requirement changes to still reflect the Principles and Guidelines, but you're allowing for the adjustment of like the decibel level and -- to continue and proceed. So it's about Principle and Guideline intent.

MR. COUTTS:

All right. For the most part, these are going to fall under the Test Assertions for the most part.

MR. GILES:

So since I guess that de minimis definition doesn't really apply, maybe we just go with minor?

MS. AUGINO:

Okay. I'll read again starting with the first one. We recommend EAC Commissioners formally adopt a yearly VVSG review process where proposed changes and/or additions are considered by the TGDC and determinations are sent to the EAC

Executive Director or a person operating in that capacity to begin the adoption process and that, whenever possible, review processes such as Board of Advisor review, Standards Board review, and public comment periods run concurrently to ensure timely adoption of changes and/or additions.

Next one, we recommend EAC Commissioners implement a process for EAC professional staff, in consultation with NIST staff, to make minor technical changes to the requirements in a timely manner. This should include the development of an appeals process for these minor technical changes.

CHAIRMAN COPAN:

Thank you so much, Lori. I'm just wondering on the second resolution to the point that Ben Hovland had made earlier about charging the EAC Commissioners to implement a process which means that they will define a new process, that potentially that that could be dealt with in a way that the EAC Commissioners permit EAC and NIST professional staff to make -- and then, as you read, because waiting for someone else to create a process and to institute that process is perhaps an action that's not necessary. What we're asking for is simply permission that between the work of the EAC and the NIST professional staff that such appropriate changes can be made.

MS. AUGINO:

That's great. So I've rephrased it to say we recommend EAC Commissioners permit the EAC professional staff, in consultation with NIST staff, to make minor technical changes to the Requirements in a timely manner. This should include the development of an appeals process for these minor technical changes.

CHAIRMAN COPAN:

Excellent. Excellent. That's exactly the context, yeah.

COMMISSIONER HOVLAND:

And I will just flag so that people don't get mad at us later, I mean, this, I would guess, is a policy change for our agency, and that would require us to go through the process that we have to implement new policy. So, I mean, it's a little potato-potahto on what you say here, but no matter what, to implement something like that would require us to go through a process.

MS. AUGINO:

I think our purpose here -- Lori Augino.

COMMISSIONER HOVLAND:

Yes.

MS. AUGINO:

Our purpose here is providing you some recommendations that are important to this body.

COMMISSIONER HOVLAND:

Thank you. Yeah.

CHAIRMAN COPAN:

Excellent. Having heard modified Resolutions 1 and 2, is the group ready to go -- the group of TGDC voting members ready to go to accept these changes?

MALE SPEAKER:

Do you want to do number --

CHAIRMAN COPAN:

We're going to do #1 first.

MS. GOLDEN:

Are we doing #3 at all?

CHAIRMAN COPAN:

Let's deal with those that we've discussed already. And so for Resolution 1, as restated by Lori Augino, all in favor of the resolution to pass, raise your hand, please. All opposed, same sign. Resolution 1 is passed, as modified.

Now, onto Resolution 2, again, as modified, are we ready to go for a vote on this, or is more discussion needed?

All in favor of Resolution 2 passing, as modified, please raise your hand. All opposed, same sign? Resolutions 1 and 2 pass.

Thank you so much.

Now, let's discuss Resolution #3. Any points of clarification needed on Resolution #3?

MR. CHOATE:

So let me read it first. So Resolution 3, EAC Commissioners should implement a failsafe for VVSG changes in the circumstance where there is no quorum of EAC Commissioners.

MR. KELLEY:

And just a quick question. Did anybody think about what failsafe is?

MALE SPEAKER:

Well, I know what the old --

MALE SPEAKER:

Clearly, it's a backstop.

MALE SPEAKER:

Well, I know what I'd like it to be.

MALE SPEAKER:

-- the Cold War definition of it was --

MR. KELLEY:

It'd be helpful to, I think, get that out on the floor.

CHAIRMAN COPAN:

We welcome amendments.

MALE SPEAKER:

Yeah.

CHAIRMAN COPAN:

Neal, what do you got?

MALE SPEAKER:

So I don't --

MR. KELLEY:

Well, I think that -- I mean, this is broad, right, a policy that states what we said originally, which is that, in the absence of a quorum, staff can take up the mantle and move the VVSG forward.

That's -- I think that's the broadest definition. And --

MS. SAUNDERS:

So -- Mary Saunders. How about something like should implement a provisional process for accepting -- that's a standards term. They can do provisional updates to standards in the absence of this -- the quorum, so something along, you know --

MR. KELLEY:

I like that. The only thing I'm thinking is that if it is provisional, then it could be unwound. I mean, it -- and then you're back at square one potentially, right?

MR. WALLACH:

This is Dan Wallach. I love the idea of a provisional process because then let's hypothetically imagine that we have an absence of a quorum and then we have the provisional VVSG 2.1. At that point a State could adopt it. That's their call. It's still voluntary. And then when there are -- when there is a quorum, it could move

from provisional to final. So I love the word provisional. It exactly captures the process.

MR. KELLEY:

Yeah, and actually just someone whispering in my ear was helpful because I understand, Mary, that the other standards industry, that's pretty typical, right? Okay. So that's helpful to have that, yeah. I'm just thinking provisional ballots, you know, I mean --

[Laughter]

MS. BRADY:

I get it.

MR. LUX:

Well, and this is Paul. I would just point out since we were hung up on the definition of de minimis earlier, a failsafe can be defined as equipped with a secondary system that ensures continued operation even if the primary system fails, which even though we're not talking about systems, when we're talking about processes, but --

CHAIRMAN COPAN:

Thank you very much --

MALE SPEAKER:

Thank you.

CHAIRMAN COPAN:

-- Paul, for those points of clarification. Mr. Choate?

MR. CHOATE:

I was just going to point out that the failsafe also has a storied history in movies with Henry Fonda, so maybe we want to stay away from that connotation as well.

[Laughter]

MR. GILES:

This is Bob Giles.

CHAIRMAN COPAN:

Yes, Bob?

MR. GILES:

So does provisional get us to a place -- and I guess this is for Ben or for Cliff. If your legal interpretation is that the Commissioners have to vote on this as a final adoption, if we put something provisional in there to allow for it to move forward in the absence of a quorum, does that get us in a place where the Commissioners or Cliff, as legal counsel, are more comfortable before we -- because I don't want to pass something today that you guys are just going to ignore because you're going to say legally we can't do that, so thanks for the resolution but we're not doing it. I don't want to waste everyone's time. So if we can have a bit of a conversation about that, that might be helpful.

CHAIRMAN COPAN:

And I would look forward to Ben Hovland's comments on this again as well. This is Walt Copan. I'm wondering whether the TGDC wants to propose a process to be ratified by the Commissioners that -- one that the TGDC members and professional staff believe is workable in the absence of a quorum. And that could be a follow-on action then from this group to provide such a process document. I would anticipate it would be less than one page in length. But to the point that we shared earlier on, at least providing the Commissioners a starting point for consideration I believe would be most helpful based on what the TGDC believes is workable.

MR. GILES:

This is Bob Giles. I like that approach, and I don't know if there are other agencies that deal with situations like this and if NIST can maybe even point to those, I think that would be helpful to say -- so it's not just -- and I like that we're giving them a starting point. We're actually not just telling them it's a problem, we're giving them a solution to the problem.

COMMISSIONER HOVLAND:

One thing I'd flag -- and I'm not able to speak for any Commissioners other than myself -- but I think it's worth considering that the Commission has previously taken action to ensure that the

advisory boards are able to function without a quorum, and so we know that's possible.

As we were discussing yesterday in the HAVA process, you know, this body kicks it off. The other boards review it. You know, there are -- what HAVA says is that we can't vote to adopt it until 90 days after the other board has seen it. I think we've seen instances where NASED and others have -- I mean, VVSG 1.1 was essentially waiting for the restoration of a Commission or a quorum. Whether or not that's been utilized is a different conversation.

But I guess the point is I think that when the 2015 quorum adopted policies that allowed for the advisory boards to continue to function with the lack of a quorum, in some ways that has set up some of this. I mean, certainly there's the room to continue a process forward where you're developing something that is useful. Whether or not that can be called a provisional VVSG, I'm not going to get into the legal specifications of that, but I think there's at least already some structure in place to be productive in the absence of a quorum.

MR. GILES:

So this is Bob Giles. And getting back to the recommendation, I think we should put something out there. It took you guys a year and a half to give us a legal opinion on this from the point that you guys said it should not be separated. So my

concern is if we just ask you to develop something, who knows how long that could take. So I like the idea of us actually handing you something to say this is workable, this is agreeable. The TGDC, NIST, and other agencies agree that this is a workable solution. So I think we take it out of your hands and make a suggestion, and then put it back in your hands so you actually have something to work with.

MS. BRADY:

Yeah, I think Ben is absolutely right. We're in a different position today than we were, you know, before 2015 because back then we couldn't even meet as a body. But now all of the boards can meet. We can go through the entire process all the way up to it's time to hand it to the Commissioners. You know, so there is room to do that. And I can see that that's what the process would likely be, that --

MR. GILES:

This is Bob Giles. And I agree, but -- and I don't want to get to that point and then it sits on an empty table because you don't have a quorum and it sits there for years and years and there is no mechanism to get it across the finish line.

CHAIRMAN COPAN:

Yeah.

MS. SAUNDERS:

So this is Mary Saunders. Just -- I'd be happy to provide a couple of examples from standards developing organizations about their provisional standards process. I know IEEE has one. I'm looking at NFPA, which is the National Fire Protection Association. It's a code and standards organization. And typically SDOs were allowed provisional standards in order to make them available to the user community on a, you know -- on a reasonable basis. It allows the technical committee to publish the standard, roll it out to in this case the first responder community, responses so that they can use it.

That standard is a provisional standard that goes immediately back into the revision cycle. In this case, once that revision cycle -- full revision cycle is active, the approval cycle, but it allows you to get a document out there that's gone through -- most of the way through the process, the technical process so that the stakeholders can actually say is this going to work or not. So I can give you a couple of examples of what they use. I can give you a couple of examples of how it works in standards developing organizations, sorry.

MR. KELLEY:

Neal Kelley. My sense is that over the last year and a half or so that we've been discussing this is that there's been discomfort among the Commission about the issue, and it seems -- it seemed

to me that it was outside of statute. And now what we're being told is that it's within statute. In other words, you can go through this whole process, you get to the point where the Commission has to act on it, and if there's no quorum, then nothing happens. As a manufacturer, if you have a provisional standard, are you going to want to invest in developing systems that you know could be potentially changed down to -- I mean, it seems to me that standards of first responders is -- I understand that you're sort of changing process, but you're actually manufacturing something. Isn't that different?

MR. COUTTS:

McDermot from Unisyn. It's a risk, absolutely, but if you know that something's coming down the line and there's -- I mean, generally speaking, you're probably going to want to work towards the previous standard, so you're not to be working towards the newest one until you know it's actually going to be the thing.

MR. KELLEY:

So this is for -- this is probably not the right way to say it, but it's for show, right? We --

MR. COUTTS:

Well, I think what we're trying to do is get to the point where if there is not a quorum, we can actually not make it provisional but

say this is it, and if you want to make changes, well, then, we're going to go to another version with the changes in it.

MR. KELLEY:

Yeah.

MS. SAUNDERS:

So this is Mary Saunders again. To speak to risk, I mean, there -- and I'm speaking generally. There's also a risk of continuing to manufacture to a significantly outdated standard, so, I mean, manufacturers would have to evaluate the relative risks of looking to a 10-year-old standard versus a provisional, you know, much more recent standard. And if it's gone through N rounds of a consensus process only missing one final round, it's a risk you have to consider but balance the risks of not having something current out there.

CHAIRMAN COPAN:

Mr. Tatum has some information that can inform this conversation.

MR. TATUM:

Mr. Chair, I'd just like to put a little context on your conversation. As the body will recall, part of this discussion is relating to changes to the VVSG, to the requirements that address new innovations. As the requirements will be developed by this body and adopted by the EAC, any clarity that needs to be provided

to the existing requirements would come from the Test and Cert in the form of an RFI, a request for interpretation and, in some instances, a notice of the NOC. Help me there.

But my point is, as new systems are developed, a vendor would determine whether there -- they would meet the existing requirements as they currently exist. And if they -- if that system doesn't meet the new requirement, then we're looking at modifying or creating a new requirement that would address that particular new innovation. And that is what would then be considered. So we should be mindful of that when we talk about modifications and changes what exactly we're talking about to the requirements. It's to cover new innovations, so, as a vendor identifies something, then we get to the bridge of does it meet that requirement or do we have to consider something new?

Updates to the requirements are a completely different matter, and I think the Commission could identify methods to revise existing requirements as they've been adopted by the Commission. New requirements, if it's a new innovation, it certainly could be a policy matter that staff would not be able to address.

MR. GILES:

So this is Bob Giles. And I guess -- and again, because we took the approach we developed these high-level Principles and Guidelines so most likely wouldn't have to touch those again. It

would really take something extraordinary for us to have to go back in. And that's why we wanted the requirements to be separate and not be at the mercy of the Commissioners and not require a vote of the Commissioners.

You are now saying legally they have to -- that is your legal interpretation that if there is a change or a new requirement that the -- it has to go through the full process just like the VVSG in order for it to be adopted. Is that what you're saying, Cliff, or has that changed?

MR. TATUM:

That's a -- I didn't say that exactly because I provided an opinion --

MR. GILES:

No, I --

MR. TATUM:

-- to the Commissioners for them to address. But the point I'm making is there's a big discussion about whether wireless modeming and so forth should be part of the process. And the requirements, the technical requirements to allow for wireless in any form of a process is a technical requirement. But to say, yes, we're going to use wireless modeming, that is a policy decision that we -- we're not certain that staff would be the people to make. So

that would be a Commissioner -- I think a Commissioner issue even though --

MR. GILES:

Well --

MR. TATUM:

-- it's technical in nature.

MR. GILES:

And Bob Giles again. And that's a great point because what if that becomes an issue in -- and for whatever reason a lot of States want to move in that direction and we don't have a quorum of Commissioners. We -- it just sits there. And maybe they require EAC certification in order to use that in their State, and we sit there for years without -- you know, so do we just tell that State you're on your own? And this is what we're saying -- now, that's a requirement, and whether it's a policy or a technical requirement, that's what this whole debate is about. It's about something coming along down the road that we don't know about right now, and you are absent a quorum and we're stuck without being able to update the requirements.

COMMISSIONER HOVLAND:

And I would just like to chime in here to flag that I am 100 percent supportive of having this conversation, but this is obviously longer than the time we have remaining. And what we're here to do

today is to try to get through these requirements so that we can start building. And I think part of what I was saying yesterday was I would love to have this conversation while people are building. And so I don't -- I'm not saying that we shouldn't continue this conversation, but I'm saying we are eating into the limited amount of time we have left today.

MR. GILES:

This is Bob Giles. And I appreciate that, but this conversation keeps getting punted down the road, and it's -- whether it's the Standards Board, the Board of Advisors. You know, this conversation started in April of 2018 when -- after years of us talking about these being separate -- completely separate and the Commissioners not being required to vote on the requirements. You guys changed the rules on that and changed your interpretation of that in 2018. So here we are in, you know, September of 2019 still having the conversation and still trying to punt it down the road further.

This body is charged with looking over the requirements and making these recommendations, and that is a concern of this body that we don't get together that often. So I get that we're on a time crunch today. And, to be honest, I mean, this is really important to at least to me personally and I believe members of this board. And if it eats into the time of the Requirements, I'm not rushing through

these Requirements then because if you're telling me we can't guarantee that if you guys pass these along today and adopt these today or recommend these today that it's not two years before we get another shot at it. And that's my concern that if new technology comes along, we have to go through this process. If -- and then if there's no quorum.

And we get it. You know, there's two debates here, whether you have to vote or not on the Requirements, and then if you guys are adamant that you do, then the second is, in absence of a quorum, there has to be some failsafe, provisional, whatever we're going to call it. So to me it is a critical discussion that we just keep kicking down the road. And we've yet to really have you guys say yes or no.

And the Standards Board, the Board of Advisors, they've all passed, you know, recommendations for you guys to address this and going back to April of this year and has there been any conversation on this, you know, since the two boards recommended it. And now you're going to get a third board recommending it, and it just seems like, all right, let's get to the meeting, let's pass these, and we'll worry about that the next time one of the boards brings it up. And, I mean, that's my personal feeling.

CHAIRMAN COPAN:

Thank you very much, Mr. Giles. I think that this is an area that all of us believe is important for the effective functioning of the TGDC and provide timely updates to the Requirements as would benefit the American voting public.

We've discussed a little bit earlier that the TGDC members will work together to provide a recommended process for the EAC to consider, and I'm just wondering whether we could bring this particular item to a close by voting on Resolution 3, as we've amended it, with this understanding that within 30 days from today that a proposed process will be delivered to the EAC Commissioners for consideration.

MS. AUGINO:

So I have some proposed new recommended language adding this 30-day thing. EAC Commissioners should ratify a provisional Requirements review and approval process for the EAC professional staff to update VVSG Requirements in the circumstance where there is no quorum of EAC Commissioners.

The TGDC will provide a process recommendation within 30 days.

CHAIRMAN COPAN:

We've heard Resolution #3, as modified, being read. Are we ready to go to a vote on this matter? Thank you.

MR. KELLEY:

Sorry, can I just get a point of clarification. And maybe this is for Cliff, but in HAVA is -- are the requirements tied to VVSG in statute so that it must move forward in that manner, or is it just that the process for the final adoption of any changes has to go before the Commission? So I'm trying to figure out if you can parse those two out in statute.

CHAIRMAN COPAN:

Mr. Tatum?

MR. TATUM:

The HAVA provides that the Election Assistance Commission will create Voluntary Voting System Guidelines for certifying voting systems. The Voluntary Voting System Guidelines are standards and requirements. You can develop Principles and Guidelines that a voting machine vendor cannot build too, so it is -- by definition, the requirements have to be included in those guidelines.

There are certainly, as identified, different types of requirements, so the Commission could look at developing a separate process for dealing with the different types of requirements that are policy-related and that are technical-related. And there's been a proposal submitted to the Commission.

MR. KELLEY:

Thank you. Thank you for that clarification. I appreciate it.

MR. CHOATE:

This is Judd. I just would renew my request to see that legal opinion when it's appropriate.

MR. NEWBY:

This is Brian Newby. And this may be another thing for our general counsel, but just I guess Bob's point, if there is a 30-day process, I think -- wouldn't the TGDC need to define how that's going to happen? Would that be through some public meeting, phone calls? I mean, I just want to make sure you -- however you're going to approve it, 30 days, you don't leave that loose and then that drifts itself. I don't know. That might be a -- it's a legal thing perhaps, but --

MR. CHOATE:

So this is Judd. I think the 30-day part was about how long from this moment it will be before we provide the recommended process.

MR. NEWBY:

But how is we -- who is we? Is -- wouldn't the TGDC have to vote on what that recommended process is?

MR. CHOATE:

Okay. I get where you're going.

CHAIRMAN COPAN:

Yes. And as this group has been operating very effectively using webcast programs and conference calls on an interim basis that I would see that there would be a vote of the TGDC members on the proposed process within that time frame, would not require another physical in-person meeting but that there would be a sub-team of the TGDC that would develop such a draft process, provide inputs from all the other members at least to have that opportunity to review, and then to agree that this is ready to be passed along to the Commission.

MR. NEWBY:

I was just suggesting you define that process here. That's all, so --

CHAIRMAN COPAN:

Yeah. Any other comments before we go to a vote on Resolution 3, as modified? Lori, would you read that once again just so we know?

MS. AUGINO:

EAC Commissioners should ratify a provisional requirements review and approval process for the EAC professional staff to update VVSG requirements in the circumstance where there is no quorum of EAC Commissioners. The TGDC will provide a process recommendation within 30 days.

CHAIRMAN COPAN:

Excellent. Any other discussion before we go to a vote? All in favor, please raise your hand. All opposed, same sign.

Resolution 3, as modified, has been passed.

And so, Lori, thank you so much for your very good and timely edits to these resolutions. It's been a great service to the TGDC members here today and those who have joined us remotely.

Ben, next order of business, please.

COMMISSIONER HOVLAND:

I think next up probably should be working through the issues that were raised yesterday that were noted that there could be probably minor changes and just to make sure that those are sort of in order.

CHAIRMAN COPAN:

Excellent. Thank you so much. I know that there has been some good notetaking on those matters and that we should now move to discuss them. Mary, would you lead us through this process, please, Mary Brady?

MS. BRADY:

Okay, Ben. This is Mary Brady. Let's -- I still can't see it.

MS. GOLDEN:

Wow.

MS. BRADY:

Keep trying.

MS. GOLDEN:

Keep going.

COMMISSIONER HOVLAND:

Oh, excellent.

MS. GOLDEN:

Oh, really?

FEMALE SPEAKER:

Sorry about that.

MS. BRADY:

Are we there yet?

MS. GOLDEN:

I still -- no, I'm still --

MS. BRADY:

Keep going.

MS. GOLDEN:

Yeah, I'm still nowhere close.

MS. BRADY:

Oh, I'm close.

MS. GOLDEN:

I'm getting there.

MALE SPEAKER:

Okay.

MS. GOLDEN:

It's getting -- I'm maybe leaning over the table --

MALE SPEAKER:

Yeah.

MS. GOLDEN:

-- but --

MALE SPEAKER:

I just got these, my first pair of Progressives. It's killing me.

MS. BRADY:

Okay. So these are organized by principle and were captured as we went through the day. So I -- my suggestion is that we run through them. My recollection of what occurred yesterday is that some, like perhaps this first one, is calling for an outside document, an external document. That's something we can agree on and move on. There are some that -- you know, that highlight that -- there were some changes that were perhaps in the redline version --

MR. LOVATO:

Real quick, Mary. This is Jerome. Would you like me to print that out and distribute it?

MS. BRADY:

It could be helpful, yes.

MALE SPEAKER:

Yes.

MR. LOVATO:

But would --

MS. BRADY:

Yes. And --

MR. LOVATO:

Yeah, if you said --

MS. BRADY:

Ben has the copy, has the only copy, so you'll --

MR. LOVATO:

Okay.

MS. BRADY:

-- you have to get with Ben. Um-hum. Yes.

MALE SPEAKER:

Single point of that entire hearing.

[Laughter]

MS. BRADY:

Well, I have the raw notes. I can re-create it.

COMMISSIONER HOVLAND:

And, Mary, if you think this is an appropriate time to jump in and say, you know, I think that it's what we're trying to look at here is if the sense of this body was captured yesterday so that if we move to a point of the TGDC recommending the requirements

move forward, that it's noting, you know, this isn't about the TGDC dotting every I and crossing every T. It's recognizing that these requirements are in a position with these notes taken to move forward in the process. I think that's what we're hoping to ask later today.

And so as you look at these, I think it's not about necessarily wordsmithing everything but making sure that the sentiment of this body was captured and then the NIST team will insert that. And as was discussed yesterday, this is just the first stop -- step in a longer process.

MALE SPEAKER:

Yeah.

MS. BRADY:

Yes, thank you, Ben. It -- and I do think they'll fall into that category, but if I could -- you know, I think there's a number of different categories that we're looking at. One is external document, the second is perhaps the principles, so the redline version of the Principles and Guidelines went too far and there was some considerations on changing it back. So that's an area where both Ben and I are noting those changes and those discussions, and they can be handled, I believe, before a vote by the Commission. I think there's still time to make those changes. And

then there's others that are changes to the actual requirements themselves.

They fall into a couple categories, as been mentioned. There's some, so, for instance, one perhaps like multifactor authentication for critical operations, we've got multiple opinions here. One -- you know, on the one side it says like, okay, let's just drop opening and closing polls from that list. Otherwise, that list is okay. On the other side it's like, no, I think all changes here require multifactor authentication. Perhaps that's an area where this body has weighed in a little bit and we need additional election officials in particular to weigh in, which will happen as part of the Standards Board review process. So perhaps that's an area that, you know, we can say, okay, we believe there should be some multifactor authentication here. Let's let the review process take care of it. They'll be -- and there are other areas where it's like, no, perhaps maybe ballot identifiers that -- where we really sort of need to come to a conclusion.

So let's -- I propose that we just go ahead and start stepping through these. Ben will be taking notes, perhaps capturing the wisdom of the group, you know, so we can see it in front of us. Is that possible, Ben?

MR. LONG:

Yeah, I mean, we'll see it right here. To a degree you can see it.

MS. BRADY:

Okay.

[Laughter]

MS. BRADY:

And let's just step through them and hopefully we can get through all of them that --

MS. GOLDEN:

Since -- Diane Golden. Since the first one's mine, the only thing I would add to this is that last clause in Principle 5, without discrimination, I think my point is I don't know how we leave that in the principle when there is nothing in the -- or -- in the guidelines or the requirements that actually address as nondiscrimination and segregation. I mean, I hate to say it, but we have something in a principle and we're not -- we can't say that this is going to happen. If you follow those requirements, there's nothing to say that you're not going to be discriminating and segregating because there is nothing in there that prevents that from happening. So I think we're being disingenuous by putting it in the principle and making us feel good that we've done something about this when we haven't.

MS. BRADY:

Okay. So we're talking about Principle 5, equivalent and consistent voter access, all voters can access and use the voting system regardless of their abilities without discrimination. And the point here is that there were no requirements that actually support it.

CHAIRMAN COPAN:

Has this particular topic been the conversation of this board to -- either yesterday or prior in terms of the definition of how this -- sort of without-discrimination clause will be then reflected in the standard language in the requirements?

MS. GOLDEN:

No. I mean, the discussion -- the whole -- you know, the whole issue of the segregated machine has been discussed, but it's only -- is out of scope, quote/unquote, because that's not about the machine itself. It's about how many of them and how, you know, the voting process is set up and all of those. So I'm not saying we've, you know, ignored our duty by not addressing it. We've been told it's out of scope so we can't address it. So what I'm saying is we need to take it out of the principle then because we are not doing anything to address discrimination and segregation. We're allowing it because we've been told it's out of scope to address it I guess.

And I will point out if you look at the other standards in there, we have standards about positioning of the voting system and reach ranges and clear floor space around the voting system, so to me that's wandering away from the system itself anyway and the positioning of things around it, so I don't know how we consistently are being told we can't address the other issue, which is the number and the segregation of this -- anyway.

But -- so in answer to your question, it's been discussed, but it's always been pushed out of scope. And my point is just if we're not going to address it, then we need to take the words "without discrimination" out of the principle because we're not addressing it.

MS. AUGINO:

Lori Augino. Are there places where -- you know how we've kind of referred to other documents or best-practice research and we've referenced to that to point folks to go where to find those most up-to-date recommendations? Could that be a method that we would want to consider implementing to still deal with -- to deal with the issue and ensure that we're addressing it?

MS. GOLDEN:

I think that was the discussion yesterday with the guidance document. And honestly, this is again -- I'll use the Access Board as an example. In accessibility circles this is what you do. You define how many accessible parking places in a parking lot based

on a whole bunch of ratios of how big the building is, how many total parking spaces there are, blah, blah, blah, how many accessible stalls do you need to have in a bathroom in a building, how many of them, where -- you know, where are they located, what's the egress to get to them. You know, they deal with this all the time in the built environment, and so this is -- it's a similar issue but very unique because voting happens in a lot of different ways whether it's, you know, vote centers, you're taking equipment out, you know, what do you do? Does everybody who goes out -- so there's a lot of things to think about and discuss.

And my fear is, as I said earlier, there's litigation starting already. I don't want the courts deciding this because they are going to mess this up. And then we'll be dealing with conflicting court decisions and trying to figure out -- it would be so much better if people who understood voting and accessibility did this. So whether we do it as a guidance document, you know, or at some point in the future it becomes -- I don't care. I -- you know, my soapbox today is I do not want that term "without discrimination" in a principle when we have not done a darn thing to address it.

CHAIRMAN COPAN:

Thank you. And I believe that Lori Augino had a very good suggestion here to reference documents' best practices, et cetera.

MS. GOLDEN:

There aren't any at the moment, so we'd have to build them.

MS. BRADY:

We'd have to create it.

CHAIRMAN COPAN:

Okay. And, Mr. Tatum, you've been patient.

MR. TATUM:

Mr. Chair, the -- to Mrs. Golden's point, the -- I'd reminded the group that HAVA itself identifies that there should be at least one voting system in each -- I'm not sure if it uses the term precinct but within each jurisdiction for voting --

FEMALE SPEAKER:

Polling place.

MS. GOLDEN:

Polling place.

MR. TATUM:

Polling place.

MS. GOLDEN:

Polling place.

MR. TATUM:

And I'd also remind Mrs. Golden that what the requirement is establishing is that the voting component shall not discriminate. So whether there's 10 or 20, the purpose of the requirement is to ensure that the one unit -- that that unit does whatever it's

supposed to do in a nondiscriminatory manner in 20 different units, but it's got to be the one that -- it starts with the one and then it's replicated.

And I follow the analogy with the Access Board, but that's a -- they're not exactly corollaries as it relates to the building of a unit. So I'd just point that out. I think the body would be -- I would encourage the body to perhaps pass a resolution that suggests that the EAC develop the guidelines that addresses the question that you want to be identified.

MS. GOLDEN:

And I am -- you know, that's kind of where we were yesterday, and I'm fine with that. I would respectfully disagree. Machines don't discriminate. Just the term discrimination has a very clear understanding in the disability world, and that is people discriminating and people with disabilities being segregated and treated separately, differently. And that is exactly what happens when it's one -- when literally HAVA -- HAVA itself has set up this dilemma by saying one accessible machine as if that somehow is not discriminatory in and of itself. And separate is not equal, period.

So I'm just saying I don't think that we are being, you know, upfront by having that clause in that principle. I just think it needs to come out. It doesn't add anything, so anyway.

MS. BRADY:

Sharon might have something.

CHAIRMAN COPAN:

Yeah. Sharon, do you have a comment that you would like to share?

DR. LASKOWSKI:

Yes. So I certainly agree that we need to deploy these properly. We do -- we got kind of halfway there I think when we said that any electronic system has to be fully accessible. So the question is one of deployment. So we've -- to me that's maybe one-third of the way there. I guess the issue in writing these guidelines was how can we talk about the deployment. In other areas of the standard like the area around the space and reachability around the voting station, we have said the manufacturers have to specify what that is. Yeah, in this case they can't specify how many. That's --

MS. GOLDEN:

Yeah.

DR. LASKOWSKI:

Yeah, so -- yeah. So the guidance document was the only way I saw going forward, but I would certainly entertain any other suggestions to make this work better.

MS. GOLDEN:

And last time -- I get that. And if we do -- and this is going to take time to develop, so, like I said, there are no best practices to point to, and that's my concern. I -- clearly one machine in a corner in my book is discriminatory pure and simple. But if a judge decides it's every machine has be -- have everything, okay, that's going to send folks into a tailspin, you know? That's going to be a whole other -- you don't want that. So what is right, 50/50? Probably not. I don't know what's right. But -- so the guidance document.

But I'll just go on record I want this principle changed because it offends me personally that we think we're doing something about discrimination when we're not. We're actually going to be encouraging it, not discouraging it with -- you know, anyway --

MR. KELLEY:

Neal Kelley. I think Diane has, you know, a good point because I just want to use the example and follow-on what Cliff was saying, in California under the vote center law currently they have changed it from one accessible unit to a requirement of three. And I have just acquired a new voting system, and I thought that was too low, and so I went to five. So when you have something in statute that says this is what you should do, well, that's what all the election officials are doing in California.

MS. GOLDEN:

Yeah.

MR. KELLEY:

They're putting in three.

CHAIRMAN COPAN:

Yeah.

MR. KELLEY:

So having some good guidance document that says under

certain formulas are under certain --

CHAIRMAN COPAN:

Yeah.

MR. KELLEY:

-- situations, you know, this is what you might --

MS. GOLDEN:

Sure.

CHAIRMAN COPAN:

Yeah.

MR. KELLEY:

-- go to would be helpful. I really do.

MS. GOLDEN:

Excellent.

CHAIRMAN COPAN:

Yeah. It seems to me that there's broad agreement here that such supplemental guidance would be appropriate in order to address this particular very important principle. And I would personally recommend not striking that reference at this time from the principles in view of all the work that's been done, but let's anticipate it and the record show that work will proceed within the TGDC and also within the community of interest to have the guidance for the deployment of these systems that are outlined in the requirements section of the VVSG 2.0.

DR. LASKOWSKI:

Yes, and I also think any guidance document that gets written needs input from NASED, needs input from the Access Board and other disability advocacy groups.

CHAIRMAN COPAN:

Indeed.

MR. GILES:

This is Bob Giles. I agree. I think having a document -- and I think we leave it in there to hold our feet to the fire and make us do that. If we pull it out, then you -- then it may just get lost in the shuffle. So I -- and I like the example you used with the parking lot. You know, there's -- if there's -- you know, that's -- when we do our ADA compliance for polling places, we go in and we know that I have to have three, I have to have five, whatever the number is, so

if there's a formula that you're comfortable with and the community is comfortable -- you know, we may not get to total agreement, but I think having a guidance document is critical, and I think we should leave it in there to make us do that.

CHAIRMAN COPAN:

Thank you so much, Mr. Giles.

Sachin, you had a point to make, please.

MR. PAVITHRAN:

Yeah, I just want to echo what Diane was saying. You know, as a disabled person, often when I go to a polling place, I -- you know, the place I vote is in the corner where it's separated from everyone else. So it is important for us to really look into something like this, and just like Diane was saying, putting it in the language saying that we are addressing something without really addressing it is just trying to show to the disability community that there's not -- you know, there's really no validity to it because it's not been addressed and still being kind of pushed around. So, no, it is constantly a pattern in any polling places. We get shoved in the corner, so it needs to be really addressed.

COMMISSIONER HOVLAND:

I'd just add -- again, I can only speak for myself here, but, you know, in my time I've noticed that all of the Commissioners are very cognizant of the fact that the Help America Vote Act that

created this agency was an accessibility law and so -- and have shown a lot of dedication to this issue. I think this naturally lends itself to a potential working group that we could create with the entities that were mentioned. And I'm happy to take that and discuss it with my colleagues.

CHAIRMAN COPAN:

Excellent. Thank you so much. We've had I think a very rich conversation about this topic. We all believe that these are important principles to be addressed within the requirements section, and then an action plan has just been outlined for us by Mr. Hovland.

So the next item then on our list, Ben? Oh, other Ben, sorry. Mr. Long.

MR. LONG:

So the next one is -- sorry, Guideline 5.1, the discussion of the meaning of modes, Guideline 5.1, discussion of the meaning of the term modes, I've highlighted it on the screen. And it states -- I think, Diane Golden, this might have been your comment, that there is a wording change in the word modes and some of the language changes that occurred. And you made some comments about the consequences of those changes and you wanted to ensure a consistent experience across the modes. Did you have more to say on that?

MS. BRADY:

Yeah, so this is -- this is Mary. But this particular comment was against the guideline, not the requirement, and so it was the redline version of the guideline.

COMMISSIONER HOVLAND:

And I believe -- I thought the conversation was useful yesterday, and it was noted to the degree of where we are with the Principles and Guidelines.

MS. GOLDEN:

Yeah, and I was -- the only thing I would add is after I read through -- it's on page 129 -- the whole discussion of that principle and those two guidelines, the word method is never used in that whole page. It uses mode. So somehow I just think that edit -- it doesn't even make sense with what you've got in the rest of the wording because -- anyway, so just go back and look at it. And I do think it just fundamentally changes -- actually, the language on page 129 is much better and clearer than either of -- anyway, so --

DR. LASKOWSKI:

When I went back and thought about it -- this is Sharon Laskowski -- a voter could use a combination of modes as well, so putting it as a method kind of brings it up a level. So maybe we need to be done is to look at the discussions underneath it to clarify what we mean by method versus mode because I -- and thinking

about it again, I do like the word method there because it's broader. It's not just the experience for a particular mode but whatever combination of access a voter is using.

CHAIRMAN COPAN:

It seems to me -- and I think the points have been well made here that the revised text of that section then will define method at the higher level and then the mode or combination of modes in the context of that definition. Very good. Thanks.

DR. LASKOWSKI:

Noted. Noted.

CHAIRMAN COPAN:

Next topic, please?

MR. CHOATE:

Can I ask a -- this is Judd. Can I ask a clarifying question real quick? Or perhaps I will state what I think I heard yesterday and somebody can tell me what -- if this is correct. So the redline version that we have, the changes were made by -- and what I think I heard was a combination of the EAC working with NIST. Is that -- in like working groups on particular points?

MS. BRADY:

That is correct.

MR. CHOATE:

Okay. Thank you.

CHAIRMAN COPAN:

So we have the recommendation from Neal to document the comparison between version 1.1 of the VVSG and 2.0. Is such a document actually available?

MS. BRADY:

No. So this is Mary. So yesterday we indicated that it was available. It is available on the human factors front, but it's something that we can put together and make available. We have the information in a -- in various places, and so it is certainly something that we could put together and make available.

CHAIRMAN COPAN:

So NIST will then take the action to provide that comparison document? Thank you very much.

The next point is under gestures, please.

DR. LASKOWSKI:

I can elucidate -- this is Sharon -- if you wish. So there was some discussion about going beyond simple gestures. In a universal design, as -- and Sachin addressed this. We want some simple gestures. It's not so much for accessibility. We're not going to match what people are used to for their personal assistive technology, and they can't learn something different at the polling place. We wanted to just include very simple gestures like touch to scroll not necessarily for accessibility but for all voters because

that's kind of an expectation now with the technology. So that's why we kept it as a -- very simple and not trying to address all the different kinds of gestures someone might use with their smartphone as a personal assistive device. I hope that clarifies a little bit.

CHAIRMAN COPAN:

Very good. Thank you so much. Any other discussion on this point before we move to the next? Thanks.

Then we'll move on to Principle 6, Guideline 6.2 and 6.2-A. This is on the E2E considerations. Mary Brady, would you like to discuss this topic, please?

MS. BRADY:

I'd be happy to. I'm trying to figure out where we are. So this was -- Sharon, I think it was under voter privacy?

DR. LASKOWSKI:

6.2, voters can mark, verify, cast their ballot or associated cast vote record without assistance from others --

CHAIRMAN COPAN:

Would you put the mic on, please?

DR. LASKOWSKI:

This is Sharon. 6.2, voters can mark, verify, and cast their ballot or other associated cast vote record without assistance from others. And the discussion was what about in E2E systems? My

point was that we would look -- that we believe that if there's verification that's included in an E2E system, which is after the voter leaves the polling place, that would be covered.

MS. GOLDEN:

And -- okay. Diane Golden. My suggestion was just to add to the discussion box of 6.2-A the fact that end-to-end is covered in the verifying of that. So if your end-to-end thing prints a little print receipt that you're handing to somebody, that's not going to fly, which, as far as I know, that's what they all do now. So it's just to call that out, that voters can mark, verify, and cast and verify, you know, even though it doesn't have verify again at the end. If you're doing an end-to-end system --

CHAIRMAN COPAN:

Right.

MS. GOLDEN:

-- that accessibility requirement applies and you're going to have to figure out how to make that end receipt thing accessible.

CHAIRMAN COPAN:

Yeah.

MS. GOLDEN:

So, yeah --

CHAIRMAN COPAN:

Very good.

MS. GOLDEN:

-- it's just adding a discussion --

CHAIRMAN COPAN:

So --

MS. GOLDEN:

-- in there.

CHAIRMAN COPAN:

Thanks so much. Yes, so that action will be taken then as a follow-on. Wonderful.

The next discussion point, please.

MS. BRADY:

So this next one is under Guideline 8.3, and this one applies to the guideline. And I believe Judd, Lori, and McDermot, I think at the point of the discussion yesterday, we weren't sure whether or not we could update the guideline, but it appears as though we have an opportunity to do that. And, Judd, you had suggested an alternate wording for the guideline. McDermot, you had asked whether or not -- who's the judge of reasonably easy.

So the guideline is 8.3, which says the voting system is evaluated with a wide range of representative voters, including those with and without disabilities, for effectiveness, efficiency, and satisfaction. I suspect that the reasonably easy comes from a

discussion under the requirements. Is that correct, Sharon? And,
Lori, you --

DR. LASKOWSKI:

No -- well --

MS. BRADY:

-- had some issues with --

DR. LASKOWSKI:

So --

MS. BRADY:

-- evaluated by voters.

CHAIRMAN COPAN:

Yeah, Sharon, please?

DR. LASKOWSKI:

So this -- these -- both 8.3 and 8.4 actually are based on requirements that were even in 1.0. And that's -- basically is to conduct formal usability tests with test participants that reflect the voter population and the election worker population and collect standard metrics. So this is kind of rather, you know, best practice standardize wording that we've been using since 2005.

COMMISSIONER HOVLAND:

I don't want to belabor discussing the Principles and Guidelines, but I wondered -- and reflecting on this conversation yesterday -- if part of -- you know, obviously people were noting the

change from "by" and "for" with the intention being a "by." But is part of I guess the -- is part of the issue here -- as we split or as the Principles and Guidelines have been split from the Requirements, you know, these are high-level principles, which people want this to be used by election workers. Now, the Requirements, how do you implement that? Well, this is what a test looks like to know whether or not it can be used by election workers. So, you know, I don't know if that was where the rub was, but --

MS. BRADY:

I do think that there was some confusion on whether or not you were actually using election workers and -- as part of your -- those who were testing the system. And I think that that got cleared up as part of the discussion. But yes, election workers are still, you know, test subjects and, you know -- but it is a usability expert that is likely running the test.

CHAIRMAN COPAN:

Yes.

MS. BRADY:

I'll help you out.

MS. GOLDEN:

This is Diane. It's -- the sentence structure -- old English. The sentence structure is really bad because the -- you know, changing that "by," "for," and the "by" at the end of the sentence,

it -- the whole sentence structure -- I just rewrote it -- said usability of the voting system by election workers is -- I mean, it's the clause. It's the "by" being at the end of it. Does that relate to their doing the usability testing or are they the test subjects? And it's unclear because it's stuck at the end of the sentence in both of those principles. The voters and the election workers stuck at the end of the sentence where you've got usability testing and in the test subjects, and it's not -- it's just worded poorly. So without reading that with a whole bunch of requirements underneath it, you are going to misinterpret it. And I think that's the challenge. If this document is supposed to stand on its own and people are going to use it, then I would suggest somebody revise the sentences so they're clearer, but --

DR. LASKOWSKI:

Yeah, there were lots of different suggestions, and we didn't come up with good wording. The -- there's only two requirements, one for 8.3 and one for 8.4, so there's not a whole bunch of requirements. There's only one under each one. We use the word "with election" -- "usability with election workers," "with voters" in the requirements, so -- and in Guideline 8.3 it says, "evaluate with a wide range of representative voters," so maybe we need to put a parallel construction in 8.4, so evaluate for usability with a -- with representative election workers or something along that line if we're

still wordsmithing guidelines. There's only one requirement. I think it's clear from the requirement what the meaning is, so --

MS. BRADY:

Well, I think we can take it as an action that, you know, we'll provide any support that Ben needs --

DR. LASKOWSKI:

Okay.

MS. BRADY:

-- to -- you know, in clarifying the --

DR. LASKOWSKI:

Okay.

MR. COUTTS:

Right.

MS. BRADY:

-- the guideline.

CHAIRMAN COPAN:

Thank you.

MR. COUTTS:

This is McDermot. This -- I mean, what we're really trying to do is make sure that the system is usable by people who are performing the functions of a poll worker. Anybody can be a poll worker to almost -- to any -- within certain limits I think, so a voter can be a poll worker.

[Laughter]

CHAIRMAN COPAN:

Very good.

DR. LASKOWSKI:

Our testing actually describes sort of the typical demographics that you would use for -- and you'd get some novice election workers and some experienced election workers to test with.

COMMISSIONER HOVLAND:

Just to pause this conversation temporarily, we received a report that the streaming service may not be working. I don't know if somebody with a computer can check. It may just be an individual's device, but we'd like to make sure that we are in fact able --

MALE SPEAKER:

It's good.

COMMISSIONER HOVLAND:

Okay.

MALE SPEAKER:

It seemed to be working, but it wasn't -- it was never showing the -- what's up on the board, so it's only shown just the people interaction.

COMMISSIONER HOVLAND:

Got it. So this sounds like what was reported was maybe an individual device issue. Thank you.

MS. BRADY:

Okay. So our next -- I think that's it for human factors. The next set of comments were against the core, so this is Ben Long and John Wack. John, you might want to join us just in case there are questions. Under Guideline 2.1, Geoff Hale noted that the change in the guideline language does not match the scope implied by the guideline language as a result of the redline version does not match the requirements. The -- essentially, the guideline used to apply to systems, and after the redline change in systems -- voting system software, the requirements actually apply to systems, you know, so that's -- I think that's noted, and we'll work to make that change.

The next comment was on reproducible builds, and I -- Dan, this -- you brought this up, and there was a fair amount of discussion on whether or not we should require -- whether or not there should be requirements that might permit reproducible builds on -- requirements on the manufacturers. There was discussion that this is taken care of as a result of testing, and the QA, the quality assurance configuration management components that will be moved to the EAC Testing and Certification manual.

It is true that -- after some conversation with Dan last night it is true that in modern software engineering you would normally have -- if you have a rather complex system, you would have some method to -- that -- you would have some software that would allow you to do automated builds, continuous integration testing, things of that nature that really sort of limit the number of errors that can be introduced by change or by configuration changes because it's encapsulated in what used to be -- there's been a lot of progress since the early days of makefiles in terms of creating this type of environment. The challenge is it's different depending on what language you're using to build in, you know, so the question is should there be requirements along this? Should it be perhaps handled in a guideline document, or should be left to the manufacturers to choose their -- a built environment that suits them?

CHAIRMAN COPAN:

Thanks very much. I'm conscious of the fact that we have kind of gone beyond our scheduled break time, and so I'd like to invite David to make a comment. I then suggest that we go to a break, a 10-minute break, please. Thank you.

MR. WAGNER:

David Wagner. I'm confused by this discussion, and I want to check whether Dan feels that his concern has been addressed.

So there's two notions in which you could imagine, talking about build. One is just it has to be possible to build it again another time. That's where build processes come in. The second -- a stronger notion is reproducible build, that it would have to be possible to build it again and get exactly the same binaries. And that usually takes extra care that isn't usually present in most modern build processes. And just relying on people to have modern software engineering will not provide a reproducible build that produces the same binary.

So I wanted to find out which of those you were advocating for, Dan, and find out whether this -- what you're talking about, Mary, actually addresses that or not because I'm concerned that maybe Dan was talking about a reproducible build to get the same binary and that maybe that's not getting addressed with the proposed action.

MS. BRADY:

And I would just sort of add on to that is -- does the current practice already provide us with reproducible builds with -- I know McDermot had mentioned that this is built by the VSTL and then pushed out from the VSTL.

MR. COUTTS:

I mean, that would -- this is McDermot. That's not necessarily a reproducible build, but what we have is one build that

is tested, and that is the one build that is used for everywhere. And actually if we have a build that was from somewhere else, we want to know it.

MR. WALLACH:

So we talked a lot about this at dinner later on. I am not prepared to say that VVSG 2.0 should specify there shall be reproducible builds. That might be something that we want to bring up for subsequent revision.

CHAIRMAN COPAN:

Yeah. Very good. I think these points of clarification have been very helpful.

I now suggest that we take a break and that we have 10 minutes to do so. So let's reconvene here at 10:36.

[The Committee recessed at 10:26 a.m. and reconvened at 10:43 a.m.]

CHAIRMAN COPAN:

We are ready to resume. And as we are taking our seats, I am asking how many of our members of the TGDC will be able to stay here until noon just by a show of hands.

FEMALE SPEAKER:

What now?

MALE SPEAKER:

Till noon.

CHAIRMAN COPAN:

Till noon.

FEMALE SPEAKER:

Yes.

FEMALE SPEAKER:

Oh, we're good.

CHAIRMAN COPAN:

Very good. Thanks. In light of that, we'd like to go forward and consider some of the open topics that have not been fully discussed. We have a presentation chart that's up on the one screen, but it's not in the lower one. And then we'll come back to the other points of editing that were reviewed yesterday.

So let me turn it over to Gema at this time.

MR. GILES:

Hi. This is Bob Giles before Gema is -- so we're not finishing this document today?

CHAIRMAN COPAN:

We're going to come back to those points.

MR. GILES:

Come back to it? Okay.

MS. BRADY:

So, in the meantime, what I'm doing is trying to get a handle on how many more of these issues do we have to go through as opposed to just going through --

MR. GILES:

Do every item --

CHAIRMAN COPAN:

Yeah.

MR. GILES:

-- point by point.

MS. BRADY:

So some of it is just discussion that we were okay with --

CHAIRMAN COPAN:

Yeah.

MS. BRADY:

-- and others it's, you know, big things like, okay, ballot IDs --

MALE SPEAKER:

Got it.

CHAIRMAN COPAN:

Yeah.

FEMALE SPEAKER:

Good call, Mary.

MS. BRADY:

Um-hum.

FEMALE SPEAKER:

Good call.

MALE SPEAKER:

Yes.

[Laughter]

MS. HOWELL:

I've got to make sure I finish today --

MALE SPEAKER:

Good luck.

MS. HOWELL:

-- so we get through everything.

CHAIRMAN COPAN:

Yeah, absolutely.

MS. BRADY:

And I think, Gema, there's no need to go back through the slides again. It's -- they were introduced yesterday, so it's more of a -- I think we want to start -- the two that Dave Wagner has suggested we start with are wireless and E2E to make sure we have those discussions while we're here in a face-to-face environment, and then we'll see how much more we have time for. So it's -- if you want to -- shall we start with wireless perhaps, David? Okay. So -- and maybe we can --

MS. HOWELL:

And skip towards --

MS. BRADY:

-- move the slides forward.

MS. HOWELL:

-- the end to the open areas and just go to the wireless open area. Thanks, Ben. And this is Gema. You wanted me to quickly go over the two slides or just to jump right into questions? All right. Questions it is.

MS. BRADY:

And, David, maybe you -- you know, I know you have some concerns from the cybersecurity working group point of view that perhaps you want to start with.

MR. WAGNER:

Dave Wagner. To tee this up, I think that there is a significant -- so there -- the issues here are whether to prohibit wireless and whether to prohibit internet connectivity and telephony, so that -- internet connectivity would include things like cellular connections. And there's a significant component of the security community and advocates who would like to see the standard prohibit all wireless and prohibit internet and telephone connectivity. So that's the issue to decide upon for this body to decide is does the TGDC want to prohibit those in the standards?

CHAIRMAN COPAN:

Thanks very much for that summary. Linda.

MS. LAMONE:

I -- the -- my concern with limiting it or prohibiting it rather than having some wiggle room with it is we have got a whole generation of people that are coming up that do nothing but use the phone for everything. And if we don't start trying to find a way to do it, they're not going to be voting. They don't know what a stamp is. They don't go to a post office. And it seems to me shortsighted of us to say, no, you cannot do any of that. I think it would be better if we had some way of dealing with it so that at least people are trying to look at it to see if there's a way to move forward in the future. There may not be a post office in 10 years, so what we do in that case for our absentee voters?

MR. WALLACH:

So I think there are at least three separate questions that we have to consider here. One is in polling place wireless -- that could be Bluetooth or Wi-Fi or NFC where the voting machines might be talking to one another or talking to assistive devices -- that's sort of category 1. Category 2 is election-night reporting and voter registration and things where there fundamentally is communication outside of the polling place but generally only to the election center office. Then there's an entire third category which is internet voting. And I think we should keep these categories completely distinct

from one another and talk about them distinctly because our -- I certainly have distinct opinions on each of them, and I imagine many of you do as well.

CHAIRMAN COPAN:

Thank you.

MS. GOLDEN:

I'll -- Diane Golden, and I'll just add I appreciate the distinction of the in-polling-place, you know, voter interaction. As I was saying last night, the way the assistive tech world is moving, I mean, I don't know if we'll have hard-wired connections for a lot of AT devices in the future. They're all going to be Bluetooth. I mean, most of them now it's USB, and I know that's a concern. And -- anyway, but, I mean, that's just the way technology is moving is to wireless connectivity between the peripherals that people with disabilities use and whatever else they're trying to interface with.

So just banning it outright might put us in a place where then you've -- you know, you have no way of interacting using your own AT, which is obviously going to be a problem. So I'd say, again, that's the danger of just a flat no across the board.

MR. GILES:

This is Bob Giles. I agree because one of the concerns is if you're using electronic poll books and those are communicating wirelessly or through Bluetooth within or -- within the polling place

or back to a central location and then you take that and you use that to program your activation core for the voting machines, so now it's touching the voting machine. In my opinion, that becomes part of the certification of the voting machine. That's how I would view it in New Jersey. So now if you just broadly say you can't do that now, I don't know how, you know, vote centers, if they have to -- you know, or early voting, how that would work with an electronic poll books that also activates a voting machine.

MR. LUX:

And clearly -- this is Paul Lux. Clearly, you know, the first thing that Dan mentioned is the first tier of information.

MR. CHOATE:

My apologies.

[Laughter]

MR. LUX:

I see how it is, Judd. That's okay.

MR. CHOATE:

Too much. I might drop this.

[Laughter]

MR. LUX:

He's just going to start throwing stuff at me. It's going to get out of hand.

[Laughter]

MR. LUX:

But I would say the first two categories certainly -- and, you know, to the concerns that Diane mentioned and that Bob mentioned I think are something that we cannot necessarily dispense with outright simply because those of us who still use the wireless technology for election-night transmissions, you know, I've got a geography problem. My county is a big rectangle. The northern border is Alabama, the southern border is the Gulf of Mexico, and I have a 20-mile-wide swath of Federal property that cuts me into two pieces with only one road that runs north and south.

[Laughter]

MR. LUX:

So I absolutely have, you know, polling places that are I don't want to say in the middle of nowhere because people from Alabama get upset when you say, you know, that they are the middle of nowhere, but, I mean, pretty darn close.

[Laughter]

MR. LUX:

Anyway, you can see it from there. And so, I mean, you know -- and I have fought this battle for years with the political parties and the media for, you know, the "we have to have results immediately" and, you know, "wouldn't you rather us take our time

and do it right rather than rush this," which, I mean, we can have a whole discussion about that. But as it relates to the technology side, it's -- and it isn't just me.

I mean, Brevard County in my State, they are the longest county. It's almost a two-hour -- well, I say two hours. It's almost an hour, hour and a half drive from one end of their county to another, so pick where you're going to put your election office in the county seat. Usually, you know, you're again talking about some severely outlying areas in that election-night reporting via whatever mode -- I mean, of course, as we all know, you know, hardline phones have sort of disappeared. You can still get one. They're no longer cheap. And if you have hundreds of polling places, you would have to install hardline things in all of those places to make that work without wireless technology. So --

MR. GILES:

And just to follow up, this is Bob Giles. I guess my concern is each State is different, and so if a State choose to do any one -- the way you broke it down, any of these three options but they require EAC certification, they're kind of stuck if we don't. So do we take the approach on all of these that they're not required to be in the system, but if a vendor wants to test to that, we do have testing or best practices? Because I don't know that we can dictate to every State that, no, you cannot use wireless, no, you cannot do

internet voting. I mean, States are already doing mobile voting. It's happening, so I don't see how you stop that.

And to Linda's point, there may be a time especially with our military and overseas voters, giving them access to voting. Fax machines don't really exist. You know, email is somewhat problematic as well, so I don't think we just close the door on all these, but I think we make it optional and we do put something in there should a State want to go down this path.

CHAIRMAN COPAN:

Thank you so much for those thoughts. Lori?

MS. AUGINO:

I -- Lori Augino. I just want to be careful that we are staying with what -- within what I believe is our wheelhouse and that's it's within the voting system that is being moved forward and tested and that we are clear that that is where our comments are and maybe take it out of election-night results reporting if it's not contained within the voting system or other ancillary systems that are not within the voting system.

MR. GILES:

And I think just to that comment, like election-night reporting, if you're taking some kind of flash drive or something out of the machine, you're going to put it into something else, are you going to

reuse that and touch the machine again? So for our election-night reporting, if it's one use when you're transferring the data. But if you're talking about something that the vendor has to reuse every time, that becomes an issue. If you're -- if that is now touching the internet somehow, we -- in our State we don't allow any voting system to touch the internet in any case, so that's why we just dispose of those flash drives every time they're used.

So the concern is if you're doing something at a polling place and do you have to -- because those, I'm sure, are not cheap if you're getting them from the vendor, that you then have to reuse those for another election. Is there a way to make sure that --

MR. LUX:

Well, and it isn't even just the media because the wireless modems are internal to the -- are an internal component to the system. I mean, they have to be installed in the system, so, I mean, it has to therefore be tested as part of the system. It's tested as part of a logic and accuracy testing when we're doing all of that as well.

CHAIRMAN COPAN:

Great. Thank you for those points. So, Dan, were you going to add something here?

MR. WALLACH:

Well, okay, so one of the things that we could talk about is saying that like a wireless modem has to be here but not here. Wireless modems are -- can be USB devices and then they can be separate and that that could be a thing that we could regulate if we wanted. These standards that we've been reading and talking and are ratifying don't really speak to internet voting. It's a different threat model. It's a different consideration. It's a different kind of voting device. So I think it's out of scope for us to be talking about internet voting at all. It's just a totally other thing that could -- we well could be tasked with, but it's not what we're doing today I don't think.

CHAIRMAN COPAN:

Yeah. I think those are very fair points. I believe that around the table we've heard broad acceptance for the existence of wireless technology as an important component of flexibility that's available to each precinct and each State. And I have not heard, though, any discussion about encryption standards, about cybersecurity-related standards, industrial IOT or related Internet-of-Things-types of standardization and reference. I mean, clearly, those documents exist. They are part of the best practices that are available to support any standards and guidelines that will be advanced as part of VVSG 2.0.

MS. AUGINO:

I think that I may be in the minority, but I would not necessarily put myself and maybe someone else in this room in the same camp as what you just described.

CHAIRMAN COPAN:

Okay. Thanks. Let's have a bit more discussion about that because it's quite clear that these are technologies that are rapidly evolving. The United States is in the buildout of a 5G set of networks that I believe we can't ignore the fact that wireless is coming into many parts of our lives, as discussed here, but I wanted to make sure that whatever consideration is being given to wireless is actually utilizing the kind of standards and encryption technologies that would represent the latest and the best in class.

MS. AUGINO:

I think that's a fair statement. I think that in the case of our vote-by-mail States in particular we just don't share some of those same challenges or needs for that, and so we can build in protocols that provide for opportunities for sharing information that are outside of the voting system themselves.

CHAIRMAN COPAN:

Yeah.

MS. AUGINO:

So from a vote-by-mail State -- and I'll -- I'm not sure if --

MALE SPEAKER:

I'm with you.

MS. AUGINO:

-- my colleagues --

CHAIRMAN COPAN:

Yeah.

MS. AUGINO:

-- agree. But from a vote-by-mail perspective, it's just not something that's necessary for us.

CHAIRMAN COPAN:

Yeah. Understood.

MR. GILES:

So -- and this is Bob Giles. So then is there a way to break it out for -- away from a traditional voting system where maybe we do need some kind of wireless but then for internet voting or mobile voting, since those aren't traditional voting systems, that we would -- that would go through this testing? I don't know if this committee would have to have a separate charge or it's something that you could do separately to say if somebody wanted to do mobile voting -- because they already are -- here are some standards and here are some standards of blockchain and addressing it separately because it's not a traditional voting system, but it is a method of voting that is happening.

MS. BRADY:

Yeah, I would say that -- this is Mary -- that that certainly is not encapsulated in the requirements as they exist today, but it's certainly something that we could tee up for, you know, for further development and discussion as part of the annual review processes.

MR. GILES:

Would that be de minimus?

[Laughter]

MS. BRADY:

I don't think so.

[Laughter]

CHAIRMAN COPAN:

David, thank you.

MR. WAGNER:

Okay. I think what I'm hearing here is that there is not support on the TGDC to prohibit wireless. There is not support on the TGDC to prohibit internet connectivity in the standards or prohibit voting systems from having that capability. So now I want to turn to Gema to find out whether she has --

MR. CHOATE:

Can I just interject and say there's not sufficient --

MS. AUGINO:

Unanimous.

MR. CHOATE:

-- sufficient or unanimous support.

MR. WAGNER:

Thank you.

MR. CHOATE:

Because I -- speaking for myself, I would ban all -- the use of wireless in a polling place.

COMMISSIONER HOVLAND:

And I just wanted to back up if it's okay because I think it ties in maybe to where you're going. To Dan's point, I'm not sure that we've parsed out being in more of these conversations in the last couple years than I ever expected to.

[Laughter]

COMMISSIONER HOVLAND:

You know, I've heard a point made that distinguishes between sort of the different pieces of the puzzle in the polling place and so, you know, distinguishes between a wholesale ban of wireless versus banning wireless in, for example, a tabulator. You know, and if you have a separate -- and again, this raises assistive technology and accessibility issues. But if you have a separate BMD and a separate tabulator, you know, that to me feels like a different environment. Again, that may be opening a huge can of worms and a bunch of cost, but I just want to throw that out there.

MR. WAGNER:

Okay. So Dave Wagner. So the challenge that I now have is the working group -- the -- I would characterize the discussions as -- the primary feedback from the security folks on the working group was the best way -- security measure we have is to prohibit this capability in the systems. So given that this is -- appears that is not an outright prohibition is not something that would be supported by the TGDC, I now want to turn to Gema and find out, Gema, how are we on requirements? Do you have what we need? Do you think we have what we need in the requirements in front of us for requirements on this subject given this decision?

MS. HOWELL:

So, currently, the requirements cover a very small portion of this open area, but I think the specifics and what folks are looking -- may be looking for based on the discussion is not included. And so what we're prepared to do is we can develop requirements maybe for the specific use cases that were brought up, and then we also have in the -- Ben, if you don't mind going to the next slide.

In the potential mitigations we've kind of looked at these different options based on the feedback that we got. So as Dave Wagner mentioned, you know, the first that came to the group was this idea of no wireless. So we have an idea of what that would look like with regards to the requirements. Another option would be

to enable or disable wireless as needed. This could be based on the use case, when it's used or how it's used, and then the last one we're also prepared as -- we have some previous requirements I think in VVSG 1.1 around -- including wireless technology. And we would reference that and update those to include how wireless would be included in the voting system, what specific security configurations would fall around that. And this is specific to wireless, not necessarily speaking to internet technology. Internet technology -- Ben, if you don't mind going two slides over.

Internet technology -- for internet connectivity, I'm sorry, we definitely have considered the no-internet -- yeah, technology or connectivity be included in the voting system, as we've talked about in the scope of this discussion, and then we also have recommendations for how to handle things like an election-night reporting with the air gap options, as well as secure configuration around how that's actually performed.

So those are not in the requirements that you have now, but we definitely have that information available and would be able to write requirements based on kind of which way you guys want to go for the internet and the wireless technology.

MR. COUTTS:

Hi, Gema. McDermot. So what we might -- we've got a lot of breadth as far as the threat model for these items, and what I

might recommend is that we take this lesson from the accessibility and usability community and have an assessment done by a third-party before you get to certification. One of the things we're trying to accomplish here is to shorten the certification period. This is definitely not doing that. And also making it -- and we also want to incentivize the vendors to do -- make better decisions moving forward, which is what the user -- which the -- what the usability tests are supposed to do. So we do the test and then we figure out, oh, this is what we should change before we get to certification. If we get to certification, then this needs to happen, we've missed the boat.

If we do the same sort of thing for security -- and I know that Department of Homeland Security has got a great facility that doing that sort of thing before -- during the development process and being able to say here's our risk model, here's how we mitigated it, making that part of our submission to the VSTLs might actually not only improve the security but also improve the process.

MS. HOWELL:

This is Gema Howell. Just something that I want to bring up that was brought up during the working group calls as well -- and to your point, I agree that that would provide value in having that testing done up front. But the actual configuration and setup that happens in the polling place, guaranteeing that that happens the

way it's done -- or the way it was done at the testing -- in that previous testing process is a concern from the working group, that maybe the folks who actually set up these systems may not be able to meet those same standards.

CHAIRMAN COPAN:

Yes, David, thank you.

MR. WAGNER:

I want to see if I understand what the action item on this is. I think this is what I'm hearing, so tell me if I'm getting it right. I think the action item on this is that we ask Gema and NIST to write requirements that reflect those alternative mitigations, that if we were to vote on adopting the requirements today, it would be subject to the addition of those additional requirements and that the -- anything that we -- that the -- our proposed VVSG would not be forwarded to the EAC until those were added. Do I have that correct? Is that the path forward?

CHAIRMAN COPAN:

I'm looking around the table here, and I believe that that's a good restatement of the actions. Any other comments or clarification on that follow-up point? Gema?

MS. HOWELL:

I just wanted to review kind of what I have. So the one mitigation that we had for wireless technology, no wireless

hardware, that one is not -- is potentially not being considered or would you like to see the requirements for all the options that I've listed? Because I know it was mentioned earlier there wasn't some consensus on all of the --

MR. WALLACH:

So I think we have some sort of a consensus that local wireless such as Bluetooth versus new devices is okay. I think we're -- I think that seems to be a consensus. Once we get to, say, in-polling-place Wi-Fi, if that's something to be discussed, then there would need to be appropriate security measures for crypto to keep random people from getting into that Wi-Fi.

Once we start talking about internet connectivity, I like the idea of developing plan A, no internet; Plan B, internet with careful controls because some counties or States will regulate it one way or another. So if we say if you're going to do internet, you have to do it this way, otherwise, do sneakernet, I think that's a reasonable approach for us to take.

I will note that you have a bullet that says telephone communication is on the no-internet bullet. Really the modern telephone network is the internet. There isn't really a meaningful difference between those anymore, which is to say, you know, to a nation-state adversary, it's just a funny looking internet that they can still attack. So from that perspective use of the telephone fits in

the same category as use of wireless cellular. I mean, it's the same threat model, it's the same kind of mitigations, the same need for air gaps.

MS. HOWELL:

This is --

CHAIRMAN COPAN:

Thanks for those points of clarification. Yes, Gema?

MS. HOWELL:

Sorry, this is Gema. Just for clarification on that second bullet point, and it should have been included on the slide, but that one in particular is talking about sending unofficial election results as a temporary way to get that information there, so totally agree that the traditional telephone network or texting includes the internet and could be at risk for that.

CHAIRMAN COPAN:

Yeah, thanks. So the action has been -- oh, yes, Judd.

MR. CHOATE:

So I have a quick comment. This is Judd. It seems to me -- I'm going to make an argument to you that there -- maybe there's another way we can parse this that would make me more comfortable with it, and that is I don't think that the way that the wireless works in a polling place now should include the conversation between the poll book and the voting system. I think

that's where the problem is because that's the way you get back to who the voter is, so you've got voter anonymity, and that's the way that is the most talked about way where vulnerabilities created by wireless exist in the voting system. I think that's the heart of the problem.

Diane's concerns I'm very wary of because I think that's where, yes, it's the future of the ways in which those in the disability community are going to operate in that voting system.

So is there a comfort level with narrowing down wireless is permitted when it's in those circumstances only but not permitted in a polling place under any other circumstances related to the voting system? Because, obviously, the e-poll book is not a part of the voting system. And people operating on their phones and so forth are not a part of the voting system. But as it relates to the voting system, should we say you can't have your e-poll book connected to -- or maybe in the reverse, wireless is only permitted in sort of extending ADA capabilities to the voting system.

MS. BRADY:

So --

CHAIRMAN COPAN:

Yes, Paul.

MS. BRADY:

I'm sorry. Go ahead.

MR. LUX:

Well, and this is Paul Lux. And I would agree with that, Judd, because -- so in my polling place, just to give you the example I'm most familiar with, yes, we have a MiFi device. That MiFi device connects my e-poll books back to election headquarters so that as people are checking in and voting, they can't run off to another polling place and check in and vote because they just can't beat the computer system. But that's all the MiFi and all that network gets used for is the e-poll books talk among themselves and the MiFi connects them to the outside world.

The wireless that is in my voting system in my actual tabulation device to send election results back to election central at the end of the night, that doesn't even get used or turned on until they say it's time to send the results. And so in that instance, that wireless connectivity is in no way, shape, or form connecting to anything else other than back to my election -- my central election system.

MS. AUGINO:

But in talking about these requirements, we're not building them to the existing technology that we know. And can we not find a way to, outside of the voting system, move those results safely from using methods that Bob discussed or methods that we can build out where we're transmitting those results, unofficial results

that still require additional vetting to make sure that they transferred correctly outside of the voting system at all so that you're keeping that voting system locked down and secure and pure.

MR. GILES:

So Bob Giles. To Judd's concern or suggestion with the e-poll books, we don't have early voting in New Jersey but it's been discussed. And one -- so if you have early voting, the way I've been looking at it is the e-poll book talks back so you can't have people going to multiple sites on the same day. But there's also the ability to activate the machine because it -- if you have an early voting site that you can vote any ballot in the county, you don't want the poll worker to make that determination necessarily to say, oh, you're -- you know, you're in Toms River Ward 2. I've got to activate that particular ballot. So the system will do that, and whether it's on a smart card or however it activates the machine, so therefore, we've got this wireless connection talking back to the voter registration system. And then the next step is it activates the card that touches the voting machine.

So there's a concern that how do you -- I don't know that you can have both. So -- and I'm not saying you have to, but I think there should -- if we're talking about requirements because that does exist, that we would have to --

CHAIRMAN COPAN:

Yeah. Thank you very much, Bob. Dan?

MR. WALLACH:

This -- okay. Dan Wallach. This is a place that I think is probably the most critical for the -- for us as a board to have some input to say -- to talk about how data flows across these boundaries from the voter registration, poll book system into the voting system. That boundary right now is very unregulated, and I think we could improve that a lot. Like, for example, we might say that the e-poll book can print a barcode on a disposable piece of thermal paper, which is then scanned. And then that barcode would only indicate a ballot style number and nothing else. And, you know, that would be the sort of thing that we could specify.

CHAIRMAN COPAN:

Yeah. This has been really a wonderful conversation. And I'd just like to turn this over to Mary Brady to summarize, so -- where we are now, and the actions that have been identified.

[Laughter]

MS. BRADY:

I'm not sure that I know.

CHAIRMAN COPAN:

You really keep us moving along. There's no doubt.

MS. BRADY:

Well, Gema, perhaps you know. So it's -- I mean, it's -- I think we've talked about wireless. We've talked about wireless in the polling place. We talked about e-poll books, that parts of e-poll books are not under scope for the current version of the VVSG. Other parts, though, like the activation of the ballot, is definitely, you know, part of the scope of the VVSG. I think, Bob, you're right. That's sort of the crux is it's -- you know, I think some of the other areas are easier. Certainly in the case of accessibility, I think there's probably agreement that we should allow Bluetooth.

I haven't heard a discussion yet about wireless in the polling place with respect to if you have a ballot-marking device and you want to print to a wireless printer, so I haven't heard that come up. And is that, you know, something that we want to allow or disallow? You know, so I think they're probably the three areas, right? Bluetooth in the polling place, general wireless connectivity in the polling place, you know, both, you know, within the voting system and perhaps, you know, if you're -- you know, in your case, Paul, where you're taking it from the -- and you're aggregating upstream, and then activation, you know, within the poll book, you know, it's -- you know, if the poll book is touching, you know, talking back to your voter registration system, for instance, in order to keep folks from voting at multiple vote centers, and it also, you know, ultimately produces something that's going to touch the voting

system. You know, is there a better way to protect that connection? And --

CHAIRMAN COPAN:

So the topic that was put on the table by Mary Brady now is wireless printing and sort of the boundary conditions that -- to which those should be applied. Any commentary from the group on guidance on that?

MR. CHOATE:

This is Judd. I oppose. And I would encourage all of my colleagues to oppose that.

MS. AUGINO:

Agreed.

MR. GILES:

So is it after it's been voted on a ballot-marking device? Because there's also ballot on-demand where if you -- same thing, it ties to the e-poll book. Instead of activating the machine, it goes through a printer to print a ballot, on-demand ballot that you then vote and -- so that's wireless or does that have to be part -- because you could have three or four printers, and then you sign in and then it -- you know, go to station two to get your ballot or whatever, however you set that up. So I'm not sure if that was -- is wireless or it's, you know, part --

MS. BRADY:

It certainly could be wireless.

MR. GILES:

Yeah, and that's what I'm saying, so it could be that -- but again, that's the ballot before touches -- that's just a paper ballot. But what you're talking about, if I use a ballot-marking device, print it out, and does it print from the machine or is there a separate printer? And there are vendors that talk about having a separate printer, so I don't know if that's connected like a hard connection or it's Wi-Fi.

MR. WALLACH:

So this is Dan Wallach. I would hope that we can say that the usual case is going to be ethernet wires or equivalent, that most printers at -- that you would use to -- for this are going to have an ethernet jack built-in anyway, and I'm -- I don't see any reason not to have ethernet wires that are taped to the floor with gaffer tape. That seems like a completely reasonable way to solve the problem.

MR. LUX:

Well -- and this is Paul Lux. And to Lori's point, though -- but we're talking about standards for future voting systems, too, so, I mean, while right now I agree with you and my -- the ballot on-demand I use in early voting and at some of my polling places is exactly that. I've seen such unreliability with wireless printing that I wouldn't want my backbone to be built on wireless printing to work

in a polling place anyway when I know I can just run eight feet of cable and go on about my life. So obviously right now that's the norm, but, you know, 5 years from now, 10 years from now we may not have that port available on those printers to do that with.

MS. BRADY:

But I do think that what -- you know, we do want to write requirements for future systems, but I don't want this body to think that we're never going to be able to update these system so we have to write requirements for the future.

[Laughter]

MS. BRADY:

So I think as wireless technology improves, then perhaps that's the time to introduce, you know, wireless and, you know, within the polling place for -- you know, for printing, for instance.

CHAIRMAN COPAN:

And we have discussed an annual process now for update and for review. And I believe this group collectively will be developing and advancing those recommendations that we believe are sound for the broadest potential use by the -- by America's voting network. So I will look forward to the revisions to that portion of the guidance document from NIST and that there would then be a conference call or webcast with the members of the TGDC to ratify that section.

One of the other areas that we have not yet discussed is the end-to-end. And so I'm just wondering whether now is an appropriate time for us to move to review and to discuss that. Yes?

MS. BRADY:

Ben, can you advance the slides to E2E?

CHAIRMAN COPAN:

Okay. Okay. Please look at the slides, cryptographic end-to-end.

MS. BRADY:

I think Dave wants to introduce the topic.

MR. WAGNER:

Dave Wagner. If I could set this up, so cryptographic E2E systems are new. We don't have any on the market today. We want to enable a new market there. It's a little bit challenging to write requirements for a new system. We have in the packet before you some minimal requirements, but there were some proposals from the working group to go further than this and to have some stronger requirements. And so I think it's up there on the slide --

MS. HOWELL:

Maybe on the next slide. Sorry, Ben. Thanks.

MR. WAGNER:

-- which involve --

MS. HOWELL:

I can step through it if you want.

MR. WAGNER:

Which involve requiring that the cryptographic protocol be published, that there be a reference implementation made publicly available of the verification that's used for audits and verification for transparency purposes, and that there be independent review by a security expert of the cryptographic protocol.

So let me set up for you why those might make sense.

They're not currently in there. It's -- you know, it's not -- I think there's a decision to make about whether to include those. In the -- yeah.

MR. CHOATE:

Can I ask a preliminary question? And my apologies if this has already been addressed and I just missed it. But it's my understanding that end-to-end has never formally been covered for certification. Is that -- am I right in saying that? And are we then proposing to wade into certification of end-to-end systems? And if we are going there, I'm fully supportive of that, so --

MR. WAGNER:

Dave Wagner. It's -- never before in the standards have the standards supported certification of end-to-end systems explicitly. This standard is the first one to -- that explicitly supports certification of end-to-end systems. We require for auditability and

verifiability either a paper record or cryptographic end-to-end systems. Those are the two alternative paths. It's currently in there that that's supported and the goal to support that.

MR. CHOATE:

Then don't let me stand in your way. You go right ahead.

[Laughter]

CHAIRMAN COPAN:

Great.

MR. WAGNER:

So --

CHAIRMAN COPAN:

Any other --

MR. WAGNER:

Yeah.

CHAIRMAN COPAN:

-- comments there, David?

MR. WAGNER:

So the thing that's unique about the cryptographic systems is they're very reliant on this cryptographic protocol, these mathematical algorithms. They're very intricate. For the rest of voting systems for cryptography we can say use the same thing that industry and government is using in other sectors, and that

works. And those are solid and we have a lot of vetting for those because they're used elsewhere.

But the cryptographic protocols that are needed for cryptographic E2E are very specialized to voting, and so they need special review that we can't just say use some existing thing because there is no existing thing. So there's a question about how to do that. We don't think the voting system -- the VSTLs have the capability to do that, so a proposal from some folks on the cybersecurity working group was to add these three requirements, expert review basically.

CHAIRMAN COPAN:

Excellent. Thank you.

MR. LUX:

This is Paul Lux. Dave, just out of curiosity then, so when you talk about utilizing an open standard, which I would equate then to some published standard for cryptography, is -- would that be to the extent that I'm -- and I guess I'm a little -- I'm -- well, I'm way in over my head now at this point, but are we talking about like, you know, could somebody use, oh, the fact that, oh, they're using published standard 1, 2, 3, 4, so now to get into this end-to-end system I know how to break into it because I know they're using this published standard for the cryptographic security?

MR. WAGNER:

Dave Wagner. Well, Gema, you can correct me if I get this wrong. I had the impression that the proposal was not so much that it's a standard but that it's a published specification or a published protocol. So it might be the vendor says I've got this great idea for -- we're going to use this cryptographic protocol and it's published -- the crucial part is published -- or they might say, well, there was this academic paper that describes how to do it -- okay.

So your main concern was by making public, do we make it easier for hackers to hack into it? And the answer is no. The purpose -- the way these systems are designed is specifically so that all these details can be made public without endangering security. That's a key part of the transparency. That's how we gain trust. The way you gain trust in a cryptographic E2E system is that some mathematical cryptographer who you trust and rely on looks at this publicly available information and says, oh, that's a good cryptographic design, you can trust the system because the cryptography is good. So to support that --

FEMALE SPEAKER:

You can?

MR. WAGNER:

-- that's where the publication --

CHAIRMAN COPAN:

Yeah.

MR. WAGNER:

-- is designed to support.

MR. WALLACH:

So this is Dan Wallach. I'm going to agree with everything Dave just said, that the name of the game in -- is that by -- this is not open like free for anybody to use necessarily, but this is open like disclosed and published such that anybody can review it, and it -- which means anybody can find problems with it and then, you know, there can be a process for resolving those issues. And that's -- the vendor needs to not hide behind trade secrecy.

FEMALE SPEAKER:

Right.

MR. WAGNER:

That's the important part.

CHAIRMAN COPAN:

Yeah.

FEMALE SPEAKER:

So --

MR. LUX:

Well, if I could follow up. So as a follow-up question then to what I've just heard both of you say and to make sure I'm understanding it correctly, you know, it -- I'm not saying this is

exactly what you're talking about, but, I mean -- so if we were to say, you know, we're going to use 256-bit encryption, which means -- and I probably am going to get this totally wrong, so forgive me, all of you technical people. But -- so I'm going to pick 256 random characters as a string and I'm going to somehow use that to then encrypt this thing, and if you want to decrypt it, you have to guess the same 256 characters or there's no way in. So 256-bit clearly better than 128-bit encryption, way clearly better than 64-bit encryption, you know, so we're going to go to, you know, one googolplex encryption or -- you know, which is like, you know, might take somebody 5 billion years to hack or perhaps, you know, a nation-state actor, you know, 84 minutes. I don't know. But that's kind of what you're talking about is a published standard.

CHAIRMAN COPAN:

Yeah.

MALE SPEAKER:

So I guess what we mean --

CHAIRMAN COPAN:

Just a second.

MR. HALE:

So it is important to note that ciphers do get decoded at points, and so this emphasizes the resolutions that you all proposed earlier and the need for a consistent --

MS. GOLDEN:

Yeah.

MR. HALE:

-- review and update --

MS. GOLDEN:

Correct. Correct.

MR. HALE:

-- so these go concurrently.

CHAIRMAN COPAN:

Yeah.

MS. GOLDEN:

Right.

CHAIRMAN COPAN:

Great. Thank you. Yeah. Any other -- yes, Diane.

MS. GOLDEN:

Okay. So, clearly, this is not my area of expertise either, but I'm just -- the -- an external expert evaluation I get, makes sense. My question and concern is who's an expert and -- okay. So from my naïve outside -- okay. So if somebody's going to ask me for an accessibility expert, I can do that. But somebody else might not think that person's an expert and I -- my assumption is the security side of the camp is even more like that than my side of the camp is

about who's actually got expertise and who doesn't and what expertise in which area.

My kind of -- this is on your -- I -- I mean I -- from a vendor perspective, I would be scared -- I don't know who you're going to pick because whoever you pick you're going to get blasted by somebody because that's not going to be the right security expert giving you that review. And I don't know what the -- you know, the testing labs are going to do with that information.

CHAIRMAN COPAN:

So if I could just --

MS. GOLDEN:

Is that for -- yeah, who is -- who's that -- why --

CHAIRMAN COPAN:

Yeah.

MS. GOLDEN:

-- who's using that expert external, you know, information --

CHAIRMAN COPAN:

Yeah.

MS. GOLDEN:

-- and what's it have to do with certification? If the labs don't have that expertise, then are they supposed to use that external evaluation carte blanche and it's like if they say it's okay, I have to say it's okay, and if they say it's not, then I have to say it's not? I --

I'm just concerned from the labs and the -- I don't know how that's going to work in the certification process.

CHAIRMAN COPAN:

So this is a standardization question, and so NIST as the U.S. Government's lead on standards is actually the lead on cryptographic algorithms. We work closely with DHS and the national security complex. And so this would be a follow-on activity around standardization for advanced cryptographic algorithms appropriate to the voting system.

MS. GOLDEN:

Okay.

MR. GILES:

So --

MS. GOLDEN:

Yeah.

MR. GILES:

And this is Bob Giles. Just to follow up with Diane. I mean, we see this where -- like with risk-limiting audits. They developed the auditing software, and then all of a sudden somebody said, well, who's auditing the auditing software? Like where does it end? And so the concern is, okay, we're saying this is good cryptology and -- but is somebody going to come along to Diane and say no, it's not, I say it's not? And so are we going to say NIST is the

standard and if NIST says it's good, it's good? I guess that's our concern because we don't want to do it and then somebody comes and says, well, that person is not really an expert, I'm an expert, and then you get slammed.

CHAIRMAN COPAN:

Yeah. Well, this is a global process. We're in the midst now post-quantum cryptographic algorithm assessments that are much larger, much more robust than what we're currently utilizing. And so it's a standardization effort that involves a broad range of expert groups. And it involves industry, as well as the public sector. So, I mean, we could talk about -- and I don't think we want to go down this rabbit hole too far about how we actually fully assess the strength and the capability of cryptographic algorithms. There are processes in place that will be advanced as this particular recommendation is advanced.

I think it's been said that this is a developmental challenge looking to the future of end-to-end cryptographic types of solutions, but I think what's been proposed here in the VVSG section is at least to provide a starting point on this journey for addressing these questions. And so -- yep, Dave?

MR. WAGNER:

Dave Wagner. So these are great, great comments, and they're also exactly the challenges we were wrestling with when we

started talking about this. So I think what we would -- what I would suggest we do is that we ask Gema and NIST to write some requirements surrounding this. The kind of thing that I'm imagining is that maybe we could specify something about what's a suitable expert, and we'd have to think about how to make sure that the expert will be acceptable so that you don't hire someone and later find out they were no good. And we have to think about how the report would be used. It's possible maybe one model might be submitted to the EAC as a part of their certification or submitted to the VSTL and then they make a decision based on what the report says. Those are the -- kind of the options that I can see.

I want to -- to our Chair, I want to give a little bit of a caution about being careful about what you commit NIST to.

[Laughter]

MR. WAGNER:

So NIST has the world-leading cryptographic validation program, but the thing to be caution about -- cautious about there is that's for cryptographic algorithms that are the standard everyday ones that are used throughout industry and the government. Those are not the kind of algorithms that we're talking about for cryptographic E2E systems. Cryptographic E2E systems, they're using this very specialized, custom, very intricate algorithms that are not supported as part of that program. And I suspect that NIST

probably does not want to commit to validating those because that would be a substantial project. So I don't anticipate the NIST cryptographic validation program to actually be able to support this or help us or ensure that these algorithms are any good because this is just beyond the scope of what most of the rest of industry and government needs.

So that's why instead of relying on the -- if we could rely on the cryptographic validation program, that would be great, but I don't think it's realistic and I don't think -- I would warn you about committing NIST to take on that project. So instead, this is the alternative is that instead of having NIST put a stamp on, say, this is a good algorithm, which I think is probably too much to ask from NIST, instead, we have this more minor version, which is it has to be public so that independent experts can form their own trust, and it has to go review by one crypto expert as part of the certification process.

MS. BRADY:

So --

COMMISSIONER HOVLAND:

Can I ask -- sorry.

MS. BRADY:

No, I'm sorry. I mean, the one thing I will add is that we do routinely provide guidance to the labs and -- as part of our

laboratory accreditation process that there is a manual that's available that the labs have to adhere to. And we do provide guidance on what type of expertise you need to look for in terms of if you're trying to get an expert for usability or accessibility or in security in the case of penetration testing, what type of expertise do you need to have.

MS. SAUNDERS:

Just very briefly, this is -- I think what I heard Walt saying is that NIST has standards expertise and the base documents for this cryptographic module validation program, while not directly relevant to this, there are -- there is a -- there are security requirements for cryptographic models. You have a lot of base in terms of documents that have been written and guidance that certainly gives you a -- NIST a leg up in looking at the technical requirements, not actually validating the cryptographic modules necessarily, but you don't even think the security -- the documents are relevant? Well --

CHAIRMAN COPAN:

Ben?

FEMALE SPEAKER:

The --

COMMISSIONER HOVLAND:

Would that --

FEMALE SPEAKER:

Oh, sorry, go ahead.

COMMISSIONER HOVLAND:

Sorry. It just leads into a general question I've had about this, which I thought Diane had covered but now I feel like we haven't. So, I mean, real high-level, I mean, if we're talking about cryptography that is beyond what there are commercial uses for or general needs, I mean, how many people -- and I'm not asking for like seven, but, you know, I mean broad level, you know, how many -- I mean, is this -- clearly, it is not a common skill, but is it common enough to be utilized in this fashion, or are we there yet?

You know, I know that particularly in the last few months we've come a long way. Obviously I know there is a certain element of pressure on this body to address this issue because we want to both be looking forward and fear that this will potentially be the last bite at the apple for a while. Hopefully, some of the resolutions earlier pay dividends to revisit some of this, but, I mean, will we be light years ahead a year from now on this issue with the developments that are happening in this space? And then, again, I back up to -- I mean, are -- is it Ron Rivest and a couple other people that know how to do this, or is it broader than that?

MR. WALLACH:

This is Dan Wallach. I think we should definitely ask Ron Rivest to do all of the work for us.

[Laughter]

MR. WALLACH:

But since he's likely to say no, there are probably greater than 10 and less than 100 academics who we could come up with who would be capable of doing a review like this. And there's probably as many people in industry who have similar skills.

In terms of conflicts of interest, you probably would rather draw from the academic community, so that way you don't have one vendor worrying about a conflict from another vendor.

And, you know, exactly how you go about -- maybe the answer is that NIST forms review bodies of suitable academics, so NIST -- a vendor goes to NIST and says I need a review, NIST finds the right people, I don't know how the cash flows, and then a panel of experts writes a report.

CHAIRMAN COPAN:

Yeah. I believe that there are processes in place that have high integrity that would bring together the very best minds in the United States and potentially from other parts of the world to crack this problem.

So just to bring -- Yep.

MS. AUGINO:

I just have one question. So are we looking to come to an agreement so that we can include this in 2.0 and then take a vote

on -- potentially on that as part of this package today? Or are we looking at something that will allow for a little bit more review and discussion for the E2E components?

MR. WAGNER:

Dave Wagner. My question to you all was whether to develop something to include in the VVSG today.

MALE SPEAKER:

Yes.

MR. WAGNER:

So do you all want us to do that work and include this in the VVSG 2.0? Those are not in here in this packet. I think there's a significant number on the cybersecurity working group who would advocate for that and are hoping that you will say yes.

MR. GILES:

Do you have a timeline of what -- this is Bob Giles. Do you have a timeline that you would think?

MS. HOWELL:

For -- this is Gema. For drafting the requirements? We have some requirements drafted. It would just be cleaning them up and then bringing them to you.

CHAIRMAN COPAN:

And to Gema, do you have a sense for the timing to have those core requirements available?

MS. HOWELL:

Just maybe -- I don't know -- I'm looking at Mary. I'm asking her to give timelines.

MS. BRADY:

I think -- you know, I think part of what we're talking about, if we move to a vote today, the vote would look something like, okay, we want to move forward with the standards with these caveats, that you will be bringing these requirements to us within 30 days, for instance, and we'll have a web meeting to discuss it to make sure that, yes, we're still comfortable. So is -- does that kind of approach seem appropriate or is it possible? Or is it far more work and we're looking at six months? So it's almost like the big dog skills, one, three, five, seven -- it's not, you know --

MS. HOWELL:

Well --

MS. BRADY:

-- one or two.

MS. HOWELL:

Well, I guess if we're talking about all of these open areas, it might require a little more time than 30 days. If we're talking about just this E2E section, I could probably turn around the draft requirements. And I think 30 days would be reasonable. If you

needed it in a shorter time, I could do three weeks or two -- I'm sorry, two to three weeks, yeah.

MR. WAGNER:

Dave Wagner. I think we'd be talking about the wireless we discussed and this crypto E2E --

CHAIRMAN COPAN:

Yeah.

MR. WAGNER:

-- those two.

COMMISSIONER HOVLAND:

Can I ask one other question like as a point of clarification on -- obviously there's value in getting these requirements, and that will aid in the development and innovation in this area, but is there also a way within the other requirements to instill protections if one of these systems is developed but not really ready for the polling place because of other issues? Like Diane's raised the accessibility piece on the receipt. I mean, are there other pieces within I guess the requirements that would say, you know, obviously secrecy comes to -- I mean, that's the biggest piece in it. But other sections of this where you go, okay, you could start developing a system and you would understand what it would look like. But unless you can do these other things, you're not going to be there anyway. I don't know.

MR. WAGNER:

Dave Wagner. I think the approach that we had envisioned was not. We're just giving you part of the requirements. We had envisioned that this is everything.

COMMISSIONER HOVLAND:

Yes.

MR. WAGNER:

If you're a vendor, you've got everything. You meet these, and you're good. So we're trying to really nail down all the requirements. And we know it's the first time that a standard has specific requirements for cryptographic E2E, so it's a first cut, but, yeah, I think we were taking a different approach there.

COMMISSIONER HOVLAND:

I should back up, too, in thinking about that. I know as we walked through there were flags where, you know, there were areas if you have an E2E, this is a different situation. And I think that is more of what I was thinking about. Obviously, you would have to comply with everything, but are there other areas within the requirements that you would need to consider slightly differently for an end-to-end system to ensure that you have those safeguards? I just raise that.

MR. WAGNER:

Dave Wagner. I think we've got all the ones that I know of.
If others know of something we've missed, I'd like to hear about it.

MR. CHOATE:

So this is Judd. I just want to tell you, I mean, we've done some important things in the last day of the half, but this is the single most important thing that we're going to do as a body in this meeting. And so I congratulate you all on going this way, and on NIST for having some requirements in the can that we can -- and Gema for your work to try to get this thing down the runway pretty quickly.

COMMISSIONER HOVLAND:

Great. Thank you. Thanks.

MS. GOLDEN:

So I'm going to try to summarize. Again, this isn't my wheelhouse per se. I -- my personal thought is we need to do this because if you don't, then your whole premise of software independence being an option more than paper is bunk. You know, you have to --

CHAIRMAN COPAN:

Yeah.

MS. GOLDEN:

-- go back and undo that because if you really -- if you don't have any requirements to get an E2E system through certification,

then it can't be used in most places, which means that that really isn't an alternative to paper. So your whole discussion about software independent is going to have to be revised if you don't do this because without this, you can't send things -- those systems through certification. I mean, I don't know how you would because you'd have no standards to test it to. So I kind of think it's a foregone conclusion. I mean, you have to do this unless you're going to revise the whole software independence standard and discussion, et cetera.

So -- and I -- hopefully -- and back to my original -- hopefully this gets the folks who are thinking about E2E to realize they've got some accessibility issues they're going to have to address, and they can't blithely just keep on doing what they're doing and saying, woohoo, I'm paperless, I'm accessible. Maybe not, you know?

MR. GILES:

And this is Bob Giles. Do you have a definition of what you guys are considering an end-to-end system specifically so we're all on the same page when we're talking about this? Is that --

MALE SPEAKER:

That's a great question.

MS. HOWELL:

This is Gema. To -- as far as specifically in the requirements, in a requirement we probably wouldn't call it out but

what we would talk about are some of the properties of an end-to-end verifiable system. And I think we could probably do that with some of what we talked about with revising the requirements. That first bullet there under the mitigations calls out the different properties. And what we would want is some detailed documentation on how those -- the end-to-end system meets the specific properties of the voting system. And so I don't know that we have a specific definition called out in there, but we do outline the properties of an end-to-end voting system and how that differs from some of the typical voting systems.

CHAIRMAN COPAN:

David?

MR. WAGNER:

I don't think there's a definition in there that I can see immediately. If I was going to give you a flip answer, the flip answer would be for the purposes of certification, a cryptographic E2E system is one that meets all the requirements in here for E2E systems. And I suspect that an academic would say it's a system that uses cryptography to ensure that -- to provide software independence or voter verification or to ensure that voters can verify that their vote was cast as the intended and counted as it was cast.

CHAIRMAN COPAN:

Thank you so much, David, for that.

I'm going to turn it over now to Mary Brady to walk us through the remaining items before we go to a vote on VVSG 2.0.

MS. BRADY:

Okay. So I went back through the rest of our handout here from the notes from yesterday, and I've identified five additional areas that we have not yet discussed. But they were discussed at great length yesterday. So these are all in -- am I right? Are they all in the security area? Let me just first state what they are.

So the first was ballot IDs with respect to risk-limiting audits, and there was a discussion on overlaps, perhaps overlaps and distinctions between 9.1.5-F and 9.4-C. I do believe that we -- you know, through that discussion we got to some suggested changes in the requirements, but it was also talked about with respect to ballot secrecy and is there some way to unwind the -- or to crack the order in which random numbers are generated and thereby applied to the ballot? And between that accommodation and perhaps having someone in the polling place knowing the order in which people voted, that you could actually figure out, you know, how someone voted.

In that particular case, so for the ballot secrecy there were some suggestions on perhaps this could be dealt with through the use of a strong algorithm to ensure that you're generating truly

random numbers or a requirement that prevents someone from cracking the order in which the random numbers are generated. So there's a potential path forward there as well.

The third area was in preserving logs in that we did not want the ability to delete logs for some period of time. I seem to remember the period was 22 months or at least 22 months, so I think there's a path forward there as well. There's the issue of multifactor authentication for critical operations. That was the fourth area that I identified. And we can go back through these.

And I think in that particular case we had some folks who were in favor of dropping from the list of critical operations, opening and closing polls, and others who said you don't really need a list. It's all -- you know, you need multifactor authentication for everything. I -- you know, and we can certainly discuss that further, but my general feeling there is perhaps we need additional election officials to weigh in. And I think that would happen as a result of the review process and in particular the Standards Board and those election officials who participate in the Board of Advisors.

And the last one was actually smaller and pretty easily dealt with. It was on the use of strong passwords. And in this particular case I believe we were leaving it up to the administrator -- an administrator to define what a strong password was. And the suggestion was that we don't leave it up to the administrator but we

-- you know, we require that we use strong passwords per NIST recommendations.

And that's all I have actually in terms of the remaining areas or the remaining topics. Do you want to go through them one by one or --

MALE SPEAKER:

Barcodes?

CHAIRMAN COPAN:

No. I think that if there are any questions --

MS. BRADY:

Oh, no, no, no, you're right. There was a barcode --

MALE SPEAKER:

Barcodes.

CHAIRMAN COPAN:

Yeah.

MS. BRADY:

But I actually did not capture that there because it was -- it was -- they were -- you were asking for barcode formats. That -- but there were no requirements I don't think that required that or no changes to the requirements.

CHAIRMAN COPAN:

David?

MS. BRADY:

Yes.

MR. WAGNER:

I think there were two issues on barcodes. There was one on requiring the format be publicly specified, and I think there was agreement for that.

MS. BRADY:

Right.

MR. WAGNER:

And that's a minor change to the requirement that can be instituted.

MS. BRADY:

Um-hum.

MR. WAGNER:

And the second was one that I raised about requiring the ability to export that codebook, and that discussion --

MS. BRADY:

Right.

MR. WAGNER:

-- was tabled, so I don't know what the resolution on that one was.

MS. GOLDEN:

Exactly. And I just think it's really important to address because of the 93 percent feedback about banning barcodes and

just what's happening nationally, I just think it's probably pretty critical to make sure this is clear what the actual position is about using barcodes and that not messing with security.

MS. BRADY:

So it was both the format, and I did actually note it. It just didn't make it to the back of the page. So it's the notion of the barcode formats but also the semantics or the meaning of the --

MR. WALLACH:

I mean, perhaps we could just use the word transparency --

MS. BRADY:

Transparency, yeah.

MR. WALLACH:

-- that what the barcodes mean should be --

MS. BRADY:

Yeah.

MR. WALLACH:

-- well-documented, public, transparent, something like that.

MS. BRADY:

So the mapping of the codes within the barcodes that -- um-hum.

MR. COUTTS:

And, Mary, this is McDermot. Sorry to add to the long and distinguished list. We do -- I feel we do need to bring up the concept of patents --

MS. BRADY:

Um-hum.

MR. COUTTS:

-- against the standard. We are definitely -- this standard is fairly prescriptive, and so I think we need to have some sort of process and policy for dealing with people who have patented something that is becoming a standard.

MS. BRADY:

Okay.

CHAIRMAN COPAN:

Thankfully, we have people around the table who deal with these standards-essential patents issues all the time. This is a standardization process, and I think there's very good documentation available for how those should be handled on a fair, reasonable, and nondiscriminatory license terms to enable the practice of the standard.

Mary, is there something -- Mary Saunders, anything that you'd like to add there?

MS. SAUNDERS:

I'm just nodding my head, yes. There is an a ANSI patent policy and related guidelines to the patent policy, and this has been a -- continues to be a topic of significant interest in many technology areas, standards-essential patents. But I think it's a good thing to have a policy established.

MR. COUTTS:

Right. So that should be a part of this standard?

CHAIRMAN COPAN:

Yeah, I believe we can reference the appropriate documents. It perhaps will just require a footnote. But there are indeed those best practices in place currently that I -- to which this new set of guidelines should refer.

MR. COUTTS:

That's all I'm asking.

CHAIRMAN COPAN:

Excellent. Thank you. Thank you. That's a great and a very, very, very important point.

We are approaching noontime, which is when I know some of us need to go. And I'd like to ask Ben Hovland for any additional comments that you'd like to raise. I know that there are some action items here. They've been well-debated, well-discussed with this wonderful committed group of experts for America's voting system. So I would like us to move soon to a vote on the VVSG

version 2.0, incorporating the actions that have been addressed in the subsequent text to be agreed by this group.

Ben?

COMMISSIONER HOVLAND:

Thank you, Dr. Copan. I would note to that, as I mentioned earlier, I don't think what we're discussing as a vote is if all the I's are dotted and all T's are crossed. Clearly, there remains work, particularly, thankfully for NIST to do --

[Laughter]

COMMISSIONER HOVLAND:

-- to get some of these things cleaned up. I do think there are significant questions on some of the last pieces that we were talking about on the end-to-end. I do think that it's worth considering -- I mean, I think that's extremely exciting, but I think we need to think about what is the timeline that that adds to this process.

And so, you know, I don't -- again, it was discussed that we may do a follow-up conference call like we've been doing. I will say as the fact that the law requires me to be there as DFO, I will be present and we'll find a way to be available whenever everyone else can make it. But I do want us to be conscious of sort of the size of the list that we are creating and the timelines that that adds

to this process. So I just would mention that. And I don't know if that impacts how we think about this.

CHAIRMAN COPAN:

Yeah. Thank you very much for those comments. I believe Mary, you and the team have been collating a comprehensive list. The action items will then include the provision of the updated VVSG 2.0 to the members of the TGDC. There'll be availability to provide additional sort of fine-tuning comments to get to that point where we have the I's dotted and the T's crossed.

This is an important step for the country, and thank you all for your commitment to the journey. Thank you to all the experts who have sacrificed in many ways so much to get us to this stage.

I would like us now, in consideration of that and in consideration of the fact that we are looking for the group to get together on a follow-up call to review the subsequent changes to ratify then version 2.0 of the VVSG.

Having said that, I'd like to go to a vote. For those of you -- based on all of the commentary, based on the actions that have been outlined, the question is do you vote to accept the version 2.0 of the VVSG for ratification, for updating, and to go forward in the process of review of the Commission and with the Standards Board?

COMMISSIONER HOVLAND:

Just for clarification, Requirements.

CHAIRMAN COPAN:

Requirements, indeed.

FEMALE SPEAKER:

Yes.

COMMISSIONER HOVLAND:

Thank you.

CHAIRMAN COPAN:

Yep, David?

MR. WAGNER:

I'd like a point of clarification about what we're accepting. Are we voting that we tentatively accept the direction this is going and that there will be revisions made and then we will be asked again to vote on the final version and that no version will be transmitted to the EAC until we've finished that process? Is that what we're doing?

CHAIRMAN COPAN:

Yes. Well said.

MR. WAGNER:

Thank you.

MS. GOLDEN:

I'll just ask another question. Do we really need to vote to vote later?

MALE SPEAKER:

Yeah.

MS. GOLDEN:

I mean, what's the background behind the vote today? What does that do other than us just sitting around and nodding and say, yes, we need to meet again and look at these revisions?

CHAIRMAN COPAN:

It's perhaps more symbolic than anything, but with the agreement of this group that this is the process that we're on and our intention is to complete and then submit the VVSG 2.0 for the rest of the process, I just wanted to make sure to validate that we feel that we are on the right track to do so.

MR. GILES:

This is Bob Giles. You've done a great job trying to keep us on track and getting us to that point, there's no doubt about it. I'm not comfortable at this point voting on these. I think we're headed in the right direction. I'm not ready to kind of just hand it over even and say there'll be revisions. You know, what's talked about is this -- you know, we are concerned, last bite of the apple kind of thing. We are going to be meeting again by phone to discuss the recommendations to the EAC, so I think we have some time. There's a lot of action items, and we went through very quickly.

And I've gotten some correspondence from other people already that there are other things that we missed in this last day and a half that should probably be addressed on the front end before we even get the public comment that we didn't get to today. And I think there might be an opportunity to do that.

And in the meantime, in good faith, I think it would allow the EAC to address Resolutions 1 and 2 so we can be more comfortable that there will be an annual process, that we're not dealing with the last bite of the apple. I mean, I think that gives Ben -- I'm putting it on you and the Commissioners to come back and say, you know what, we took your resolutions, we took them seriously, we actually took action on them, then I would be more comfortable moving forward and with the possibility of us missing something and not worrying now it's going to take two more years to fix something. So, I mean, that's -- I don't know how everyone else feels, but that's my opinion.

CHAIRMAN COPAN:

Thanks for sharing that.

COMMISSIONER HOVLAND:

One thing I'd like to I guess think about or see if it's there if there are distinctions that can be made, you know, I think the question is, is there a piece of this -- I guess obviously the most work probably needs to be done on the last items. Is the bulk of

this in a position where -- I guess you have to make a decision if we want everything we talked about to be in one ready to go or if it's worth bifurcating something like the end-to-end and saying, okay, everything else we're pretty comfortable with, we don't want to hold up this package? If we need broader discussion, again, I think that's useful.

And again, like I said, you know, I mean, we've done all of the call -- we've done all these calls, we can continue to do that. It I just want to be clear that we are exploring options to both get this right but get this done in as timely of a manner as possible.

MS. AUGINO:

So I think that the method that you just described is exactly what NASED and other election -- from the elections community have asked for, and that's a nimble process to be able to review these requirements outside of this process where the TGDC takes a vote and then they go to the Standards Board and they go to the Board of Advisors and then they go out for public comment. So because of the need to move quickly, we have advocated for that for a long time. And I think what we heard from you and from your legal counsel today was that that's not a possibility.

So I think if we want to be very thoughtful and thorough in these requirements as a part of this official process, then I think that we have to wait until they're in a more final state. And if we can

accomplish that in the next 30 days based on the work that Gema and NIST are -- and EAC staff are going to go do over the next month in consultation with some of the constituency groups or whatever we're calling them now, I'd feel much more comfortable, as my colleague Bob, to wait those 30 days. We've all got some work to do, to come back as a body, and then feel a little bit better prepared to take that vote that you're requesting.

CHAIRMAN COPAN:

Other comments on this topic of can we go to a vote on those items that have been fundamentally agreed and are good -- in good shape and then those additional ones, including the cryptographic and the wireless technology pieces? Other comments, please?

MS. GOLDEN:

This is Diane. And I don't disagree with the concept we're back to de minimis and technical changes versus substantive and that whole discussion. And I don't agree there may be a chunk that we have to set aside because we can't agree on. The problem is it's not clean, simple, clear, and they're interrelated and the overlap. And, like I said, if you pull the E2E out, then you got to go back and change the whole software independence discussion because that's not accurate anymore.

CHAIRMAN COPAN:

Yeah.

MS. GOLDEN:

It's just not an easy -- like it's this one-, two-page thing we can just set out. It's like you got to go back through the whole thing. And I would say, depending on who's sitting around this table and the election officials, what's de minimis to me is not de minimis to somebody else in terms of --

CHAIRMAN COPAN:

Yeah.

MS. GOLDEN:

-- their life and their priorities in the election, you know, community. So, yeah, I --

CHAIRMAN COPAN:

Any other viewpoints to share on this? Because what I'm understanding is that we will defer then going to a vote until the document is advanced to the point that the group agrees as the TGDC. Yes? I'm seeing nods around the table. So we will do that. Thank you so much.

MS. GOLDEN:

Can we schedule --

MS. BRADY:

Yes.

MS. GOLDEN:

Do it now while we're all sitting in this room.

MR. CHOATE:

I think we're all free --

MS. GOLDEN:

Get a date.

MR. CHOATE:

-- on November 5th, aren't we?

[Laughter]

MS. AUGINO:

That's more than 30 days.

MALE SPEAKER:

Yeah.

MR. CHOATE:

Oh, that's right.

MS. BRADY:

So I'm just trying to get confirmation from Ben that in terms of timeline what's our real target. So we say -- you know, we'd like 30 days but what's the drop-dead in terms of we've missed our opportunity?

And I think with respect to the HAVA process there needs to be enough time for NIST to -- you know, after TGDC adoption for NIST to transmit the document to the Executive Director at the EAC and there's enough time there to get it out to the boards, you know,

in consideration, get it out to the Standards Board and the Board of Advisors who are -- do we know when they're scheduled to meet?

COMMISSIONER HOVLAND:

I have heard generically April, but I don't believe those dates have been confirmed. But I welcome other input.

MR. NEWBY:

Well, I'm not anxious to provide other input, but, you know, just realistically the window -- you -- by extending it the 30 days, you may already be missing that window. And I say that because I know how long it took to adjudicate the VVSG comments, and you know you'll get a lot of comments on requirements. So if the board meetings are in April or May, 90 days gets you about a 30-day period to adjudicate all the comments. And that may be a push. And that's a -- that's suggesting that the requirements were ready to go today. And when we did the VVSG in September of '17, it took about a month to get from NIST back to the Executive Director. So that's the timeline you're working with.

And then we know now that the EAC will be in a continuing resolution through November 21 and therefore can't plan or commit to funding expenses for a meeting yet until after that period, so the April/May could get pushed a bit. And if the April/May gets pushed a bit, then that window hasn't been lost. So, I mean, that's kind of the moving pieces that you're dealing with.

MS. BRADY:

Okay. So just let me try to understand this and then try to restate it in perhaps a different way. If I'm understanding you correctly, the desire is to have the requirements in the hands of the Standards Board and Board of Advisors for 90 days prior to their meeting?

MR. NEWBY:

I think that's --

MS. BRADY:

Because they're required to have --

MR. NEWBY:

And then I would --

MS. BRADY:

You're required to give them 90 days.

MR. NEWBY:

Right. And as -- and then -- and I'm just -- I'd go back to Vice Chair Hovland to step in, but I think the thought is -- what I believe I've heard from Commissioners -- that's why I'd ask him to step in -- there'd be a concurrent period as public comment and the period to the advisory boards, and I think, unless -- Cliff could say something different. You'd probably -- I don't think they could pass something in day 80. I think it would have to have been the 90, but

I may be wrong about that. So -- yeah. And it really is going to come down to how long it takes to adjudicate all of the comments.

COMMISSIONER HOVLAND:

I would say, lawyering on the fly, which is dangerous, particularly because I'm not that good of a lawyer --

[Laughter]

COMMISSIONER HOVLAND:

-- my memory of it is that it says we can't -- the Executive Director transmits and then the Commission cannot vote for 90 days after that transmittal. So I think more than it is -- I think the question is more do they have enough time to review? And if we have to wait, you know, a month after the boards to then vote, you know, so be it -- because we also have -- I mean, there's the other pieces of the puzzle, which are the public hearing, which are the -- there's the public comment, and that's what we're talking about could potentially overlap. So I think the issue would be ensuring that the other boards have it in time to review before their meetings to be able to provide sufficient guidance or input if they so choose. And then ideally that would be overlapped within the -- then some at least if not all of the 90 days of public comment.

MR. GILES:

Just to touch on the scheduling because we're going to have Presidential primaries next year, so I think we're more looking towards May. I think March, April would be tough to get the Standards Board together. So I don't know that -- and again, we're obviously going to have to reach out to the Standards Board and see what time works for the bulk of the board to get them together. But usually that March/April would be pretty tough I think in a Presidential year.

MR. NEWBY:

So I think that may be right. In '19 I thought April would be better and the Standards Board wanted May and somehow we -- I think we kind of got to what -- the date we were, but the early indications were April was better than May this time, but that -- you know, that's a group of five people who said that so --

MR. GILES:

Yeah.

MS. BRADY:

So let's pick a date.

MALE SPEAKER:

We have proposals.

MS. AUGINO:

October 11th, October 17th, October 23rd, any of those dates look good for anybody?

[The Committee discussed proposed dates from 12:09 p.m. to 12:12 p.m.]

CHAIRMAN COPAN:

Would it be more helpful for us to come to a point of adjournment here and then work on the scheduling and as quickly as possible agree to meet?

MS. GOLDEN:

Yeah. How long of -- yeah, we can adjourn and then -- I don't know how long we're talking about this conference call being. That's the other thing.

MALE SPEAKER:

Yeah, it depends on how many items we have to discuss.

MS. GOLDEN:

That's --

CHAIRMAN COPAN:

Yeah.

MS. GOLDEN:

See, I mean, if we're talking about a --

CHAIRMAN COPAN:

Yeah.

FEMALE SPEAKER:

A half day.

MR. GILES:

And I think we can do a lot of email back-and-forth ahead of
time --

CHAIRMAN COPAN:

Yeah, with --

MR. GILES:

-- so when we get there, we're not --

MS. GOLDEN:

Yeah.

MR. GILES:

-- first time seeing it --

CHAIRMAN COPAN:

Right.

MR. GILES:

-- so I think we -- hopefully, we're almost in agreement by the
time we get to that meeting.

MS. GOLDEN:

Exactly.

CHAIRMAN COPAN:

Right.

MR. GILES:

And say, okay, let's formalize this.

CHAIRMAN COPAN:

Yeah.

MS. AUGINO:

And I think setting this deadline to actually work toward a final product is going to help hold everyone's feet to the fire --

CHAIRMAN COPAN:

Yeah.

MS. AUGINO:

-- because those deadlines that start ticking, I don't think you can send these documents to the Standards Board and the Board of Advisors in their current form anyway, so I think that this actually -- process will help us stay on track overall in the long run.

CHAIRMAN COPAN:

Yeah. Yeah, absolutely. Absolutely. Thank you so much.

So in view of all these conversations, I'd like to thank everyone for your participation, for your hard work, for everyone who's been a contributor to this effort. And we look forward to seeing the revised draft of VVSG 2.0 in advance of the meeting requirements. Thank you -- before our conference call to be established. Thank you so much. Meeting's adjourned.

[The Technical Guidelines Development Committee Meeting of the United States Election Assistance Commission adjourned at 12:13 p.m. on September 20, 2019.]

bw/cms

DRAFT