

**United States Election Assistance Commission
Roundtable Discussion**

**“Transforming Election Administration, Voting System
Accessibility, and the Certification Process”**

1225 New York Avenue, NW

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VERBATIM TRANSCRIPT

The following is the verbatim transcript of the United States Election Assistance Commission (EAC) Roundtable Discussion “Transforming Election Administration, Voting Process Accessibility, and the Certification Process” that was held on Thursday, May 9, 2013. The roundtable convened at 12:01 p.m., EDT and adjourned at 5:20 p.m., EDT.

ROUNDTABLE DISCUSSION

MS. MILLER:

All right, good afternoon everyone. Good morning, for those who may be joining us from the West Coast. We are starting this panel at 12 o'clock Eastern Standard Time. It's a little bit different, but we want to engage our folks on the West Coast as we can, so hopefully, we have an audience from that end of the world, as well.

Today's topic is “Transforming Election Administration, Voting System Accessibility, and the Certification Process.” It is a continuation of our roundtables as we have been doing for the past two years or so. As you know, we're unable to have public meetings because we do not have a quorum, but we like to continue our conversations and try to address voting and the accessibility issues and other issues surrounding election/election administration, which is the EAC's charge, so we've taken on the process of doing roundtables to continue these conversations and to continue these discussions. We're very fortunate to have a very elite group of panelists, I would say. They've always been willing to join us, and we never get any kind of, I would say, resistance from them. We ask and they come, and so, we're very, very happy that we're able to do that.

I'm going to take a minute and first introduce Monica Holman Evans. Monica is our Director of Grants. She is one who works behind the scenes. This first panel is going to talk about their grant research and

the funding that EAC has provided, and allowed them to come up with some of the wonderful interventions they've come up with, behind grants funding. And, I will say none of that would be possible without Monica, who's handing out the money. So, we need to, at least, recognize and thank her. Monica has been with the EAC since July of 2010. She took over from our, then Director, Mark Abbott, who, many of you may know, who moved on to bigger and better things. And she's been acting -- she started as Acting Director in October 2010, and then, took over the permanent position shortly thereafter. Monica, obviously, is skilled in grants management. She's been doing grants management for over 19 years. I promised that I would say she started at the age of five, so there is no, kind of, figuring out what her age is. But, Monica, I want to introduce you, and allow you to say a few words if you would like to.

MS. EVANS:

Thank you. We actually awarded the Accessible Voting Technology grants in 2011, and this was a three-year grant program. And, we're only two years in, but we have incredible results to present after only two years. And so, I really want to thank our grant recipients and sub-recipients for coming out today to present such wonderful results. And so, I think you'll really enjoy the presentations that you hear today. And I would really be remiss if I didn't acknowledge the work of our senior advisor in the grants office, Patrick Leahy, who is really responsible for bringing the grant recipients and sub-recipients together. He really does yeomen's work, in the grants office, with these grantees, and he really makes my job easy and he makes me look good. So, I really want to give Pat an opportunity to say a few words, because he really

does a great job in working with these recipients, with our accessible voting community.

So, I'll just turn it over to Pat, now.

MR. LEAHY:

Thanks Monica. Before I start, and I'll keep it very brief, this is the other unsung hero of the grants office, Galahad, who is my trusty advisor. He's my seeing-eye dog. So, for me, working with these sub-grantees and being on the front line of what they're doing, and the results that they're making, has just been fantastic.

Just two points to throw out for everyone's consideration before we get started. I find it exciting, and certainly, very, very energetic as far as this topic is concerned, that we have two intermediaries, Clemson and Information Technology, and Information Foundation, and between the two of them, dozens of sub-grantees, working on areas from surveying people with disabilities in the voting process, to Anywhere Ballot, which you'll hear about today, which is working on your ballot before you walk into the polls, just a variety of areas that they've been able to look at. So, it's just been fantastic to see that.

And then, second, they're getting their work out into the field. They're doing pilots. They're working with election officials, working with state and local elections, some association elections, getting their research into the field, so that it's part of the elections process. And we want to do more of that. So, we'll hear more about that today. But thanks Monica, and I am going to turn it back over to Alice for more.

MS. MILLER:

Okay, thank you. I realize I forgot to say my name.

I'm Alice Miller. I'm the Chief Operating Officer and current, acting Executive Director for the EAC. I think many of you know we're without a quorum of Commissioners. I kind of like got this position as acting, because the permanent director decided that he no longer was going to stick around and he left, so there we have it.

But having said that, I want to move on and introduce -- or re-introduce, and I'm sure most of you have known Merle King has done these panels for us for a number of years, and we could not do this without him. I say, all the time, we start with an idea, and we kind of mold it around, and figure out how we're going to put it together. And all of this comes together with a lot of behind-the-scenes work, and with Merle, definitely giving more than his fair share of volunteer time, which he doesn't want me to say, to pull this together.

So Merle, as many of you know, is an Associate Professor of Information Systems and the Executive Director for the Center of Election Systems at Kennesaw State University at Kennesaw, Georgia. He's a researcher in election administration. He was the 2005 recipient of the National Association of Secretary of States' Medallion Award for his work in Georgia elections. Merle is very modest in asking me not to say that. I told him I was going to say it anyway. Together, with his colleagues at the Center, he's led the development of one of the nation's best resources for election administration support. The Center for Election Systems provides voting systems technical support to Georgia's Office of Secretary of State and to 159 county supervisors in Georgia. He teaches graduate and undergraduate classes related to legal and leadership issues in information technology. And, I'll say it again, he has been one of our biggest cheerleaders. He's always there to support us. Merle is very,

very, very informed in these election related matters and information technology as it relates to resources, in progression and innovations, and we're so very happy, very fortunate, and very thankful to have Merle to continue to work with us and moderate these panels.

And I will turn it over to Merle.

DR. KING:

Thank you, Alice. It's a pleasure to be here, and one of the reasons I wanted Alice to abbreviate my introduction, is when I introduce the panel's speakers today you're not going to hear anything as elaborate and detailed as that.

But, it is my pleasure to be here, and I welcome our colleagues from around the country who are joining us on the Webcast. And today is an unusual opportunity for those of us here at the table and for those members of the election community who follow the state-of-the-art and the state-of-the practice and the future of voting systems. If you're an election official, and there are many of you in the room today and watching, we have the opportunity, periodically, to demonstrate our craft. We will be doing it with municipal elections this fall, and we will be doing it again with general elections in 2014, and we just finished a cycle. So, an election official's life is driven by these opportunities to demonstrate our capability in what we do. And today is that kind of opportunity for the EAC to bring together a body of work that they have sponsored and encouraged and endorsed. And it's an opportunity for researchers to really show the impact that this research is having, and the place that it's going to hold in the future of voting systems, of election systems, and election administration. So, I thank the EAC for their vision of putting together this

kind of platform where the viewers and the participants here can really see the breadth and the depth of the work that's being done in this area.

Before we begin with our presentations, a couple of housekeeping issues. We have hard deadlines with our roundtables, and part of that has to do with our broadcast, and our closed captioning, and so, this roundtable will end at 2:30 today. And I have a large panel of distinguished speakers, and I will do my best to help you stay on task and on target, but we will need to finish right at 2:30 today. I think you heard that the microphones are always on, in regards to you having to manipulate them, so don't worry about pressing buttons. Just begin to speak and the microphones will come up to volume.

What we're going today is begin with a series of presentations that will illuminate and highlight the research that's been done by each of the panelists here at the table, and the organizations that they represent. And then, we'll conclude with a discussion that talks about, how do we prioritize this, how do we operationalize this, what are our next steps, what's the long-hanging fruit, where can we go from here to move these innovations and move this research into widespread practice. So, we'll kind of break it up into two sessions.

And I'd like to start by introducing our first presenter today, Dana Chisnell. She is a self-described election nerd, who has trained thousands of election officials to test the design of their ballots. She's the lead on a project to develop a series of Field Guides to ensuring voter intent. The Field Guides, funded by a Kickstarter project and the MacArthur Foundation are designed to be quick, easy and accessible help for local election officials, to do the best possible design work. Through the Accessible Voting Technology initiative, with Drew Davies and Kathryn

Summers, Dana developed the Anywhere Ballot, an accessible, responsive, digital ballot template for ballot marking.

So, with that introduction Dana, I'll turn it over to you.

MS. CHISNELL:

I want to start with a story. When Emma, this is not her real name, but when Emma came into the lab, we had a nice chat and she had settled, she was about to try out marking a new kind of a ballot on a iPad, and she was excited to tell me about her experience voting in the Presidential election. She remembered who she voted for, but -- she told me who that was, even though I told her not to, but she couldn't remember what voting system she actually had used to cast her ballot. We were meeting for the first time in January of 2013. Three years before Emma had had a stroke. All the outward signs of the stroke were gone. Her hand/eye coordination was fine, her speech was clear, but she could not remember from page to page, in the ballot, how to actually mark her choice for candidates. I was devastated for her, but she seemed almost oblivious. And with Emma, we had butted up against some of the major challenges we all face in making voting accessible for all voters.

Right now, the way we treat accessibility in the polling place is as an accommodation. The Help America Vote Act helped us get this far by putting accessible systems in every polling place, and when this happened more people could vote privately, independently and securely than ever before. And this is a very good thing. And while the participation of voters with disabilities has increased over the years, there are still really serious obstacles. From a recent article by Whitney Quesenbery, in the Information Technology and Disabilities Journal, I have this, "Accessibility within the polling place, finding the accessible voting system and getting

set up to use it, can be a problem, though there are conflicting accounts. Numerous anecdotal accounts and blogs and other social media suggest that voters with disabilities often arrive at the polling place to find that the accessible system is not set up or not working correctly. Election officials often report that few people use the accessible systems. But, a 2008 survey by the National Federation of the Blind said that when blind voters went to the polling place, about half, around 51 percent, were able to vote without assistance, and most, 87 percent, said that the accessible system was set up and operating when they arrived. However, the NFB concludes, even with this very positive report card of voting experience, some clear areas for improvement still exist, considering that one in ten who voted in the polls said an accessible voting machine was not available for them, and nearly one in five who did attempt to use an accessible voting machine said poll workers had problems setting it up, or activating the machine, especially activating the audio ballot, which was the way in which a great majority choose to use the machine.”

So, voting, for people with disabilities, is rarely comfortable or efficient, and it's very clearly different from how other voters vote. Now, while the VVSG, the Voluntary Voting Systems Guidelines, you'd think I've never said that before, while the VVGS accessibility standards address many accommodations for people with vision, mobility, and dexterity issues, the scope of the VVSG is the voting system. But, there's a vast spectrum of needs when it comes to making voting private, independent, and secure for people with disabilities. Some of those needs are difficult to recognize for election officials, and often for the poll worker, and even sometimes for the voter. But technology and design are good enough, ten

years later, that there is no good reason that the accessible voting system must be segregated.

The projects you're going to hear about today are all working in the spirit of making voting universally acceptable -- accessible. They envision a world in which there isn't a special accessible system, but instead, all voters in a polling place use the same system. These projects reach beyond the voting system, to the ballot, to voting materials, to polling places, stretching to address accessibility across the voting experience.

So, collectively, the researchers here at our team have spent hundreds of hours, well, maybe thousands of hours, actually, observing people like Emma, and others with low literacy, with mild cognitive impairments, and information processing issues. They're regular people. They're people you know. Some are young and some are old, some are wounded warriors. They're people you would not always be able to pick out of the crowd, as disabled. And they're people who want to vote. We've watched these ordinary people with extraordinary abilities who work around their limitations in their daily lives interact with what we made, and we were repeatedly humbled.

We knew, going in, that plain language in instructions should make voting easier for all voters, not just voters with disabilities. But, what we learned in these projects went way beyond best practice, and we saw that, including what Sean King (ph) calls plain interaction, makes a huge difference in whether voters can vote in the way that they intend. The results of the studies in the Accessible Voting Technology Initiative will make participating in elections easier, less frustrating, and more inviting for voters of all abilities. So, the research you're about to hear about marks an exciting and wonderful point in design usability and accessibility

in elections.

I'm proud of my work on the Anywhere Ballot with Kathryn Summers and with Drew Davies, and I'm excited that Kathryn is here to talk about that project.

DR. SUMMERS:

Okay, thank you. We are very excited...

DR. KING:

Kathryn, I'm sorry, I'd like to introduce you.

DR. SUMMERS:

Oh, you can go ahead and do that.

DR. KING:

It's a little bit different format than we use. Kathryn Summers, who is about to speak, is an Associate Professor in the Division of Science, Information Arts, and Technologies at the University of Baltimore. Kathryn's current work focuses on making medical and other information easier to find, navigate, and read on the Web for people with lower literacy skills. The results of this research have been presented at a variety of international conferences and published by the American Society for Information Science and Technology and Interactions magazine. Kathryn has also done qualitative observational research supported by eye tracking measurements on how to make online forms, such as registration and medical assessment tools, easier to use with people -- for people with lower literacy skills.

All right, thank you Kathryn.

DR. SUMMERS:

All right, thanks. All right, so that's why they roped me into this project, even though I haven't done as much work in voting, but I find voting a very

compelling and important issue. And, it is dear to my heart to make voting accessible for everyone, including those who are at risk because of their reading skills or other disabilities or other life experiences that have made it so that they don't read well.

So, we worked on, it was Dana, Drew, and myself, we worked on trying to create a ballot that would work on any device, and the reason we thought that was important is because then voters can use their own familiar assistive technology. And, again, they're not segregated to a special accessible device. We also wanted to optimize the ballot for people with low literacy by focusing on plain language and plain interaction. We used the NIST medium complexity ballot, slightly modified. It was about 18 pages with 14 races, one constitutional amendment, two ballot measures. We did a paper prototype first, and then, a digital prototype. The paper prototype we started from what we knew, best practices. And, as you can see, we went through 16 versions. So, we learned a lot during those -- that round. And then, we built a digital prototype. We focused on participants with low literacy skills, advanced age, or mild cognitive impairments.

We learned a number of things. We confirmed what Ginny and Dana Chisnell have found about the crucial role of plain language in ballot instructions, and we found that participants with lower literacy really do tend to act on every single word. That meant that language tweaks became very essential, things like eliminating ambiguous words, reducing jargon, having less text on the screens. And a couple of examples of that were things like "Touch to see additional candidates" needed to become "Touch to see more names," very small changes, but sometimes with big impacts for voter success. "Review screen text", we found that the review

screen was causing some confusion. You could have voted for four candidates and you only voted for two. We changed it to “You voted for two people. You can vote for two more.” Focused on actions, and moved from the familiar “You voted for two,” “Oh yeah I remember voting for two,” and “You can vote for two more. On things like the finish -- the final screen, where you’re going to cast your ballot, participants had some anxiety and backed away from casting their ballot. We found out that focusing the text on the message and on their choice rather than on the danger of making mistake reduced that anxiety and freed them up to move forward. “Are you sure you finished voting”? Now, once you press the vote button you’re not going to be able to do anything. We just said “Are you finished?” If you want to go back, do this. If you’re ready to vote, you know. And that cleared that up and freed them to move forward.

We also know that in voting there are some necessary hurdles, hurdles that we’ve built into the process on purpose. A completely efficient transaction would let them change their vote by simply touching the new selection, but, in voting, we require them to deselect before they select a new one. This is a known interaction challenge, and our participants struggled with this as we expected. But, we, again, found ways to improve this. We simplified the text message, the error message that popped up to help them know that they needed to deselect, and then, we bolded the key action. You can see the bold there, “Touch the blue box” to remove the name you don’t want. So, if they didn’t want to read the whole screen, they would, at least, have a better chance of seeing the key information. And we made it easier to get out of the error message, which we’ll talk about in plain interaction.

So, with plain language, we found out that, as plain language advocates know, we need minimal text, short sentences, specific concrete familiar words, no jargon, large type size. We also found that we needed to keep the interaction very plain, as well. This is especially important as we transition from paper ballots to electronic interfaces, where interaction design becomes much more deliberate. Previous research with low literacy participants has shown that any kind of distraction from the main process they need to accomplish can be disruptive. The distraction can be as simple as a link, a shift in the location of where they need to be acting, information on a sidebar. All of those can have detrimental effects on task success, and we found similar problems with distractions impeding the voting process. So, we started off simple and had to get even more simple. We found that we needed to keep the interaction very focused on immediate action. We needed to eliminate supplemental content. We removed extra icons, and removed the back button from all the screen in the review process, all kinds of little changes that turned out to be essential.

So, this was our instruction screen and it had too much information. They thought the images on the screen were interactive, and so, we removed -- we had to remove the images and reduce the text so that they weren't trying to read it and act immediately. On the ballot item instructions, the voting screens themselves were streamlined to focus all the voter's cognitive resources on the voting process rather than on processing the information on the screen. So, you can see at the top we had instructions on every screen. We removed those and condensed them to a single line. And even the extra icons were eliminated. We had initially built in a number of help options. You can see the little "i's." They

were help on, what race is this. You could pull up additional help on instructions. We even anticipated supporting voter education at the voting -- at the point of voting, which is something that a variety of researchers have wished we could do, and I -- we were all very -- well we were mostly very excited about that possibility. And we found out it didn't work, not for these at-risk audiences. It disrupted the process and kept them from moving forward successfully. So, we simplified the icon to not be so obtrusive, because the obtrusive icon was calling for interaction. People kept trying to touch it and not realizing why that wasn't letting them vote that way. And then, we took them all away except the definition of what race is this.

For the text entry, we used a non-QWERTY keyboard, because we were dealing with people who don't have extensive experience with keyboards, supports the text entry for those unused to typing, we made the letters bigger so they were easier to identify. And, at the last presentation of our results Sarah Swierenga suggested that we pull an idea from K-12 which is to start each line with a vowel to make the vowels easier to find. She says that some research has shown from K-12 that that's very helpful for beginning readers, and so that's something we'd like to explore.

And the last thing that we found out we needed to -- we had to find out what behaviors our participants want to use to interact with the ballot, and then try to make those behaviors work. And so, our ballot lets users scroll by pressing a button, dragging the scrollbar, or flicking a finger. Similarly, you can touch anywhere on a name to select it. When an error message does pop up, we made the close button green, so that it matches, you can't see here, actually, it matches the green interaction

buttons on the rest of the interface. And we also made it so that if you touch anywhere outside the light box, it will close.

So, to sum up, our plain interaction findings were that we needed to support immediate action. They want to read it and do it right in the same spot, right in the same moment, eliminate distractions and disruptions, make their natural user behavior successful, if we can, be aware that little things have big impact. And the biggest takeaway is that iterative testing is a wonderful way to be brilliant. And so, if you -- and it's really for most of us the only guaranteed way. And so, we really advocate this iterative testing. We'd love to share the results of our iterative testing, but we recognize that other people can be brilliant with iterative testing, too. You just -- but it's very hard to do it without that.

And we have a few open questions. We realized, with Emma, who she talked about, one of the things that we think might have helped Emma -- we have this set up so that it worked with assistive technology, but it's sort of an all or nothing, right now. You either have the whole thing read aloud to you or you read it on the screen. We think that Emma may have been helped by having the instructions read aloud, and then, she could read the ballot choices and make hers. And we didn't get a chance to pursue that, but that's an area that we'd like to see more research in. If this is an Anywhere Ballot, as well as an any device ballot, then we need a way to pause and resume voting. If you're marking your ballot before you come, then you may be interrupted. And also, with people with traumatic brain injury, they sometimes need to pause in the middle of a long interaction, so that's something that still needs to be done. And then, there's always room for additional keyway testing to perfect compatibility with assistive technologies. But, we gave it a pretty good shot.

DR. KING:

Okay, I'd like to follow up with a question to Kathryn and Dana before we move on to Daniel.

Dana, in your presentation, you talked about voting systems as being a system in a portfolio of systems that voters interact with as a part of the overall voting process. And when I look at the clarity of your ballot, and the elegance of that ballot, would there be challenges, by that being the only clear narrative for voters in that process? In other words, would starting at this clear ballot design concept lead jurisdictions towards improvements in the other systems, if they're going to online voter registration, other kinds of interactions that jurisdictions have with voters via text?

DR. SUMMERS:

We hope so.

MS. CHISNELL:

Yeah, I certainly think that a lot of things that we learned about the instructions, specifically, could transfer over to all kinds of systems, to forms, to voter education materials, anything that's voter or poll worker facing. Certainly things that we learned in the study would help poll workers do their jobs more efficiently and much easier.

But, I think one of the big discoveries for us was how important the interaction design was, and what a clear, clean digital design should look like for a ballot. And I'm excited about creating, sort of, a pattern library out of the ballot that we developed that could be transferable to other variations on digital ballots. And I'm pretty sure that those things are transferable, flexible, portable, because we've seen similar things happen with the best practices for printed ballots that was developed by the EAC

in the Design for Democracy project. Those principles hold true for practically any form that you can create. It's not specific to a ballot, so we see good design practice.

DR. KING:

I think that's an excellent and important point, that many jurisdictions have their ballot design imbedded into statute. But clearly, from what you're presenting and your research indicates, you don't need to wait until your next iteration of your voting system to begin improving the interaction between your voters via printed material.

MS. CHISNELL:

Exactly true. We've been having conversations already with a couple of different states about implementing the Anywhere Ballot, and one of the first things they say is we can't implement all the instructions the way you have, because we have stuff in our legislation that prevents us doing that, but we'd like to test it alongside what we have to do, and then, this may make a case for changing the election code.

DR. KING:

All right, well, thank you. Daniel Castro is a Senior Analyst at the Information Technology & Innovation Foundation with experience in the private, non-profit and governmental sectors. Daniel has organized a public conference on the VVSG, a public forum to discuss voting technology policy, and an event on Capitol Hill to showcase innovations in voting system technology. He was the Project Director and Co-Principal Investigator of the EAC sponsored Military Heroes Initiative, to research improvements in voting accessibility for recently injured military personnel. Daniel is the Project Director for the ITIF Accessible Voting Technology

Initiative, a three-year research grant from the EAC to develop more accessible election technology. Daniel.

MR. CASTRO:

Thanks Merle. It's a pleasure to be here today. As Merle mentioned, I work for a think tank that's really focused on how we can leverage technology and innovation to grow the economy and create other kinds of benefits for society. And so, I've always been very interested in voting, because I see this as an area where we have many opportunities to accelerate innovation and to bring you technology to help a process that's so important to so many people. And so, I was, of course, delighted when the EAC really showed, I think, tremendous leadership in sponsoring the Military Heroes Initiative and the Accessible Voting Technology Initiative. This is an area where there's been a real need for focused research and I think the projects you'll be hearing from today really highlight how, with even a small amount of funds, we've really been able to make substantial progress. So, I have the pleasure of going after Dana and Kathryn, who are two of the grants that we funded as part of our project. So, if you remember nothing else from what I say today, at least remember that we're funding excellent work such as this.

But, what I want to do is talk, just kind of briefly, about how we decided to structure our research grant, and then, talk about some of the projects that we've already completed, and some of the projects that we have in progress, including some that you'll hear from from the other panelists.

What we decided to do is break our project into three phases, and we really wanted to do something that's called, kind of, design-lead innovation, where we're bringing together user needs and the potential

technology to come up with creative solutions. So, we started off with the first phase, where we're really focusing on defining the problem. We spent most of the first year on this where we had a lot of research that was targeted at understanding the specific needs of people with disabilities, where the current state of research was, where there are new opportunities, and where assistive technology might be useful. Then, we moved into the second phase which is focused on designing new solutions and developing new technologies and new processes. And I'll talk a little bit about that. And then, I'll talk just briefly about what we'll do in the third phase.

So, to start it off, some of the projects that we've already done, one of the first big projects that we funded was with the University of Washington, that was focused on understanding the accessibility of current voting systems that were supposed to be designed for accessibility. And we published a recent white paper on this. We also submitted this as comments to the EAC, as part of their VVSG call for comments. And one of the main findings is that we have seen improvement over time. The older systems are, you know, significantly less accessible than the newer systems, that we have seen progress, but we still are consistently finding some types of problems. And what we were able to take from this is some new research areas where we can focus on.

We also did a project with the University of Colorado in Denver, specifically Assistive Technology Partners research group, that was looking at how we can use assistive technology in the voting process. And what this group did is they described, really in detail, the different tasks involved in voting, what was needed to complete these tasks, and

how assistive technology could enable people to exercise these tasks, or complete these tasks independently. And what we were able to do, I think, with this research and some of the other research is make it easier for new researchers to join this, to join this area of research, so people that don't really have a deep background in elections or voting can see now where the problems are, where potential technology solutions are, and quickly come in and participate. And that was really one of our goals, with our call for proposals that we got through later, where we funded new research, was to bring in new people who weren't involved in this before, that might have some really good ideas.

Some other projects that we did, we also brought in some political scientists from the University of Utah and Cal Tech to identify some of the barriers to political participation. We were able to use a Census data, data from the current population survey, to look at what are some of the macro level trends in this phase. So, you know, one big finding here was some of the convenience voting policies that have been implemented in states, things like Election Day voter registration, absentee voting, and early voting centers, were very important for people with disabilities, particularly certain types of disabilities; that this was something we saw that it doesn't matter necessarily to all populations, we don't want to think of people with disabilities as a single group, but really focus on where we can be effective.

We also -- we took this kind of macro level look, using the Census data we also did some micro level research. We did a number of ethnographic interviews with people with disabilities. We did about almost 50 of these where we had qualitative researchers talk to people in structured interviews about their voting experiences, both for people who

had voted previously in elections, and people who had not voted previously. We had them observe people with disabilities going to the polls, and voting with them, and talking with them after they had voted. And what we were able to do is, first of all, confirm the findings that we had from some of this larger research, but also try and really understand what are some of the causes of these problems and what are the specific barriers people are encountering on the ground in the poll places, and then, maybe how we can go and change some of these problems.

We also funded, at Georgia Tech, a graduate course on universal design. We had an instructor who has taught universal design, for really, architecture, before, and focusing on other types of needs and applying these same principles in the election space. We had some great students involved in a project, and they proposed a prototype which we ended up funding later on called the EZ Ballot, where they came up with a new voting system that was designed around these universal design principles, so that the same interface would be used by everyone regardless of the type of input they were using. So, it uses a single interface that has a “yes” and “no” button for every question that you would encounter in the ballot.

We also held two design workshops where we brought in disability advocates, people with disabilities, voting system vendors, researchers from other fields, designers, election officials, just a whole interesting group of people, to sit around and do design studios, where they were focused on specific problems that we’ve encountered and how they can design solutions that would address these needs. This was, I think, very successful, because we came up with a number of proposals out of this. And I have on the screen here a sample poster that was created on the

second day from one of the groups that was proposing a new way of, you know, thinking about one of the problems that we have in elections. We also held a kind of larger design-focused workshop that was open to everyone, with OpenIDEO. We had an online innovation challenge where people were invited to answer this question “How might we design an accessible election experience for everyone?” We had people share ideas, not only on how to improve elections and voting technology and voting processes, but also, just talk about their experiences. And anyone in the world could participate in this, they could provide feedback on the ideas that were received, they could provide new suggestions for how to iterate and improve these ideas. And we came up with ten winning selections, some of which we later funded.

And finally, to kind of cap off this first phase, we put together a document, or a publication, called “50 Ideas for More Accessible Voting.” What this is is 50 pages, one idea per page, very simple, straightforward ideas of how we can make elections better. And this is something that is, you know, something that can be taken by any election official at the state or local level, it can be taken by, you know, the EAC and NIST and others who are looking at this from the federal level, as well as voting system developers and designers who can take a little idea and implement it in their system. One, you know, simple idea that we have in here. And this is kind of recapping things that we pulled from the design workshops and the open challenge. One idea they came up with was in Georgia we have cards that you use to insert into the electronic voting system to activate it. We had somebody who was at one of our design workshops who said, you know, I don’t have very good grip on keycards like this, but I do have very good control when they have holes, so that I can put my finger in, and

I can manipulate it better. This is a simple change that we can make to make all of these systems much more accessible for this population.

So, what we did after this first phase is we opened up two rounds of competitive grant funding, where we -- we had a call for proposals for ideas on developing new voting technology and new pilots based on what we had learned in the first phase. We got many great suggestions and ideas and proposals and we're funding -- in total we're funding over 15 projects. So, you know, just briefly we have, for example, one project that's evaluating the use of iPads for people who are using them to vote in long-term care facilities. In the City of Denver, they had received a grant to do this pilot, but they hadn't received funds to actually evaluate it. So, now we have some good lessons learned both from the experiences of people who voted and from the poll workers.

As you heard, we had the University of Baltimore, with Dana and Kathryn, design an accessible ballot interface for mobile devices and other devices, especially for people with cognitive disabilities. We had other voting technology. We had the EZ Ballot that I mentioned earlier, that we funded, to really develop this out into a prototype. So, you saw the sketch earlier. Now, just recently, I saw the prototype that they have where they've actually implemented this, now, on a Microsoft surface tablet. They have two controls available, and now they're actually testing this with users right now.

We also have, from Georgia Tech Research Institute, a number of projects that are working on how we can make voting interfaces more accessible. And they've actually developed a voting system test bed to quickly answer some new research questions that we have, and you'll be hearing that from Dr. Fain in a minute. At Michigan State University, we

had a team that's been working on how we can use joystick controls that are used on motorized wheelchairs as an input to voting systems. This is a technology that's already being used. How can we integrate this?

But we're not just doing technology, we're also -- we found that one of the primary issues that we came across in the first phase was that when there wasn't accessible information for people, they weren't able to vote or they had problems voting, or they weren't able to use the accessible systems that were available. So, we have three projects that are looking at how we can make voter guides more accessible. We have one from the University of Maryland, Baltimore County that's focused on how do we create Web-based voter guides for people with aphasia. We have -- from CITRIS, you'll be hearing from Dan in a moment, talking about a interactive voting guide for people with cognitive disabilities. Finally, we also have a project from a group called Apps4Android that has developed a accessible voter information guide pulling in the open information that's made available through the PEW Research Center and Google to put this together into an accessible mobile app for individuals, especially those with -- that need non-visual access to the information, can use. We actually got a demo of this, or a beta version of this app, out before the 2012 federal election.

And finally, we have a few projects that are looking at election administration. We have one, at UC Berkley, that's looking at pilot testing a program for supervised voting for individuals living in group living facilities. They're taking some best practices, applying it to different sized counties, and seeing if they can deploy this, really, statewide. As well, we're also having the team, a team from Georgia Tech, develop new training materials for poll workers based on interviews that they're doing

on the ground with different poll workers and the problems that they're having.

I've covered a lot of the projects that we're doing, and I just want to emphasize, especially with completed projects, we have some really great research that's out there. All of this material is available on our Website at elections.itif.org, as well as posters that we've presented and other research that's been presented from the different sub-grantees.

DR. KING:

Okay, thank you. Daniel, I'd like to follow up with a question. I've often thought of ITIF as kind of a portal for accessibility research; that you're the place that kind of intersects a lot of different research initiatives in the same sphere. Can you talk a little bit about some of the synergies that are derived from having this kind of portal approach within your organization that brings together researchers, not only matched up to a specific grant initiative, but researchers who can then interact with other researchers, if you will, that are brought together in your portal?

MR. CASTRO

Right, no, I appreciate that question. I mean, you know, one of our goals really is, as I said, you know, we want more people in this field, because there's so much interesting research. And when you look at a voting system, it's not that different than some of the other technology systems we have out there, and people are doing interesting research on how to make those systems successful, as well. What I'd like to see is that voting systems be the kind of premiere place for accessibility research; that it's not kind of the last place that accessibility goes, but really, it's the first place. And you know, accessibility is trickling down to ATMs from voting systems, and we take that kind of approach.

But what we see, yes, is ITIF is a portal. All of the grants that we've funded have really focused on bringing together different types of researchers, who maybe didn't work together before. We want to make sure that most of our projects, if we have technologists who the primary recipients, then they're talking to election officials, they're talking with advocates, they're talking with people with disabilities in different communities, so that they're able to, not only, you know, design the solution that maybe works well in the lab, but is really something that will have an impact in the field, because that's our real goal. And we want to make sure that we can get that transfer as seamless as possible by having them work together from the beginning.

DR. KING:

Okay, thank you. Before we move to the next presentation I'd like to remind everybody who has joined us on the Webcast that we are taking questions by email and questions by Twitter, and when we get to the end of our presentations, hopefully, if you've sent a question in, we can get that into our queue, and get you a response from this panel. The EAC Website is www.eac.gov and I think there's a link there on the front page that will guide you towards either e-mail or tweeting us questions.

Our next presenter is Dan Gillette. He's a project scientist at Carnegie Mellon University - Silicon Valley, where he conducts design research in the areas of voting, disability and considerate systems. Additionally, Dan consults, teaches, and designs innovative products and experiences in the domains of education, healthcare and disability. From 2002 to 2008 Dan was chair of the Innovative Technology for Autism Initiative, a grassroots consortium focused on developing better tools for individuals with autism. Dan holds a B.A. in human development from the

Lesley College Graduate School, and Ed.M. from the Harvard Graduate School of Education with a concentration in cognitive science, psychology and instructional design. Dan.

MR. GILLETTE:

Thank you. I'm presenting on two projects, so I'll be moving a little fast, but hopefully, you'll be able to download the presentation and see a little bit more.

The first project is an ITIF project, Vote Your Mind, at the Center for Data and Democracy at UC Berkley. And our team is Greg Niemeyer, Camille Crittenden, myself, Faraz Farzin, Andie Hisch, graphic designer, and Kevin Koh who is our student programmer. The problem that we're focused on is that current voter education materials are long, confusing and don't hold your attention. How can we fix that? So, here's an example. Here is a voter guide that actually has a lot of useful content. They've asked each candidate three questions, and then, provide answers that the candidates gave, so you can compare. In the very, very small print underneath it, there are actual background information; where they went to school, what's their job, essentially, who they are. So, there's good content, but this is a very difficult to read layout. And then, look at another voter guide, this is from my own precinct, and this is a very informative piece on a proposition, but it's 12 pages long. So, every possible point of view is actually provided, and well written, in most cases, in this voter guide, but that's a lot to work through to decide a single proposition, this one about whether or not we should be supporting parks in a certain way. So, those are the problems that we're focused on.

Our goal is to provide a solution for individuals, for everyone, you know. When we talk about this project to the general population,

everyone says I want that. But our initial start is looking at individuals who have cognitive difficulties, such as attention problems, memory issues, and perhaps some dexterity issues, as well. And this project has just started, so I don't have really anything to show you that's in a state to be seen, but I'll tell you where we're at. We are creating a tablet-based voter guide for individuals with cognitive disabilities, that breaks content into chunks, so that you can work through it. And the guide actually breaks things down in a way and interacts with you in a way where you get a piece of information, you digest it, and you move on. It provides multi-media. At this point we're considering text to speech, adding some graphics, especially around things like propositions, charts and the like, and animation to help you focus, to help you understand where the content you need to pay attention is, and to help you find the controls. Gestures that are designed for individuals with fine motor difficulties. So, it can be difficult to tap a button on a flat screen, such as a tablet, and hit the spot you're supposed to hit. And so, one of the things that we are working on is, we actually have implemented, but will be testing, is the idea of slashing or making a check type gesture. As long as you cross the button, you will make that button register. Activities to keep the reader active, so we'll be doing things like -- this is an area that we're under quite a bit of research, but asking you to match information to certain candidates, would be one example just to help you be a little bit more active in what you're doing and to stay on task.

One of the things that we're very cognizant of is, in any case, when you allow someone to make a wrong decision, you know, so it's a multiple choice test, for example, and you take -- and you check the wrong answer, that lays down in your brain a pathway that suggests it might actually be

right, because it looks that way on the page. And in the case of the population that we're most concerned about, with this, that can happen even more easily. So, one of the things that we are very focused on is to make sure that anything we do doesn't lay down an erroneous connection between an issue or a candidate and that piece of information. And that's an area where, when we do activities, we have to be especially careful. So, one of the things that we have is kind of a reverse of a first choice, which, if you drag something, or tap something, it will start to look like it's in the right place, but if it's the wrong answer it's just going to snap back. So, you never see that. Those are the sort of things that we're paying attention to.

We're going to allow someone to mark their preferences as they move through the guide, and then, it will result in a printable sample ballot. And where we're at is we've conducted a review of voter guides from around the country, selected what we consider to be a reasonable sample text, that's kind of average, but has enough information for us to work from. We are currently prototyping the application and we'll be conducting a small usability study in mid to late summer, that we hope to start getting results out sometime in August -- in October, I'm sorry. So, that's Vote Your Mind, at UC Berkley.

At Carnegie Mellon University, we're on the RAAV project, and our team is Ted Selker, Shama Hoque, and Ashwin Arun, currently are both student graduate assistants. And we're looking at a number of things, So, one thing we've already looked at is we've looked at a bunch of DREs and their instruction sets, and reviewed, how are instructions provided. And what we found was a lot of inconsistency in terms, which caused ambiguity. We found instructions that weren't necessarily related to the

task at hand, so everything was read from beginning to end, about the entire voting process, instead of being specific to what I might be looking for. And we are working towards creating more consistent and contextually appropriate syntax for voting machine instructions.

We're also working quite a bit in audio ballots. We're focused on more efficient list browsing, so we're looking at ways that we can represent the text, audibly, in a faster manner, for people who aren't used to sped-up text. We are looking at how to do a write-in system for non-alphabetic keyboard users, or for systems that don't have a keyboard at all. As I said before, we're looking at making things a little bit more focused on the actions that the voter is trying to do at the moment. And we're working on review schemes, such as schemes that are more dialogue based, and will say, "Are you sure that's the one you want?" Those won't actually be the words, but that's the concept. Instead of just saying "selected," clarifying "you have chosen this, this is how it will be cast," looking at different ways of providing audio queues, earcons, which are audio icons, that can remove text from the process, and system responsiveness. One of the issues in most audio ballots on the market today is there might be a lag time that allows the user to think that the machine didn't catch that last button press, and they'll do something to fix it, and that will cause a problem. And they go down this road where they end up where they didn't anticipate because the machine didn't respond in a way that makes sense. We can't make every machine immediately responsive, so one of the things we're looking at is what sort of feedback do you have to provide in different situations. This is a poster on our write-in project that you can review. You can -- you should be able to

download this from the Website, but I won't get into it due to time constraints.

We're also looking at command and control, which is how do you physically interact with the device and get your intent across to the device, so buttons, screens, gestures, sounds. And multi-media interfaces, so as Dana was hoping for, to get to systems that aren't just text, aren't just graphic, aren't just audio, but start to blend those features to be more understandable and more useable.

What I really want to talk about today where we have some interesting work going on is magnifiers, because it's something that gets overlooked, as kind of a simple technology, but is actually quite important. So one of the things is who needs voting magnifiers? Someone who needs a voting magnifier is someone who probably doesn't know they need it, until they're in the voting booth. If you have a problem with vision or reading that affects you on a day-to-day basis, then you will probably have a solution, such as glasses or other things available, that you would bring with you to vote. But, if you get into the voting booth and you find that the print is a little too small, the layout is a little blurry, you might be in this in between space, where your vision may have a little bit of decline, but may not in your day-to-day life affect you, and you need a solution because we can't just hit a button on a paper-based ballot and say resize the text. And that's the group we're talking about. We're also talking about people who do not utilize assistive technology, and that we're focused more on the folks in this in between area. But that is a population that's growing quickly. We have aging voters who may be retired, and may not be choosing to read something as small print, say as a newspaper, as often as they used to, and don't realize that they need

some assistance. Also, diabetes is causing a huge uptick in vision problems in the 21 to 39 year olds. And that is something that you don't necessarily notice until it gets more severe. So, that's who we're talking about.

The other thing is that a voting magnifier, and this is very important to remember, is not corrective. It does not bring the ballot into focus. It is in between the eye and the ballot. So, what it does, it just makes it bigger. So, for some people with a little blurriness, or it's not quite bright enough, that will help. For someone who everything is too blurry at any print size, a voting magnifier, we cannot provide a solution in the voting booth. That's something they have to bring. So, that's another thing just to think about the technical limitations.

Common issues with the common voting -- so this is Ashwin, one of our students, who is voting and he's holding a Fresnel lens, which is something -- it's a flat magnifier that magnifies evenly. They're inexpensive, somewhat rugged, so they're used a lot. But what you can see is his posture is all bent up. He wants to align his eyes with the magnification, and he wants the magnifier to be aligned with the ballot, and that's not in line with his body. So, he has to bend over. When he does that, his forearm is no longer long enough to mark underneath it, which is quite uncomfortable, so he's contorting, and he will twist. The focal length of these magnifiers that are bought off the shelf is for about two to four inches of height, but we have a pen that's five to five-and-a-half inches tall. So, to keep it in focus, I can't mark underneath it. And you see this in polling places all the time, is, people will put down the magnifier to mark, but then they don't see what they're marking, which causes problems.

Other issues is that many of these are floppy, not all. There are ones that are quit rigid, and that changes the focus. And holding it, especially for the populations I was talking about, if you cannot hold it at exactly the same height, and keep it steady, then you will lose focus with the magnifier, and that will be distracting, and you'll constantly be changing focus. So, these are some of the problems we're facing.

Other issues that are broad issues, but really come into play, here, is light in the polling place. Light from above can be reflective if it's too focused. Not enough light and these cheap magnifiers -- any magnifier is going to reduce how much light gets through it. These cheaper ones reduce more light, and so, if you have someone with macular degeneration as part of their issues, light is already an issue. Not enough light is getting through their eye, and then, we darken the ballot with a magnifier, because we don't have appropriate lighting in the polling place to begin with. So, that's an issue.

So, what we're prototyping and we're going to be testing in the November elections, hopefully, we have a few people signed up to help us do that, it has to be freestanding so it stays in focus. It has to be lit underneath, so it's not reflective. And it has to be lit so there's enough light. This is an off-the-shelf item. It's close, but it's a little too low, and it's too flexible, not sturdy enough. So, we are creating prototypes to see if we can get it on to the market. Other things are inexpensive, easy to set up, and clear to set up, and clear to use. And another issue that's come up is easy to stow, in a polling place. We believe, and there's some research to back this up, that if someone takes their ballot to the polling booth, and then realizes they need a magnifier, even if they know that one is available at the registration station, they will not go back and get it.

There are social reasons. There are convenience reasons. They'll just muddle through, or try, and they may mis-vote as a result. They need to be in each polling booth, so we need to make them affordable enough to be there. We need, also, for them to be able to get out of the way. So, how does it stow? Does it hang on a voting blind when not in use, but is easily usable? Is it built into the voting blind? These are things that we are creating prototypes for.

DR. KING:

Okay, thank you Dan. I wanted to follow-up with two questions on your presentation.

You had -- one of the slides talked about the contradictions and potential inconsistencies in language.

MR. GILLETTE:

Um-hum.

DR. KING:

And I know, as we talk about writing instructions for poll workers, and we talked about writing instructions for voters to come in, if you're in a DRE jurisdiction, everybody has contemplated using press, touch, hit, select, et cetera. Could you talk about, what are the consequences of that kind of inconsistency in language? I think we recognize it as election officials, but we don't often understand that the consequence is severe enough to motivate us to go back through and review all of our materials. So, could you just briefly mention that?

MR. GILLETTE:

I think one of the big issues is trying to understand what is common. So, for instance, if you put most of voting texts through a grade level analyzer a lot of the voting jargon, like candidate, will up the grade level. But that's

a common term around voting. But, something like press, click, tap, that has some variability. Right now, we're creating an instruction set for our write-in solution, and we've been spending weeks on those words, because which -- to a computer science student, to someone who regularly uses assistive technology, all three of those might mean the same thing. Two of those might mean nothing to the type of person we're thinking about. So, part of that is just the testing.

The other issue, and I think Kathryn is probably more suited, theoretically, to back this up, is when we're in a situation listening to instructions we are looking out for terms. And we can probably pick up or change the meaning of a word, for the moment, in our minds to -- for that term to hold through the experience. But, if you have multiple terms for the same thing, you dilute that, and it's just confusing. So, a term, in the case of a lot in like the DREs, tends to mean there's an action associated, and so you want to keep that very consistent because it's a consistent action. And if you don't, then your directions aren't being received in the right way, you'll forget them, you don't understand why is it -- is this a different situation in this moment, because the term is different. That ambiguity creates paralysis in the user, usually, you know. You either stop because you don't think you understand what the machine wants you to understand, or you just start hitting everything because you don't -- the machine doesn't get you.

DR. KING:

The last question I have, and actually, when we get finished with the presentations I may throw this one back out, if you talk to many election officials about the technology that they're using for vote capture, and ask them, do you have an accessible solution, they will always say, yes. And

when you ask them, well, what do you think accessible means, they usually give you some very, very precise descriptions that doesn't seem to address the continuum phenomena in disabilities and accessibility. And so, if you could, as you talked about cognitive disabilities as one of the areas of research, could you just briefly talk about the notion of continuum in the analysis of, not only the accessibility issue, but then ultimately, the solution that has to address it?

MR. GILLETTE:

Um-hum, that's a big question, and I have a lot of thoughts on it. And...

DR. KING:

Can I come back to you on it, maybe? Is that...

MR. GILLETTE:

Yeah, I mean, I think what I will say is, we've been in a situation -- you know Disability Rights Movement is based on a for us/by us concept and a lot of voting machines have not included us, whoever that is. And for -- what's interesting is, with changes in demographics, more of us are that group. And so, I think there's an opportunity -- one of the nice things is there are two reasons why universal design, one machine for all people or one system, is now easier to comprehend. One is, technologies have gotten to the point where a lot of these features are affordable and doable. And the other is, because more of us are feeling certain impairments, which doesn't necessarily mean that we're disabled, but we have a better sense, and that if enough people are involved, then you sort of cover the range. But, if you focus on just one specific area, if you think, oh, someone who is completely blind, or someone who has no short-term memory, then you're creating things that get in the way of other people. So, it really is, you need -- everything I've talked about, and I think most of

us talked about, requires a group to, one, think about the ideas, a diverse group, and then, a diverse group to test it, and refine -- and then go back, refine and test and test.

DR. KING:

So, there is no "them," there is only "us".

MR. GILLETTE:

There has only, only been us.

DR. KING:

Yeah.

MR. GILLETTE:

But now, I think more people realize that they're part of that.

DR. KING:

Yeah, that's very good, I like that. Thank you. Brad Fain is a Principal Research Scientist at the trade school just down the road from where I work...

[Laughter]

DR. KING:

...Georgia Tech, with over 20 years of experience in human performance research. He currently leads and serves as the technical director of Accessible Voting Technology Initiative and serves as the director of Georgia Tech's HomeLab. Brad established the Accessibility Evaluation Facility at Georgia Tech, and has pioneered evaluation technologies designed to measure accessibility and usability of products and services for people with disabilities. Brad also directs the Center for Consumer Product Research and Testing at the Georgia Tech Research Institute. The Center's mission is to identify, research, and publish pre-competitive data concerning the needs, aspirations, and abilities of children, older

consumers, consumers with arthritis, and consumers with physical, sensory, or cognitive disabilities. Brad?

MR. FAIN:

Thank you very much. When I'm talking about the voting technology, I'd like to give you a little bit of a background about where I started in this journey. I'm going to call this a journey, that Daniel and others have brought me along on, because it has been a learning experience for me, and I start from somewhere that was probably completely different than most of the people in the room. Early in my career, and still -- indeed still now, I do most of my research in military systems. So, these are complex systems that average people are asked to interact with in order to achieve some kind of goal, whether that be in a cockpit, or in front of a command and control center, or in front of soldier borne equipment that they're carrying with them. And so, that gave me a different perspective than most. The perspective I have is that it has to -- whatever solution you come up with has to operate in the context of a larger system. And so, from the very beginning, I looked at this from a systems engineering perspective, not necessarily solely a technology only perspective. So, I was lucky enough to be asked by Daniel to cooperate on the Military Heroes Initiative project, which was completed last October. And we were looking at very -- a very specific problem, and that is how do you provide an accessible absentee ballot experience to soldiers who were recently wounded in recent conflicts. And we started that process, as I would start any systems engineering process, by understanding what it is that they're trying to accomplish, you know, the private and secure, independent placement of a vote. And then, understanding the users themselves, you know. What is it about these recently wounded soldiers that is unique?

And what are their needs, desires, and aspirations in order to interact with and place their vote? So, one of the things that we learned is that they're very different than the general population, right? So, they're very comfortable with interacting with technologies, especially those that were recently wounded in these conflicts. But, some of their injuries might not be physical, at least, not in the sense that you and I can see. There's a tremendous amount of folks that have brain injuries as a result of experiencing blasts, that have PTSDs associated with their experiences overseas, in fighting. And those disabilities aren't necessarily easy to recognize and identify by those that are trying to provide assistance. Also, because of the nature of the military health system, they tend to move through the system rapidly, right, from the various levels of care, and when they get to where they're at, for long-term rehab care, they're probably outside of their district, outside of their support network, and they probably haven't had the training that others would have on assistive technology. So, they're really entering into this environment with a quite different experience than most people entering into a poll, for example, with a general disability. And so, we couldn't assume that they would know how to use a screen reader, for example, or know how to use other assistive technologies that we often assume, as designers for people with disabilities, how they would have the right metaphors for interaction, and so forth.

So, we started this journey by essentially understanding the users, and then trying to understand the environment that they're in, and how they -- how that may modify their ability. So, once you understand their mission, what it is they're trying to do, what it is they're able to do, and what environment, then you can start asking the right questions as, you

know, what is it that they need in order to accomplish those goals in the environment that they're in. And so, we worked with others to identify potential technology solutions for marking an absentee ballot, and transmitting that ballot back to their home location. But, we found very early on that the technology solutions are meaningless without associated policy solutions, right? This is a bigger problem than just the technology solutions. And so, that helped me understand, you know, that we really need to work both fronts. Partner -- the technology folks need to partner with those that are interested in policy solutions, in order to actually achieve the desired goal.

It's -- we also found that the ballot design was almost as important, and perhaps even more important, than the ballot, ballot delivery, and marking system, right? So, that's the instructional design, the information design, the ballot design issues have to be taken into consideration at the same time as you consider the technology problems. And these are things that we've heard from other speakers, but I had to learn them, personally, as part of this journey.

So, as we move into the current project, which is the Accessible Voting Technology Initiative, we had to decide what is our role as the technology partner in this area. And I've seen it and defined it as multiple ways. I don't think we're going to have a shortage of good ideas. As we've heard on this panel so far today, there's lots of wonderful thought about how new technologies can be developed for, to enhance the experience of those with disabilities, and how those might be applied to their advantage, and so forth. You know, I'm totally amazed by the interaction with my colleagues and the wonderful ideas on research that are going on.

But, we're still left, on the far right of the problem, which are the policy -- people making policy decisions and those making business decisions about how to -- what technologies to implement, you know. They're left asking the question of, which of these good ideas should we focus on and spend our resources to actually implement? Where should I spend my time in fighting to get policy changes implemented at? And that's where I think where our role is, is to providing testing and providing evidence of these new ideas that are coming down that researchers are identifying and coming out with evidence supporting, one way or another, which, and prioritizing which of the technology solutions are most valuable, and help prioritize those.

And so, we've developed, essentially, a test bed that came from the Military Heroes Initiative test bed design in order to allow us to do science-based research, right? We're not interested in developing our own voting system. That's not the point of any of this. But what we are interested in doing is taking ideas that we either generate internally or learn from our colleagues, and testing them in a candidate system and seeing if they -- which ones and which combinations have the most benefit. And so, that's kind of the role that we're playing and I'll be talking to you in a minute about some of those potential solutions.

So, one of the questions that I'm asking myself today is that, can a low-cost tablet successfully be integrated with our test bed that we have to do accessibility and usability research that both policymakers and those that are making selections about specific technology solutions, can they be used to make decisions? And that's the point that we want to address. And it comes from multiple areas. It comes from wanting to improve the experience of those interacting with the voting system. It comes from

wanting to address the lack of accommodation for hidden disabilities that others have talked about today. It comes from wanting to understand the usability issues with the ballot design, and even the paper ballots that many still use. And understanding the complexity, expense, and setting up and configuring accessible systems that poll workers experience. So, it comes from multiple different areas.

So, in order to address some of those issues we've gone through the process of iterative design, as Kathryn pointed out. I'm not sure it rises to the level of brilliance yet, but we're on our way and somewhere along in that process. And we've taken ideas from multiple different sources, come up with some, what I believe is useful research questions in order to exercise this ballot delivery method, and developed, essentially, a core set of functionality that is rapidly reconfigurable, that allows us to test these ideas in a scientific and structured manner.

The design of the ballot that's on the screen isn't so much as important as to what is underlying that ballot, what's driving that ballot by technology solution. Essentially, it's a way of expressing a new ballot design, in whatever format that seems most feasible to study, and building into it the types of procedures and tools that are useful for actually documenting human performance. So, the ballot works by automatically logging and judging and recording accuracy issues, timing issues, interfaces with our eye tracking solutions, so that we know where people are looking, where they're spending their time, and so forth, so that we can actually collect data in a meaningful manner.

The second stage of that is actually expressing a physical design. And this is one of the many iterations, but of one that we're addressing currently, is how do we incorporate what we've learned in ballot design in

building the test bed and build that into a physical hardware interface, so that we can test both as a system. As I said before, the testing as a system is part of our core desires. So, we came out with a solution that many will find familiar, but it's designed based on the research that was conducted, both, at Georgia Tech and elsewhere, and how do we optimize the layout of the buttons, how do we optimize the interface of the ballot with the hardware, and so forth. And then, beyond that is taking a look at the realm of various AT and making sure that that assistive technology easily integrates with the actual device. And we've built in ways of plugging in new technologies that can accommodate a joystick solution, if one is identified, to a single button switch, in order to do that research.

So, some of the research that we either are conducting now, or have completed, ask some very simple questions, questions that many that I've talked to had thought had been solved, but probably had not been solved to everyone's satisfaction, and that is, what is the optimum configuration or a button layout for various ballot designs, and so forth. So, we studied the problem to start with between a five button and a two button layout, and as iterative testing goes, we found out that neither one was optimal. And we're currently redefining the test to include a three button layout, as well, in order to further test that idea. But, in conjunction with answering the question about, you know, given that we have a certain interface requirement, is it better to have a column layout or a scroll layout or a multi-page layout of the ballot, and how does that interact with the ballot design, and so forth. So, that's one of the areas that we're looking at.

Another area of research that we're very interested in is this issue associated with font design and font selection. There are a number of

fonts that have been proposed and used specifically for people with dyslexia. We know that that is a hidden disability that has people have to spend a lot of the time in the voting systems area looking at, so we're planning on running a study with users with dyslexia. In fact, it's ongoing right now, looking at various fonts that have been shown in other areas to improve the reading experience and performance of people in that subgroup. And so, hopefully we can come up with some recommendations early this summer in that area.

In our interactions with L.A. County and other folks in the -- performing the actual elections, we came up with -- identified an area of research that we thought was very important. One of the first questions L.A. County asked us when we spoke with them is, what have you done in the area of multi-lingual ballot design. And, well, the answer had to be not a lot, unfortunately, but we're trying to rectify that issue. So, what we're interested in looking is extending the plain language research that others have done in designing a ballot that is useful to -- in Spanish, and in Chinese, and seeing if we can replicate that result, because there really are two issues here that need to be addressed. One is, does the plain language concept expand to other languages? But, number one, how do we properly translate the ballot in the first place, so that it can be properly converted to plain language and those other languages. And so, we're endeavoring on a research program to look at that issue, as well.

Thank you very much. We've got a lot of work to do. This is the folks on the team that's currently working on this, Carrie Bell, Andrew Baranak, Linda Harley, Matt Hung, Sarah Farmer, and Chandler Price. We've learned a lot in this process. We thank Daniel and his folks for bringing us along on this journey because we really have been amazed by

research of other people in this area. But, we don't want to lose sight, that it is a systems approach, there isn't a pure technology solution to this problem, and we have to address all of those things in order to come up with a viable solution.

DR. KING:

Thanks Brad. I wanted to ask one follow-on question. You touched on one of the issues that I think drives to the heart of the challenge of incorporating accessibility solutions into voting systems, and that is the tension between the technology and the policy. And one area that that comes into play is the use of individually owned assistive devices in the precinct. And, you know, one of the things that I've certainly heard from the speakers, here and elsewhere, is the advantages of permitting individually owned adaptive devices into the precinct. And, of course, often from the election administration perspective, particularly, one of a security, is the challenges that present. Could you just kind of briefly touch on the perspective of individuals who have already invested, both monetarily, and time, in mastering adaptive devices, being able to use those in a broad range of activities?

MR. FAIN:

It is certainly a complex issue. And we've seen this issue and this desire in other domains, as well. Spent a lot of time working with workers with disabilities wanting to interface their own assistive technologies in the workplace, and when the technologies are publicly -- public technologies, sometimes that's a little bit difficult to accommodate.

So, the first question that usually comes up when I'm asked about this has to do with security, right? We don't want to introduce potential issues associated with informational assurance and security of the ballot

by allowing a connection of assistive technologies to the device, to the voting system. One of the potential solutions that I am currently most interested in, is that, can we separate what we do in marking a ballot from what we do in casting a ballot. In doing so, we remove most of the security concerns with connecting foreign equipment to voting systems, if we allow them to connect assistive technologies to the units that are used for marking the ballot, but perhaps, not used for casting the ballot. I think that's a reasonable approach. There's still policy issues to be addressed in that, but it is a – potentially, a solution to solving that problem.

While, you know, as you mentioned, it is a personal experience, and certainly a very personal experience, for some with disabilities, in wanting to use the assistive technologies that they have invested in, and I certainly support that, to the extent that we can accommodate that while maintaining the security and integrity of the voting system, I think we should, for those very reasons. In some cases, it's harder than others, and there will be challenges going forward, but it, certainly, I think it's the right thing to do.

DR. KING:

Thank you, Brad. And Brad, if you would pass that clicker down, Douglas Kruse is a...

MR. KRUSE:

Actually...

DR. KING:

Oh I'm sorry.

MR. KRUSE:

...if I could just mention, before you introduce me, Lisa and I are going to do a tag-team presentation.

DR. SCHUR:

Yes.

MR. KRUSE:

She'll go first, and I'll finish up. So, you should probably introduce both of us before we start.

DR. KING:

An excellent suggestion. And since Lisa is going to speak first, how about if I introduce you first?

DR. SCHUR:

Sure, sure.

DR. KING:

Okay, thank you. Lisa Schur is an Associate Professor at the School of Management and Labor Relations at Rutgers University. Lisa focuses on disability issues in employment and labor law, particularly the Americans with Disabilities Act, and its relationship to other laws and social policy. She also studies alternative work arrangements, such as contingent work and the connections between workplace experiences and political participation. Her work has appeared in the Industrial and Labor Relations Review, Social Science Quarterly, Political Research Quarterly and Industrial Relations, as well as other journals.

Also, Douglas Kruse is a Professor and Director of the Ph.D. Program in Industrial Relations and Human Resources at Rutgers School of Management and Labor Relations. Doug has a Ph.D. in Economics from Harvard. He conducts econometrics studies on employee ownership, profit sharing, disability, worker displacement, pensions and wage differentials. You need to come work down in the state university system that Brad and I work in.

[Laughter]

DR. KING:

That sounds like a litany of our concerns. He has conducted several studies for the U.S. Department of Labor and for the U.S. Department of Education's National Institute on Disability and Rehabilitation Research. He was appointed to New Jersey's State Rehabilitation Council and the President's Committee on Employment of People with Disabilities.

So, Lisa and Doug, thank you for joining us, and I'll turn it over to you.

DR. SCHUR:

Thank you for inviting us. We're very happy to be here. So, what we're going to talk about is our national household survey on disability and voting experiences in the 2012 elections. And we provide new data on the accessibility of polling places as experienced by people with disabilities.

So, to provide some context, we, and others, have done a fair amount of research on disability and voter turnout over about 15 years, and the findings are always that people with disabilities have lower levels of turnout compared to people without disabilities. And as you can see, 12 surveys show disability voting gaps of four to 21 percentage points from 1992 to the 2010 period. Political scientists have identified three major categories of factors that affect voting and those are resources, recruitment -- resources such as education and income, recruitment, did anybody ask you to vote, and psychological feelings of political efficacy. And these help explain the disability gap, but they don't completely explain it. There is still this unexplained gap, and inaccessible polling places may play a role here, both in making voting itself more difficult, and also, by

sending the message that people with disabilities are not fully welcome in the political sphere.

So, the EAC provided funding through the Research Alliance on Accessible Voting for a national household survey following the 2012 elections, and in this survey we contacted representative samples of people both with and without disabilities to examine their voting experiences. And we surveyed 3,022 people, in total, with an oversampling of people with disabilities, so that they represent 2,000 of the respondents, and people without disabilities represent the remaining 1,022 respondents. We oversample people with disabilities to get a clear understanding of their experiences, and also, to be able to make comparisons among people with different types of impairments and disabilities. The survey was conducted by a professional polling firm, and we used basic voting questions from the Census Bureau supplemented by questions on voting difficulties and voting predictors from other surveys. Our focus on polling place accessibility, as reported by voters, can be seen as complement to the physical studies of polling place accessibility done by the GAO.

The disability questions were based on the Census Bureau measures. This slide shows the number of people in our sample who have hearing, vision, cognitive, and mobility impairments, and who have difficulties with activities inside and outside the home. So, we have a good representation in each group.

Among people who voted at a polling place, we asked a series of questions starting with, "When you voted at a polling place did you have any difficulty in," and this slide shows the basic results. For example, four percent of people with disabilities had difficulty getting into the polling

place compared to zero percent of people without disabilities, four percent of people with disabilities did. And people with disabilities were more likely to experience each type of difficulty. The most common difficulty was reading or seeing the ballot. That was 12 percent of people with disabilities. And the next most common was understanding how to vote or use the voting equipment. That was ten percent of the people with disabilities. Overall, almost one-third, 30 percent, of the voters with disabilities reported one or more of the difficulties, and that's compared to eight percent of people without disabilities. For those of you interested in statistical significance, given the large size of our sample, this difference is significant at the 99.999 percent level.

Now, of course, you may already be thinking this just reflects voters and some people may not have voted at a polling place because it would be too difficult. We'll come back to this in just a minute. But before that, let's just look at the experiences of those who did vote at a polling place. For people who experienced difficulties, we asked people to describe the difficulties in their own words, and recorded them verbatim. And this slide shows examples of some of the most common responses. Among people who said they had difficulty finding or getting to the polling place, common problems were that it was hard to get a ride, the polling place was not well marked, or the polling place had moved. Among people who said they had difficulty getting into the polling place, the most common problems were there were steps or that there was a long walking distance. And one woman reported that they set up a plywood ramp to get her wheelchair into the polling place but the plywood wasn't strong enough, so she ended up having to be carried up the steps into the polling place. Among people who said they had difficulty operating the voting machines, some of the

problems were that it was hard to pull the handle, it was hard to see, the machine was set up too high for someone in a wheelchair, the machine malfunctioned, and the voter didn't know how to operate the machine.

So, who had the most difficulties? Here we show people with visual impairments, or cognitive impairments, and those who had difficulty with daily tasks inside the home were the most likely to report having difficulty voting at a polling place.

And I will turn it over to Doug for the rest of the findings.

MR. KRUSE:

Okay, we found that about one-third -- we asked a question about needing assistance in voting. About one-third, or 30 percent, of voters with disabilities said they needed assistance compared to 11 percent of people without disabilities. For voters with disabilities, election officials and family members were likely to be the ones providing the assistance, about 42 percent for each, while election officials are the most likely to provide assistance to the voters without disabilities.

We wanted to know about accessible voting technologies, obviously, an important topic today. This was a hard question to design, and we worked with members of RAAV on it. Our final question wording, after a number of iterations was, "In addition to standard voting equipment, were there any extra features or devices that helped you vote, such as a magnifier, large visual display, special keypad, or earphones?" You can see on this slide seven percent of people -- of voters with disabilities answered yes. The most common feature or device was a large display, followed by a magnifier or visual aid. Sometimes people complained these devices are not set up and ready to use, as Dana was talking about earlier, and that election officials did not know how to use them. So, we

asked about this, and found 75 percent of people who used these features or devices said they were set up and ready to use, and 97 percent said that election officials knew how to set up and use them. So, there is just a tiny percent who said it was a real problem. As you say, there was a number -- there are many anecdotal accounts about that.

We wanted to know, not just about physical difficulties, but also about whether people felt they were treated in a respectful way. We're glad to report the large majority of voters felt that election officials are very respectful toward them and there was no difference between people with and without disabilities. Only three percent of each group felt they were treated disrespectfully when they tried to vote in the polling place.

After all the detailed questions, we asked a summary question of the overall ease or difficulty in voting in a polling place. Exactly three-fourths of people with disabilities said it was very easy, which is a good result, but two concerns are, this figure was lower than for voters without disabilities. You can see that's 87 percent for them who said it was very easy. Also, at the other end, six percent of voters with disabilities said it was somewhat or very difficult to vote, which is larger than the two percent of voters without disabilities who said so. So, that six percent figure may not look large, but given the size of the disability population, which is growing, as we've talked about, that represents over one-and-a-half million people, which is enough to swing an election if these people decide not to vote.

So far, we've focused on voting at the polling place and of course it's possible to avoid polling place difficulties by voting by mail. We also measured this. As shown on this slide among voters in 2012, close to one-fourth of voters with disabilities voted by mail, compared to one-sixth

of voters without disabilities. In other research we've done recently, we find that people with disabilities are especially likely to vote in states where everyone votes by mail, that is Oregon and Washington, and in states with no-excuse mail ballots, where you can get a mail ballot without having to declare the disability. And Daniel was referring to research like this earlier too. Voting by mail doesn't solve all the voting difficulties, because ballots can still be hard to read, understand and fill out. Among those who voted by mail, 13 percent of voters with disabilities said they had difficulty reading or filling out the ballot, and 11 percent said they needed assistance from a family member, usually.

Among those who -- am I on the right slide here? Among those who didn't vote at a polling place in 2012, either because they voted by mail or didn't vote at all, we asked when they last voted in a polling place. Those who did so in the past ten years reported very similar experiences to those who voted in a polling place in 2012. Just about -- just under one-third of them said they had some kind of problem when they voted prior to 2012, but since 2002. For those who had not voted in a polling place in the past ten years we decided to ask a hypothetical question in order to measure their expectations. We asked, "If you wanted to vote in person inside the polling place, do you think you would experience any difficulty in getting to the polling place or using the ballot or voting machine?" As shown at the bottom of this slide, 40 percent of people with disabilities said yes, compared to one percent of people without disabilities. The most common problems that were expected was getting to the polling place and understanding how to vote or use the voting equipment. Of course, the numbers for this group may be biased upward a bit because of what survey researchers call justification bias. People

may be citing these problems as a way of justifying their failure to vote. Nonetheless, they provide a picture of what types of real or imagined problems may discourage people from going to vote at a polling place.

Finally, we asked -- this is one of the questions we couldn't resist putting in there -- we asked everyone, both voters and non-voters, "If you wanted to vote in the next election, how would you prefer to cast your vote?" A striking finding is that a majority of people, both, with and without disabilities, want to vote at a polling place. 58 percent and -- I'm sorry 68 percent, I need to get my glasses on for that, suggesting there is a powerful meaning and a symbolic importance in being able to vote, in person, at a polling place. At the same time, people with disabilities are less likely than those without disabilities to prefer voting -- I'm sorry -- they're more likely to prefer voting by mail, and less likely to prefer voting on the Internet, which we strongly suspect reflects the fact that people with disabilities are less likely to have Internet access.

Our overall interpretation is that there are several signs election officials are doing a good job, particularly in assisting people with disabilities and treating them with respect. Nonetheless, the high rate of voting difficulties among people with disabilities is clearly a cause for concern, and the survey points to some of the problems they're particularly likely to face.

So, we look forward to any questions and feedback we may have.

DR. KING:

Thank you. Well, I have a question that occurred to me as I listened to your presentation.

The sample size is extraordinary, and I commend you on the work that you did, and designing the data collection. As we all know, in the last

election, President Obama, at his acceptance speech, referenced long lines and the impact that it could have on voter turnout and follow through of voting. And even though I didn't see it referenced in your research, it struck me that jurisdictions that are ill-prepared, either in terms of their preparation of poll workers, voting materials, the actual physical constructs of the precinct, may be contributing to ineffective or inefficient processing of voters through lines, in dealing with voters with disabilities. And I wonder if you have any insights or comments, particularly addressed to our colleagues who are election officials, about improving the efficiency, the overall throughput efficiency of your voting precincts by paying more attention to some of the details that you've identified.

DR. SCHUR:

Well, we didn't mention this in our presentation, but among reported difficulties, waiting in line, eight percent of the voters with disabilities compared to four percent of voters without disabilities reported waiting in line was a problem. Do you want to add anything?

MR. KRUSE:

Well, yeah, what you're raising is a good point.

DR. SCHUR:

Yeah.

MR. KRUSE:

One of the things we didn't mention, but should have, is that some of the problems that are identified here in our survey are really outside the control of election officials, for example, getting to the polling place, you know. Obviously, polling places should be located in convenient places. But the question of transportation is generally outside the control of election officials. But a lot of these problems are in the control of election

officials, such as, you know, waiting in line. As you say, there's all kinds of things that contribute to delays. Problems like steps are a pretty obvious one that should be under the control of election officials.

So, I don't think we have any particular insights on what election officials should be doing better, other than to validate what you're saying that that's -- that how they organize their activity, how they prepare, can be an important factor in the extent to which people with disabilities and others wait in line. And just to add that, of course, waiting in line can be a problem for everyone...

DR. SCHUR:

Right.

MR. KRUSE:

...but especially for people with mobility impairments...

DR. SCHUR:

Right.

MR. KRUSE:

...who aren't in wheelchairs, but they tire out.

DR. KING:

Okay, Lisa?

DR. SCHUR:

Oh, I just wanted to add that I think some encouraging ideas that a lot of these solutions would not be high cost, like providing some chairs for people to sit in while they're waiting. Making sure that there aren't steps, that polling places are located with entrances that you can just go right into. Those are not particularly high-cost solutions.

MR. KRUSE:

A few folding chairs should be very cheap.

DR. SCHUR:

Yes.

DR. KING:

I agree. All right, well, thank you very much. Our last presenter, Juan Gilbert, holds the Presidential Endowed Chair in Computing at Clemson University where he serves as the Chair of the Human-Centered Computing Division in the School of Computing. Juan is the PI for the Research Alliance for Accessible Voting, which is one of two award recipients of the U.S. EAC's Accessible Voting Technology Initiative. He is the creator of PRIME III, a universally accessible voting system research prototype. Juan is also a Professor in the Automotive Engineering Department, as well. Juan.

DR. GILBERT:

Thank you, Merle. I'm going to begin with a video demonstration of the technology we've been working on, and then, I'll talk about that a little. So, go ahead.

[Video demonstration played for the record]

DR. GILBERT:

Okay, so what you saw there was a demonstration of different components of PRIME III, and we can have a discussion about that. Hopefully, people will have questions and I can explain everything in detail. But essentially, everything you saw was done with commercially available off-the-shelf kind of components. And it's primarily software driven.

So, that was an accumulation of ten years worth of research. We started this ten years ago and we've had, I'm low balling it, but today, we've had over 8,000 people test this in one capacity or another, and we've covered every imaginable demographic. The only demographic we tested with that could not vote, privately and independently, using this approach, was a person that was deaf and blind. Everyone else, every population we've tested with has been able to privately and independently vote using this platform.

So, we've done sample, or I guess, demonstration elections. The National Society of Black Engineers is the world's largest student run organization, and they've used PRIME III since 2008. The National Council of Independent Living used PRIME III for their national election twice. We did a Presidential mock election at Auburn University, and the State of Oregon used PRIME III and, I guess, in May of last year, in the Presidential primary, where they actually went out to assisted living homes and allowed people to vote on PRIME III and printed a ballot, which then was actually mailed in.

We also did a study with Self-Advocates Becoming Empowered, SABE. We did their national election last year, and that was an interesting election because that was the first time we actually put pictures on the ballot. And when we did that election, we knew there were individuals who had different levels -- reading levels, but we didn't know who -- where they were. But, all of them were able to vote using PRIME III, clearly, with the pictures. So, we then -- after we did that election we did a mock election four days before the last Presidential election at Clemson Elementary School, where we knew we had people vote that could not read. And they were able to vote, privately and independently, using the

pictures. And that was fascinating because the kids voted Obama to win, and the parents contested that, and four days later he won. So, it was interesting to see the kids knew what they were talking about.

On July 16th we will be doing an election for the NAACP in Orlando, Florida, and we're scheduling an election demonstration on October 8th in Cleveland County, North Carolina, at Kingstown, North Carolina. It's a mayoral election.

So, we've done several demonstrations over the past ten years. This is just a few of them, and in every case we've had different demographics using the same platform. So, the idea that you have one machine that everyone can vote on is actually real, now. When we started this in 2003, people said you couldn't do that, you have to have an accessible machine. And now, we're seeing even vendors starting to say not necessarily, we can have one machine that everyone votes on. I think Brad had mentioned earlier, can we separate marking the ballot from casting the ballot. And that's exactly what we've done here. We separate the two.

So, the -- I know we have another roundtable coming up to discuss this to some extent, but we're actually starting to look at technology transfer, taking from research to practice. So, as you start to do these kinds of things, how do you get it into the real world? So, we're starting from a point where the things we've done, none of this has been patented. We deliberately didn't do that. We put this in the public domain, and we wanted to make that publicly, aware, because we're finding that now the manufacturers are getting a little excited about some of the things we're doing, because they don't have to pay for it, it's in the public domain. And so, we're partnering with different organizations. We're partnering with

different manufacturers, and looking at how we can work together to get this technology, and our findings, into real elections.

And so, I'll stop there. Thank you.

DR. KING:

Thank you, Juan. Thank all of you for the presentations, excellent overview of what has been going on, in the past three years, with the grant funds provided by the EAC. And I commend all of you, for, not only the excellent presentations, but really, the work that's back behind it and the implications of that work.

What I'd like to do, now, I'd like to ask a question. I'm going to start with Juan and work our way back around the table. And, you know, I think one of the challenges for election officials, as they watch researchers, such as this group, talk about research issues, research agendas, outcomes, is trying to get a sense of where are we going with this, what are the follow-on steps. All of you have, not only, invested time and effort in this research, but you have begun to I'm sure formulate your next step strategies. Where do we escalate this research to? How do we dovetail it with other research? How do we operationalize it, perhaps?

So, what I'd like to ask each of you to do is to talk about some of the follow-on steps that you envision for your research, and share that view with our listeners on the Web but, as well, as our colleagues here at the table. And I'll ask Juan to start that, and we'll work our way back around.

DR. GILBERT:

Well, at this point, we're going to continue to do some demonstrations, but we're stepping up our documentation and dissemination efforts. In the last year of the funding from the EAC, we want to disseminate what we found

and work with the vendors and do this transfer. We want to see this put into practice. So, that would be our primary goal. We'll continue to do the research, but I think, at this point, we're very comfortable with what we've found and the impact it will have, and now we can see it in practice. We've done demonstrations with, again, every imaginable demographic. It's no longer a theory, can you create one machine that everyone can vote on. That's not a theory anymore. We've demonstrated that and we have evidence to show you can do it. So, now it's time to transfer and get it in. So, that means dealing with election officials, policymakers, and then, advocacy groups, as well, to make this a reality.

DR. KING:

Okay, thank you Juan. And I don't know Lisa and Doug, if you want to answer this together or individually.

DR. SCHUR:

I'll start.

DR. KING:

We'll start with Lisa.

DR. SCHUR:

I see our work as really focusing on evaluation. So, what I would love to have is every – well, ideally every two years, but every four years go back and do it again, and see what areas need improvement, where there is improvement. And that's where I see our main value. Do you want to add anything?

MR. KRUSE:

Yeah, and we're glad -- you know, we see this to some extent as a baseline. We're not, you know, trying to keep ourselves employed in

doing this. We'd be glad to hand it off to anybody to do this research. We think it would be valuable to establish this kind of longitudinal perspective.

I might mention that we're -- you know, of course we're writing up a report with the most important results, which will be widely available. One of the -- and we want to make this as useful as possible, indicating what, you know, what are the most significant problems that people with disabilities -- with and without disabilities, face, so that election officials know what to focus on. And actually, Lisa and I were just talking last night about this as we're finishing up our report, realizing that one really nice comparison to do, one nice tabulation to do, would be to look at the difficulties experienced by those who said that the overall experience was difficult. You might remember six percent -- we asked a question about how -- overall, how easy or difficult was the entire voting process, and most people said it was easy, even if they, you know, said there was some problem in getting to the polling place or something like that. We'd like to focus on those six percent that said it was difficult, and say okay -- and see what kind of problems are those people having. And those would be the ones that election officials should really focus on, see what -- because, in particular, I think those six percent are the least likely to show up next time to vote. The ones who said this was difficult those are the ones who are going to be most discouraged from voting in the future which is ashamed. It shouldn't happen.

DR. KING:

I think, as a follow-on question, one of the challenges that election officials have, with everything that's on their plate, the funding issues, challenges of working with aging technology, et cetera, is kind of elevating your focus of accessibility beyond legal compliance. And what I liked about your

presentation and your research is really talking about improving the voting process for all voters, rather than simply going down a checklist and saying “We’re compliant, we’re compliant.” Could you talk about that a little bit, maybe as one of the outcomes of your research, which is, when I looked at your list, you talked about a gap of four to 21 percentage points, which, that’s astounding. And when you look at the number of people, and based on what Dan talked about, this continuum notion, that the merit of your research seems, to me, to be driving us towards interrogating our processes, not for legal compliance, but for the inherent integrity of those processes. If you could comment on that a little bit, just, where that may go.

MR. KRUSE:

No, I think that’s a really good point. And we, in our -- we did use the Census Bureau questions to divide, you know, the sample into people, with and without disabilities, because we want -- we felt it was important to make that distinction. Nonetheless, we are both very sympathetic to this continuum idea...

DR. SCHUR:

Right.

MR. KRUSE:

...that disability really is more of a continuum. And we’ve got a lot of gradations. Actually, we didn’t present results here, but we do ask about - we do tap into some of those gradations by asking about, do you need help with activities of daily living, trying to get at some notion of how much the disability may impact your daily life. But, we also ask whether people consider themselves to have a disability. 70 percent of our disability sample considers themselves to have a disability, 30 percent does not.

They say, yeah, I have a hard time walking or climbing steps, but, no, I don't have a disability.

DR. SCHUR:

Yeah.

MR. KRUSE:

And that really ties in, I think, to that continuum concept.

DR. SCHUR:

Yeah, my mom is 88, and definitely has major arthritis and other issues, and she absolutely says she does not have a disability. So, I think there are quite a few people who fall into that category, as well.

MR. KRUSE:

Yeah.

DR. SCHUR:

And, yeah, to the extent that we can make voting an easy, clear process for everyone, I think that's to the advantage.

MR. KRUSE:

And using a common technology...

DR. SCHUR:

Yes, I think that's...

MR. KRUSE:

...has been suggested, not a special machine.,.

DR. SCHUR:

Right.

MR. KRUSE:

...but a common technology for everyone.

DR. KING:

And since most of us recruit our poll workers from our voters, anything that we do that makes the voting process more accessible, probably also opens up and makes more invitational the process of recruiting and retaining poll workers. So...

MR. KRUSE:

Yeah.

DR. KING:

Thank you, Brad?

MR. FAIN:

There's -- as I mentioned in my talk, the goal, at least in short-term, is to create this body of evidence that can be used by election officials and vendors. And so, our near-term plan is to work with those users, those election officials and vendors, to understand the body of evidence and express that in design that they're working on or the requirements that they put into RFPs, and so forth.

But, beyond that I want to be -- continue to be an advocate for those with hidden disabilities, particularly those with cognitive disabilities, or a result of traumatic brain injury, people with arthritis that have a little bit more difficulty interacting with the technologies, than maybe everyone else, and other hidden disabilities, like dyslexia and so forth. I think that's a critical role for myself and my group.

But beyond that, looking at the long term, my goal is to inspire a new generation of folks that -- of researchers and designers, and provide them with the tools that I think they'll need in order to address this problem, later on down the road, after I'm retired and on a beach somewhere. But, yeah, as part of an educational role, working with the students that we have in our program, helping them understand the needs

of those that are unlike themselves, perhaps, and make sure that they adequately consider them throughout the design process, I think that's my goal, long term.

DR. KING:

Brad, do you see -- the graduate students that you're able to recruit and engage in your program, do you see them staying in this field? Are they getting bitten with the bug, if you will?

MR. FAIN:

We do. There's a lot of folks that are very passionate about what they do, on this project. And just being able to interact with people with disabilities, long term, and sit down with them side by side and work through a problem has -- they've gained insights, that they wouldn't have gained otherwise. And I think that's inspired them, if not in the voting system field, in other areas related to technology interface with people with disabilities, they'll be -- that will go with them wherever they go.

DR. KING:

Okay, good, thank you. Dan.

MR. GILLETTE:

I think there are probably three categories for next steps. Some of the things that we're doing that are, say, very specific to DREs, our best bet is to work with people like Juan, and with vendors, and just advocate for the things we think should be there. But stuff specifically around the voting process is tricky, because of the legalities and requirements. And then, there are other things that are around voting that are much easier to turn into products and get out there. So, the voting guide, you know, if we're successful, then we'd love to create a toolset to allow anyone to program

that, fill in the text, and it could even be about marking interface, at some point, that could be plugged into any machine.

But the other thing is that there are areas that we see that aren't necessarily targeted by funding at the moment, that are huge areas of need, in part because of changing styles of voting and demographics. One of those is I would love to work on resolving the need for individuals with disabilities to require -- and the aging, to require assistance while voting by mail. So, I think it was talked about in a few places, that there are huge gaps. It's not truly accessible voting. We're just offloading the requirement of who assists, and how. And I think that technology, and just, good focus can bring a lot to bear to make that more independent and more verifiable, is a big issue. If I have someone help me, how do I know that they did my intent?

Other issues is getting to know election officials through the process of these grants. They have many needs that are solvable, but they don't have the resources. So, how can we provide the right information? For instance, at the last NIST event, similar to this, an election official came up to me and said one of my biggest problems is our phone system crashes right before every election, you know. We've put all this effort into providing information, but everyone wants it at the same time. Well, that's not a terrible technological problem. A university shouldn't solve that. But somebody, and maybe a university, could do the part of, this is where you go to find solutions, and this is how you do it low cost, versus through an expensive vendor.

And it's these little pieces that add up to everything that we're hearing about, are barriers, and it's nice to see them fall. But I'd like to

see some more focus on how do we get enough people in the room who can just say, there is a solution for that, and get it to those people.

DR. KING:

I remember a chart that was widely circulated back in the '70s about the dissemination of innovation and technology, and it was a chart published by AT&T that showed back in the early '20s the number of operators that were needed to support telephone customers, and the straight line projection by the mid '70s, everyone would need to be a telephone operator to meet that demand. And, of course, the irony is everybody became a telephone operator.

[Laughter]

DR. KING:

And election officials have looked at that same chart, and overlay poll worker, and asked the question, can everybody become a poll worker. And the vote-by-mail solution, essentially, addresses that problem, but as you pointed out, it creates additional problems and these problems are interrelated. And so, only pushing the ballot out of the election office to eliminate one problem, which is, difficulty in recruiting/retaining poll workers, without addressing the follow-on challenges it creates, which is the accessibility of that ballot, as you point out, I think really underscores our challenges of always thinking through the unintended consequence of these procedural changes that we look at in elections. And some of them are socially driven, some of them are politically driven, but all of them have to be assessed. And what I find so encouraging is that the accessibility community is more and more finding its voice to engage in that conversation, and to point out the things that you're pointing out, which is,

we may be solving one problem, but we're offloading it, because now, these people are the poll workers. So I think that's an excellent point.

Daniel.

MR. CASTRO:

Yeah, so, for all of our projects, especially the technology-based projects, you know, there's really three things. There's technology transfer, which we've talked about, where you're really trying to get the ideas that are being developed in the labs to the vendors. You have technology adoption, where you're working with the election officials, to then get these systems into the poll places. And you also have technology acceptance where you want this to be something that the users want to use and are able to use, and so, with all of our projects we've really tried to focus on integrating all of this in from the beginning. So we're, you know, as I said we're working with vendors, we're working with election officials and we're working with the users. I think that's one way of being able to, hopefully, get to all of these things.

But I just wanted to, you know, pick up on some comments that other people made. People have talked about elections before, and said, you know, the purpose of elections is not to, you know, convince you who won, but who lost. And it's I think the same thing with some of this research. We're really trying to also convince, you know, people, you know, there are some things that you should stop doing. And that's, you know, that's the takeaway because, you know, as you mentioned earlier -- as Lisa mentioned earlier, we are having continuous improvement, and we want to have continuous improvement. So, we will have best practices, but that's going to be a moving target. It will be a more clear target, what

you shouldn't be doing anymore, so that's one way I think we can engage a lot of different stakeholders into making immediate impact.

And, you know, just the last point along with that, is, we really want more data driven elections. And, you know, this is, you know, going to Brad's point about having a good scientific research base, but it's also, you know, getting to other ideas that are out there, where, you know, if I want to know the best restaurant in D.C. I can go on Yelp and find out. If I want to know, you know, the best kitchen appliance, I can go on Amazon and find out what that is. We don't have that, kind of, data-driven, user generated data about elections that we could have, that could potentially point us to new solutions, and provide the kind of continuous feedback, so that, you know, not only do we know what good ideas are, and we get people to implement them, but then, people are rewarded because we can actually recognize where it's been successfully implemented, that we can have this kind of positive reinforcement.

DR. KING:

Good, thank you. Kathryn.

DR. SUMMERS:

I'm actually going to get let Dana speak first, because I want to make a pitch for a couple of new research -- complimentary research things, so why don't you talk about the ballot, and then I'll talk about these other two.

MS. CHISNELL:

Well, first of all, the Anywhere Ballot is actually available for you to try out. You can bring it up on a tablet, in a browser, if you go to Anywhereballot.com. So, it is available for playing with. Also, we want to make it available as a -- on a creative common license. So, anybody who

would like to implement it can take what we've learned and try it out. So, it's flexible for lots of different systems.

Obviously, one of the next steps in the research projects is to offer it as, you know, the test bed ballot design for all the other technology based projects. I feel like it's pretty heavily tested, and would do pretty well in all those events. And considering your different charters on your projects and your different focuses on voters with disabilities in different areas, it would exercise it even further.

In our ideal world we'd also get the Anywhere Ballot out to small organizations; student councils, neighborhood associations, places like that, that could try it out and apply it in lots of different kinds of elections, to see how it worked for a broad base of different kinds of communities. And we are talking to a couple of states about implementing the Anywhere Ballot on their ballot marking accessible systems, right now. So, we're hoping to get to see the outcomes of that sometime in the next several months.

DR. KING:

Okay, good, thank you. Kathryn.

DR. SUMMERS:

So, I actually just wanted to -- what I'd really like to do now, is, you know, work on the ballot, but I would like to be involved with voter ed materials for low literacy audiences. And the other thing that I -- was suggested by Jim Dickson, and I realized how passionately I want to do this, is an ethnographic study of barriers to voting for low literacy users, to parallel the work that's been done on users with disabilities or wounded warriors, because that work has not been done for low literacy users. And, you know, the early indications are that they do vote at a significantly lower

rate than other groups, and they are experiencing difficulties at the polling place and in the voting process, that have not been studied or documented. And so, I would really, really like to do that.

DR. KING:

Okay.

MS. CHISNELL:

A huge percentage of the voting population is actually functional or low lit. Latest stats...

DR. SUMMERS:

43 percent from -- the latest national literacy survey shows that 43 percent of adult Americans read at below basic or basic levels, and the easiest way for us to sort of understand what that means is that's eighth grade level or below. And that 43 percent doesn't include the three percent of people who don't speak English well enough to participate in the adult literacy survey, or the two percent of people who have such cognitive disabilities that they can't participate. And so, you add that into the 43 percent and you've got almost 48 percent of the adult population who are at risk for literacy issues. And sometimes it's cognitive impairments, sometimes it's -- a lot of times it's some degree of cognitive impairment. But it doesn't necessarily mean they can't -- when you look at those testing at a more fine grade level, it's not that they can't identify letters or numbers. It's -- they actually did better at identifying letters and numbers that were removed from words, than they did at identifying words. Just in the last literacy survey they did some supplemental testing on the low literacy folks, and they -- their performance actually went down when the letters and numbers were in words, because some of the cognitive resources that would otherwise be available to figure out what letter that is

were being diverted into trying to figure out what word that was. And so, it's really -- you know, so it's really a simplicity issue. The more we can make that a simple, plain language, plain interaction, familiar words, you know, so that they're not -- so you can't just divert any of those cognitive resources, because it's going to impact performance.

DR. KING:

Okay, we've got about ten minutes left. And what I'd like to ask the panel to do, we have it's kind of a tradition on these roundtables, and it's always to look towards operationalizing this. The purpose of the Election Assistance Commission is, in fact, to assist, and we always want to look at, what is your advice to a constituency that you interact with. And whether that's an election official, voting systems manufactures, election systems manufacturers, what is the low hanging fruit, if you had to recommend one follow-up action as the result of this roundtable today for them to engage in, at their level, whether it's a state level or local level. And I'm going to ask -- I'm going to start down here, and if you could just briefly, 20 or 30 seconds, identify one thing that they could begin to do today, because there's still plenty of time left on the West Coast to get to work.

[Laughter]

DR. KING:

And I'll start with Dana and we'll work our way around the table.

MS. CHISNELL:

Maybe this is because this is where I do most of my work, but I would say simplify language in every possible voter and poll worker facing thing that you got. Many instructions are indeed imbedded in legislation, and this is a time to make friends with your local legislators, to make a move to

simplify those things. There are lots of examples now. There's no reason not to go forward with that.

DR. KING:

Okay, thank you. Kathryn.

DR. SUMMERS:

We obviously have a lot in common, theoretically. So, plain language, and then, I would add to that, and I know she would agree, is plain interaction. Simplify the language, simplify the interaction. And the other thing I would add is do some iterative testing, which, I also know is a big thing for her. So, plain language, plain interaction, and iterative testing.

DR. KING:

Okay that's good, thank you. Dan.

MR. CASTRO:

My focus is traditionally with the Federal Government, so I'll go there and I'll just say, you know, I think what we have here is excellent, and I would like to see this, you know, institutionalized so it's not, you know, up to, you know, random congressional budgets and legislation, but we really have a continued focus on accessibility research and continuous improvement in elections. I'd love to see work there, and I think that's -- I don't know if that's a low-hanging fruit but that's, I think, the clear objective in finding and working out research with.

DR. KING:

Okay thank you Dan. Dan.

MR. GILLETTE:

I think the lowest hanging fruit is to look outside of elections. If you have a problem, look at something that's in any way analogous, even just on a future level or a micro-experience level, and find something that's been

proven to work in another place, either by acceptance or by research and start -- see how you can start from there. I think too many of our, especially, the process of voting is in this purely based on legal patterns and does not start from, certain technologies lend themselves to certain ways of being utilized. And I think in the sense of experiences, poll workers all of that, again, you know, you look to children's literacy, you look to adult education. Look outside. Don't expect everything to come from your own community.

DR. KING:

That's excellent advice. Brad.

MR. FAIN:

If I had to pick one thing for election officials to do that's in the category of low-hanging fruit, it would have to be to get out into the community and get to know the voters, right? It's get to know the voters that are having difficulty interacting with your equipment today. A lot of election officials have successfully set up voter advisory boards for just that purpose. Encourage that across the board. Get feedback on performance, especially after elections, about how you did meet the expectations of those users, or maybe how you didn't. And then, use that information to judge the merit of technology solutions based on a better understanding of what people actually need.

DR. KING:

Okay, thank you. Doug.

MR. KRUSE:

Well, as our -- just going from our survey, we found that most the most common problems experienced by people with disabilities were reading or seeing the ballot, and understanding how to vote or use the voting

equipment. And so I'm going to cheat. I'm going to suggest two things, not one. One is making sure people can see the ballot, obviously, going back to the magnifiers or large display. That seems pretty straightforward. Put a magnifying glass in each polling place, at each spot. That makes a lot of sense.

And the other is plain language. I think a lot of people who are talking about reading or seeing the ballot, when we asked verbatim, I went through some of those verbatim responses, some people said, I just couldn't understand the wording, you know. And so, I think plain language fits into that. So, I'll just reinforce what you were talking about.

DR. SCHUR:

Yeah, and I think things like just making sure that there aren't steps in front of polling places. That's something that's very easy to spot, easy to deal with. I would go there.

DR. KING:

Okay. And Juan.

DR. GILBERT:

Real simple, don't throw the baby out with the bathwater. Don't pass legislation that stalls innovation. Just, you know, there's a lot of people itching to pass legislation that would be prohibitive of innovation, and I think it's out of just not knowing what is capable. Again, people told us you will never create a machine everyone can vote on. And we have evidence it can be done. So, just be careful about the legislation that is passed.

DR. KING:

Okay, well, thank you. I appreciate everybody's preparation here, today, and engagement. In just a moment I'm going to let Alice have the last word, and we'll be out of here, right on time.

One of the things that so draws me to work with the accessibility community in voting systems is the unique role that it plays in the portfolio of viewpoints that have to be accommodated in the design, construction and deployment of a voting system. And for those of us who work in the other areas, the areas of security, auditability, you know, operations, we often use very, very kind of sterile words to describe what we do. We talk about accuracy and precision and things of that nature. And when I was preparing for this roundtable I was looking for some definitions of accessibility, and I found one, and it talked about the ease of participation and use with dignity by a person with a disability. And this is the only area that I am aware of, in voting, where we talk about the dignity of the voter, and the dignity that they bring to the process.

So, with that, I thank all of you for your work. Your work is incredibly important. Perhaps it's undervalued, but certainly not by people who understand elections and understand the importance of making this a universal right for all the citizens of our country.

Thank you, and I'll turn over the microphone to Alice.

MS. MILLER:

Thank you Merle, first of all, again, for your willingness in just always being able to moderate these panels. And, as we all see, he does a wonderful job with it, getting all the information out, and being able to question the panel who, of course, come well prepared, and well versed in this topic matter.

I do want to say that, in summary, obviously what this is, is the goal, the ultimate goal toward eliminating barriers to voting. We all want to be able to see everybody vote privately and independently, have their vote cast -- counted as cast. And this research that has, fortunately, been provided by EAC funding has just lead directly down that road. It's important that it's continued. It's important that we are able to reach that goal. So, obviously, your continued research and your continued dissemination of that research is what is important, especially I'll go to Dan's point, as I move toward us. And I mean that both, visually and mobility wise, and, you know, everything else, we are all becoming us. And it's important for everyone to recognize that. And I say that to my 23 year old, who's somewhere in New York, flitting around, thinking that she'll never be us. But, all of us are moving in that direction. And so, that's very, very important. The research is important, the conclusions drawn from that research, and we are very, very appreciative of it, and hope that we'll be able to continue to provide funding to allow that research to continue.

So, once again, thank you everyone, we appreciate it. And Merle, again, thanks for your help with this process.

DR. KING:

Thank you. With that, it is 2:30, and we'll adjourn this roundtable. Safe travels to everyone, thank you.

[The United States Election Assistance Commission (EAC) Roundtable Panel recessed from 2:30 p.m. until 2:49 p.m.]

MS. MILLER:

All right good afternoon. We're going to start with the second half of our roundtable. This afternoon we will be talking about the certification process and innovations to certification moving forward from where we were, to where we are, to where we want to go. We have another panel, distinguished, another distinguished group of panelists who are well versed in the certification process. Some are vendors, some -- we have technical reviewers, as well as election officials, who have been involved with the certification process from the beginning, and, in some cases, even before the EAC took it over. So, I want to recognize and thank the panel for participating. Again, Merle is here to help us get through this process. I can't say enough that we can't thank him enough, we cannot do this without him. He's been very, very generous with his time and continues to do so.

To start us off I want to introduce Brian Hancock, who is the individual who oversees our testing and certification process at the Election Assistance Commission. He has been in that capacity for at least the last ten years, and we just told him it has been the best ten years of his life.

[Laughter]

MS. MILLER:

Even more importantly, more things are yet to come that will highlight his career as he goes through this whole certification process. So, Brian is going to go through his presentation involving streamlining the EAC testing and certification program, and then, turn it over to Merle, in which we will put out questions for the panelists to address, as he has presented his presentation. Brian.

MR. HANCOCK:

Thank you very much Alice, appreciate it, and appreciate everybody that's watching on the Web, and all of you folks that have come in. We do appreciate the time and your expertise in helping us work through some of these issues we're going to be discussing this morning.

Before I get started with my presentation I'd like to sort of follow-on, as we usually do at these roundtables, and let Merle introduce the panel members, since they're the ones that are really going to be giving us the important feedback, today, before I start my presentation. Merle.

DR. KING:

Thank you, Brian. Joining us today is Traci Mapps, who serves as the Senior Director of Compliance Operations for SLI Global Solutions, which is a voting system test lab in Denver. In this capacity, she manages all the day-to-day operations of the VSTL accredited by NVLAP and the EAC. She also oversees SLI's Accredited Testing Laboratory for Health IT, which is also accredited by NVLAP and by the Office of the National Coordinator of HIT. Ms. Mapps is a highly experienced executive level manager of test labs and test operations. With more than 18 years in the industry, her experience includes managing multi-million dollar test facilities for Fortune-1000 communications and enterprise software organizations. So Traci, thank you for joining us today.

Brad King received his B.A. in History and Political Science from Indiana University and his J.D. from the College of William and Mary in Williamsburg, Virginia. Beginning in 1985 he served as Senior Staff Attorney, Legislative Services Attorney and Counsel to the Indiana State Election Board, and then, State Elections Director for the Secretary of State of Minnesota. Since 2002 he has served as Co-Director of the

Election Division of the Office of Secretary of State of Indiana. He is the Immediate Past President of NASED, the National Association of State Election Directors, which is where I see Brad most often, and served as Chairman of the United States Election Assistance Commission Standards Board. Brad is a member of the Bar of the State of California, the State of Indiana and the United States Supreme Court. So, Brad thank you for joining us today.

McDermott Coutts is the Director of Research and Development for Unisyn Voting Solutions. McDermott has been working in the elections field since 2002, and served as the architect for the development of two federally certified end-to-end voting systems, the Unisyn OpenElect, which was certified to the VVSG 1.0, and Los Angeles County's InkaVote Plus certified to VVSG 2002. McDermott also provides customer training and Election Day field support, which has the side benefit of providing invaluable practical election experience. McDermott, thank you for joining us today.

Mark Skall is currently a Technical Reviewer for the Election Assistance Commission. As a Technical Reviewer, Mark is responsible for conducting detailed reviews of technical documents, such as test plans, test cases and test reports submitted by testing laboratories, to determine if voting system manufacturers should be certified by the EAC. Prior to becoming a Technical Reviewer with the EAC, Mark was the Chief of the Software and Systems Division within the National Institute of Standards and Testing, NIST. Mark and his division were responsible for developing testing tools that improved the quality of software in the industry, and for working with major standard organizations like W3C, ANSI, ISO, and OASIS to develop standards. His division was

internationally recognized as the foremost experts in conformance testing and voting system standards. Mark, thank you for joining us today.

Steve Pearson is the Vice President of Voting Systems at ES&S. Mr. Pearson is responsible for all ES&S voting systems Product Management and Design, U.S., federal, international, and state certification testing and approval of ES&S voting system products. Mr. Pearson works closely with the EAC to ensure each voting system meets the VVSG standards. Also, he works directly with members of the National Institute of Science and Technology and various independent testing authorities throughout the U.S. and Europe. With over 20 years of experience in systems development, Steve joined ES&S in 2001 with a strong background in enterprise class systems development and implementation. His passion for bringing solutions through technology keeps him focused on his current work at ES&S. And Steve, thank you for joining us today.

Dr. Juan Gilbert holds the Presidential Endowed Chair in Computing at Clemson University, where he serves as the Chair of the Human-Centered Computing Division in the School of Computing. Dr. Gilbert is the PI for the Research Alliance for Accessible Voting, which is one of the two award recipients of the EAC's Accessible Voting Technology Initiative. He's the creator of PRIME III, a universally accessible voting system research prototype. Juan is also a Professor in the Automotive Engineering Department, as well. And Juan, thank you for joining us on this roundtable.

So, with that impressive list of discussants at this roundtable, I'll now turn it back to Brian for his presentation.

MR. HANCOCK:

Thank you, Merle. And thank you for sticking with us for this second session. We very much appreciate it.

We're going to talk about, this afternoon, and what my presentation is going to be, is, really, on how we can streamline the EAC's testing and certification program to take care of some problems that we found over the course of the program's life, really. Before we go onto where some of us think we should be headed, I think we need to talk about -- a little bit about what we do now, and sort of where we came from.

Most of the panelists here are quite familiar with conformity assessment, but for those watching that aren't, we do run a conformity assessment program, here, which is, essentially, a system established to ensure that any product or service meets the requirements that apply to it. In our case, it's voting systems meeting the requirements of the VVSG. There are a number of conformity of systems that exist across the globe, really, to ensure compliance with all sorts of requirements and all sorts of different products.

There are three main types of conformity, or attestations of conformity. You have first party attestation, which is, by the manufacturer or the supplier of a product, second party attestation, where the user of that product actually issues the attestation, and then, finally, third party attestation, which is what we use, right now. Testing is conducted by our voting system test labs, and they are that third party, and then, the EAC actually gives the final certification.

Our certification is the process through testing and evaluation conducted, again, by a test lab that validates that a voting system meets all of the requirements of our Voluntary Voting System Guidelines and,

this is important, and performs according to the manufacturer's specifications for that particular system. So, that's where we are now.

And I think we need to hit on some of the criticisms of our current process to learn why we think we should move forward in some of the manners that I'm going to be suggesting. We've taken our fair share of criticism over the past ten years or so, and I think a lot of it has been real, and some of it has been perceived. Certainly, during the initial several years of our program, I think we would be the first to admit that it was very new. We were, you know, pioneering a lot of things, so to speak, and it took much longer than we felt it should have, and certainly the election officials and manufacturers thought it should have. And certainly, that extra time cost money, and that's important to everybody. I think some of the perceived criticisms are that that is still the case. And while we can always make things better, as you're going to hear, I do think that over the past several years we've come a long way. And, you know, perhaps some of the manufacturers here agree or disagree with that, but certainly, I think we're at a point now where our program is almost as streamlined as it can get, with our current process and procedures. And that's why we think we need to propose some new procedures to make the process even better.

Some criticisms of our process, time, testing takes too long. Cost, again, testing is way too expensive. And then finally, relevance, and in some degree, this might even be the most important part. So, time and cost factors can contribute to state and local jurisdictions looking for alternatives to our process in order to run effective elections, you know, even though they may support the program in principle. And I think most election officials do support the program in principle, but we have to

remember that they have to run elections. And that's the bottom line. They need to get it done, somehow. And that's their job. That's what their tasked to do and that's what they have to do. And so, that's sort of where we are now and why we think we need to make some of the proposed changes that I'm going to talk about next.

Before we thought about what type of changes we need to make, we asked one of our EAC voting system test labs to do an average time and cost analysis, a statistical analysis, not of any one particular voting system campaign that we've actually done, but we sort of asked them to look at the averages for all of the voting system test campaigns that that lab has come up with, and sort of give us some numbers on those. They, of course, had to make some general assumptions when they did that, and those assumptions are listed on this slide. The election management system was fairly large, greater than five modules. One type of precinct count optical scanner with about five units would be included, one type of ADA device with three units in testing, one type of central count optical scan device with two units under test, and about a million lines of source code, or so. And generally, the average length of time required to complete testing on this sort of average voting system would be about 35 weeks, or so, give or take a few weeks. And so, those are the assumptions that we took, moving forward.

And these are some very interesting numbers that we came up with. As you see, the slide talks about several different areas, specific testing areas, areas that have very specific requirements in the VVSG, how many hours, total hours each of those took for testing, what percentage of the testing each of those were, and then, what percent of the overall time of the test campaign that represented. And so, the first

one is TDP, or technical data package. This is the very voluminous information required by the VVSG to support -- documentation to support the voting system. It took about 240 hours, which represented about 4.4 percent of the testing and 9.4 percent of the total time of testing. Source code review took a whopping 2,100 plus hours, accounting for 39.4 percent of the testing time -- of testing, and 28 percent of the total time of that test campaign. Finally, hardware testing took about 655 hours, about 12 percent of testing, and 15.8 percent, almost 16 percent of the time of testing. And when we add those up, these three elements together, technical data package, source code review, and hardware testing, took over 3,000 hours on average, were 55.8 percent of testing, and about 53 percent of the total time of testing.

And so, why are these particular numbers relevant? We feel, and we've heard from others, that voting system manufacturers and election officials are not getting the greatest value or efficiency, concentrating what we all realize are very limited resources in these specific areas. You know, TDP documentation is extremely important. We all know that. But, is that documentation worth all the time and money that the test labs are spending to review it now? Source code review, we also understand, is very important, but I think there are other ways we can go, and I'll speak about some of those in a few minutes, where we can do it more efficiently. And finally, hardware testing is something that's very well known. There are many, many labs out there across the country that do and can do hardware testing, are accredited by any number of organizations to do hardware testing, and it's something that, you know, through the military and aviation and other industries is a fairly known quantity.

So, our thoughts are that we need to change our process, to shift the time and the associated cost burden of TDP, source code review, and hardware testing, out of the VSTLs and back to the voting system manufacturers. So, how do we do this? One way, and the way that we're proposing right now, is through the use of a manufacturer or a supplier, as it's known sometimes, declaration of conformity, or DOC. And what this is, according to ISO 17050, which talks about this in an international conformity assessment level, is a form of attestation of conformity to meet demands from the marketplace and regulators for confidence of a product. The acceptance with a supplier's declaration of conformity can be enhanced by retaining documented information to which the supplier bases the declaration and making this documentation available to others upon request.

This first paragraph goes a little bit in more detail into it, but I think the translation at the bottom is really the most important thing here. The EAC would be asking voting system manufacturers to provide a signed declaration of conformance for the VVSG requirements related to technical data package, source code and hardware testing. So, what this would do, is it would allow a voting system manufacturer to test VVSG requirements of these, either in-house, when they can, or in the case of hardware requirements, at another third party lab, which would need to be done in almost all cases.

This is very difficult to see, but it's just a sample of a supplier or manufacturer declaration of conformity. It's actually from New Zealand, but it's sort of the concept that we would be shooting for. That first area is just information from the manufacturer. The boxes below talk about which requirements that manufacturer is attesting to have met. It can include the

manufacturer's own test cases, things like that, to prove and to document through an audit process, or other process that that testing has actually been done. And then, the bottom line is for signatures, dates and signatures from someone in upper management at the manufacturer, actually, stating that these have been done and warranting that the product actually meets the requirements that are listed here on this document.

There will be some potential legal ramifications for moving in this direction. Again, as I said, more research needs to be done in this area. That's very important. But, certainly misrepresentation on the DOC might fall under the Federal False Claims Act or other federal laws. And so, we do need to have our attorneys, or at least our contract attorneys, at this point, look into this and help us move forward in this direction to see exactly what those issues might be.

I spoke a little while ago about making source code review more streamlined and more effective. In this area we're going to continue to work with the NIST SAMATE program. That's the software assurance, metrics and tool evaluation program at the National Institute of Standard and Technology, or testing, Mark, depending on what the case might be. Basically, they develop automated source code review tools that will help voting system manufacturers more easily do their own internal testing and make the results available. Certainly, right now we're working on it by -- in giving those tools to our test labs to use, to make that process at the VSTLs more streamlined, but we think it can be even better used by the manufacturers. It's very -- right now, basically, the time and the cost is because it's generally almost all manual source code review, and when you get a system with a million lines or more of source code, McDermott

and Steve can both attest to the fact that it takes a really, really long time, as can Traci. So, that's something that we will be continuing to do, regardless of this method. And the folks at NIST have been very, very good in helping us in this area.

We feel that, perhaps, given these manufacturer declaration of conformity processes, election officials and, in fact, the EAC to some degree, should have some additional protections, assuming that this is the way we want to go. To me, one of those would be an ISO 9001 certification. Essentially, ISO 9001 is a global quality management standard that requires organizations to establish, document, maintain, and improve a process based quality management system. Some of the manufacturers currently use ISO 9001, others do not. But, at the very least it gives a very, very strong baseline knowing that there is a documented process at the manufacturers for quality control. And I think that's very important, both, for us and for election officials. So, that's a suggestion that we'd like some feedback on, as well.

What will be the outcome of some of these programmatic changes? Well, one of the things I think it's going to allow us to do is refocus the testing process on areas that we feel are in need of some additional scrutiny, currently. These areas include, and this ties right in with our last panel very nicely, usability and accessibility. Currently, both of these account for only .74 percent of testing, and about 1.57 percent of the total time of testing. Also, security and telecommunications, currently, they account together for about 4.4 percent of testing, and about 9.4 percent of the overall time. Both of these, and I think you heard in the last panel just how important, particularly, for that group, usability is. And I think for all voters, frankly, not just voters with disabilities, but all voters. If the system

isn't usable, the security, accuracy, reliability, and all of those other factors sort of fall by the wayside, if voters can't use it.

So, what do we hope some of the effects of these proposed changes are going to be? We think that they can improve the efficiency and reduce the cost of testing by a minimum of 30 percent, time and money. We think these efficiencies could be even greater depending upon the implementation by all participating parties, depending on how it's done, and it could even go up to about 50 percent, or so, of the current cost, depending on how much we can streamline the process. Again, we need to refocus testing on areas more critical to the actual security, accuracy, and reliability of the voting system. And finally, it's going to increase the relevance of the EAC's testing and certification program to election officials, by getting better products into the marketplace at a more rapid rate.

That was sort of a quick and dirty on some of our thoughts, but I think at this point, Merle, perhaps it's best to open up and get some discussion going and some back and forth on these issues.

DR. KING:

Okay, well thank you for the presentation, Brian. And I think for those of you who have been onboard with the VVSG and the program since its inception, this is a clear change. It's a change that has been clearly thought about, and it has been talked about, and it is in that stage and that vein of looking at the feasibility of this. As Brian pointed out there are many, many legal and operational issues, but right now, we're talking about how would it impact the stakeholders? If this change were to go through the formal process and be implemented, how would it impact the voters? How would it impact the local jurisdictions, the states,

researchers, manufacturers, test labs? And that's where I'd like to start this discussion.

And if it's okay, a lot of times I just kind of, you know, work on lines, but in this case, I'm going to start with the vendors, because I think that's really where this is -- if it works, it will work because of the vendor buy-in, and the vendor support of it. But, I'd like to start with McDermott, and then, go to Steve with the first question, which is, how would these proposed changes impact your organization in terms of, not only the obvious, which is decreased -- potentially decreasing costs, decreasing time to test, but how would it impact, internally, your own design for testing, your own policies for managing internal testing and disseminating those results? So, if I could start with McDermott, and then we'll go to Steve.

MR. COUTTS:

Thanks Merle. To be honest, this wouldn't change what we do internally a whole heck of a lot. Unisyn is an ISO 9001 company already, and we have our policies and procedures as to how you develop software, how you test software, how you document software. All of these things are already in place. What it really gives to the voters and our customers is that we're able to respond more quickly. At this point, if a rule or a law were to change, you're talking a minimum of a year before you could get a change in place. And this could cut that down, dramatically. But, as far as what we would do internally, very little change would actually occur.

DR. KING:

Okay. So, you primarily see it as a way to be more responsive in aligning your development and deployment process with the behavior of the jurisdictions and the states?

MR. COUTTS:

With both the -- aligning both with the market and being able to pay a lot more attention to the voters. I mean, one of the things that I would always want to do more of is getting out doing more focus groups, getting more time with the voters to find out what it is that they actually need, what do they want, so the iterative discovery process that was talked about earlier. And that's a huge benefit.

DR. KING:

Okay, thank you McDermott. Steve?

MR. PEARSON:

Well, first of all, I want to thank the EAC for being receptive to these changes. And I know we've been doing this, we've been working together with the EAC, Brian, very closely since -- we submitted our first application to the EAC in March of 2007, and have been consistently and persistently in certification since that timeframe. And in that timeframe, we have certified, we have completed testing successfully on six systems. However, you would do the math and you'd think well that's only a year per system but, you know, our first certification took 22 months to get through the program. But, I will say, the last certification testing campaign that we've just now completed was the best. And so, what I've seen is continual improvement. There's been a lot of growing pains, you know, along the way. So, we're very appreciative of the fact that you are looking at the items that are going to bring more value, versus those that really brought very marginal value. So, we believe this will have significant impact on our organization.

One of the challenges we have, from a source code standpoint, is we have seven languages in our systems, coding languages, of which,

really, only one of them, there's really nice automated tools, so that we can streamline that conformance aspect of it. And typically, you know, the biggest challenge we have is when -- we've worked with all three of the VSTL labs, and interpretations have been different from each lab, requiring us to reformat, recode significant portions of our systems, as a result of those interpretations, those variances in interpretations. Those -- that's costly, it's frustrating, and it really again brought no value as to the accuracy or the security of how the system operated. So, I think that this is really a large, big step that we would very much embrace. We take this all very seriously, so internally, having those responsibilities to comply and conform, we would do that and we'd be happy to sign up for those.

One other aspect is, before we -- one of the things, another lesson learned along the way is, we've learned that we've had to take ownership for the readiness of these systems. We no longer go into a certification hoping to complete it in a certain timeframe. We have a very high level of confidence that we will pass the certification, or complete the test campaign in a specific timeframe. And it's only because we've taken responsibility for the quality of our systems upfront and we pre-certify. We do pre-validation certification testing on all aspects of the system before we ever go to the lab, which includes source code review, which includes hardware environmental testing with other labs, before we go into the VSTL campaign, because we don't want any surprises.

So, we're doing these things anyway, and I really think that this is going to streamline the process to the point where we can now get product and enhancements to our customers quicker than we have been able to in the past. And that is our motivation, you know. Our motivation is to get these systems through the test process as quickly as possible, so

we can get them into the field because they're needed. And there's been pressure on all of us to do that. And so, I think working together there is a good solution here. So, thank you.

DR. KING:

Okay good, thank you. I'm going to go to Juan, because you're sort of in that next tier down, not a vendor, but certainly, working in partnerships with vendors, and then, I'd like to go to the testing folks, and then, finally Brad, end up with you.

But, going to first, Juan, your perspective on how this would impact an emerging company, a company that is perhaps looking to come into this market space that may not have yet developed a manufacturing base, may be in that formation stage, from your perspective how does this look.

DR. GILBERT:

Well, it looks like it would fit. It's anything to expedite the process. But from what I understand the big hurdle, particularly for a new emerging company would be the cost to get through the process. The time, it is what it is, but if you can't afford it, then that just stops everything. So, I think the cost is going to be the big barrier there.

The thing that really stood out to me in this was, I was not aware of the amount of usability/accessibility testing, or the lack thereof, that was actually being done. But, I think that's a component, and there's ways -- I have ideas on how to make that more efficient, at a less cost, and leveraging other resources. But I think emerging vendors, the hurdle is going to be, what's the cost. The time is fair for everyone. It's the same. It doesn't -- the time to get through doesn't favor one company over another, it's that cost. Do they have the startup and ability to get in it? But...

DR. KING:

Okay, Brian.

MR. HANCOCK:

Yeah thanks, I just want to sort of follow onto a point that Juan brought up, and I really meant to talk about in my presentation, and that is, you caught onto the very low numbers there for the usability/accessibility testing. I mean, I think what we have to say is that partially reflects the more minimal requirements in the current VVSG, right, that next iteration document VVSG 1.1 that's been out for public comment. And certainly, what's called the 2.0 document has significantly more testable requirements for usability and accessibility. So, that's not the whole reason that those numbers are so low, but it's certainly part of the reason. I just wanted to bring that up.

DR. GILBERT:

Yeah, and I realize that 2.0 is much more extensive, and we've commented on it and things like that. But, from my perspective, it's interesting because working as a researcher in this area and having a background in computer science, so I hear my colleagues who will say, you know, security is very important and they're concerned about that. And then, I have colleagues who are on usability and accessibility. And so, from that perspective, there are a couple points I'd just like to make real quick.

One is the accessibility perspective, just for the record, is the law. I mean, it's required. Security, and this is an interesting conversation I had with my colleagues, which is, to my knowledge, I haven't seen any documentation of a state of federal election that was modified by a security hack or flaw, directly, but there are several documented cases

where the usability has impacted the outcome of elections. Every year that I -- I could go every year and tell you an instance where the usability has changed the outcome. Now, whether that means it was favorable or unfavorable, it depends on who you are, but this is evident. So, I think there is somewhat of an urgency, here, with respect to the usability and accessibility component, because elections are, to date, being modified by the usability and accessibility components.

DR. KING:

Thank you. Let me go now to Traci and then come back to Mark. From your organization's perspective or to the extent that you can kind of speak for the industry, how does this look?

MS. MAPPS:

No, I mean, I think we're flexible to help in make the testing process as efficient as possible. Some of the things that, you know, I can think of that would impact our organization are, you know, if we're not doing source code review one of the things that that impacts is our ability to actually identify risks in the code. Our source code reviewers, as they're reviewing the source code, they're actually looking for risks and they're working with the functional testers to identify areas where we might need to focus a little bit more on functional testing. So, eliminating code review eliminates the ability to do some of that for us.

You know, in doc review as we're going through documentation review we're also using the documents that we're provided with, which I would think that if we're not doing doc review we would still get a TDP of all of the user guides, the system specs and what not. But, you know, during doc review is when we're coming up to speed on the systems. That's when we're really doing a lot of the training of our individuals and

helping us to become more familiar with the ins and outs of the system. So, we would be much more dependent on the manufacturers to help us in coming up to speed, because we wouldn't have the time during doc review to do that.

We also use the documentation to develop all of our test modules, and so, that's something else that we're doing during the documentation review is using all of the specifics that are in the documentation to develop our specific test modules for each of the vendors. So, we would need to work with the manufacturers to actually make sure that we've got that documentation, and work with them a little bit more closely in understanding the specifics of the system, so that we can develop our test cases. Our test modules are very specific, you know. We go, you know, down to right click here or left click here, you know, enter this, and a lot of that comes from the documentation and we're getting that during the doc review. So, you know, that may -- when we look at removing source code review or documentation review, and talk about improving the efficiency or the timeframe, there's more time that might be needed to be put into that by removing those pieces at the certification process.

You know, another thing that we would need to look at, Brian brings up, you know, putting more time into security testing, maybe penetration testing, usability and accessibility testing. Right now, the manufacturers work with the study groups and they provide reports to us on the accessibility testing that they've done. So, there is very little accessibility testing that's done at the labs. The security testing that we're doing does not include things like penetration testing. And so, that's going to take a different kind of resource to do that testing, and in some cases a more expensive resource. And that's something that we would need to take a

look at, you know. Your security people, you know, especially penetration type testers and some of the people who really get into looking at hacking and looking at, you know, your more in depth security, that's all they want to do. And so, having someone on staff to do that type of testing is expensive, especially if there's not a lot of EAC type certification efforts that are going to be coming our way, but us having to have these resources on staff, throughout the year, you know, we're going to have to look at cost, overhead cost on our end.

And I know that we're going to be talking about cost in a different part, but that's something that would be an impact to us. If we take away source code review, but we are having the manufacturers actually use the automated test tools that NIST develops, and then submit the reports to us for review, we still need to have individuals who have the ability to do source code review, or at least understand how to review those reports on staff. Again, these people aren't people that you can necessarily put on functional testing, and so, it's an overhead that we need to consider. Not saying it's not possible but, you know, when you look at cost and reducing the cost of tests, I think we need to look at the overhead cost at the labs, as well, when we're looking at all of this.

DR. KING:

You raise some very interesting points Traci, and one that comes up frequently in state certification testing is that the review of the architectural models, review of the documentation, not only permits you to design tests for the system, but it really reveals the behavior and the attributes of the system. And I think the point you're making, which is, that one of the undocumented benefits of reviewing the TDP is the learning that occurs

within the lab, and that if that process is removed there has to be some way to mitigate that loss of understanding. I think that's an excellent point.

The second point that you make is that not all testing resources are utilitarian; that is, if you pull them off of one application that they can be as efficiently applied in another. So, I think those are both really good points and is exactly the kind of feedback that the EAC is looking for here, which is using this kind of multi-perspective technique to see how this looks from all the different points. So, I think those are...

MR. HANCOCK:

And let me just mention one thing. We were looking ahead when we were sort of discussing whether we would try to implement this or not, or propose this, we were looking ahead and we do understand that whatever next iteration VVSG document is going to require, and right now, does require, additional testing in some other areas. So, it will jack up the cost. I mean, we've talked about this in different forums a lot of times. And so, one of the things we're trying to do is just look at areas where we can save some costs, right, to sort of lower the overhead, overall. But we certainly were cognizant of that fact.

MS. MAPPS:

You know, I'm very interested, too, to hear what the states have to say, because we do have states that leverage source code review and documentation review from the EAC certification efforts, you know. I can talk to -- we're the VSTL, currently, for the State of New York, and New York has leveraged the work that's being done at one of the other VSTLs for the manufacturers that are being tested. And so, with that going away, I'm just wondering if the costs are going to go back to manufacturers to have to do that testing for the states, if they're still requiring those types of

efforts to be in place. So, I'd be interested to hear what the states have to say and how they would perceive this, as well.

DR. KING:

Well, we're going to come to states in just a moment, but Mark, your insights.

MR. SKALL:

So, I think we're at a critical impasse in our testing and certification program. We've been hearing for quite a long time now anecdotal evidence that source code testing takes as much as 50 percent of the time, so I'm glad to see it's a little bit less than that. And that's just a long time to do testing, which, although it's important we all know that software maintainability, coding standards have their place, certainly does not affect the integrity of the voting system on Election Day. That's where we need to concentrate our resources. And we've bandied about suggestions for how to reduce this time, going up to this suggestion that Brian has proposed. I've proposed things like not doing line-by-line review of source code testing, but sampling, since all of testing is sampling by definition. We clearly spend a lot more time doing source code review than we do other types of testing. But I think this approach of self-certification is certainly the superior approach. I think it's a no-brainer. I think it makes perfect sense.

And I think there are, really, you know, two aspects of this. Certainly, it would save time and money. That's a given. Whether in fact it will end up, one will be able to use those resources to do more extensive testing in other areas which are much more important, like usability, and I completely agree that this is an underappreciated area that causes tons of problems. And security is the question. I think that right now, like Brian

said, requirements in those areas are fairly sparse. I think you can make the argument security, you certainly could expand the testing, because security requirements are so general, could kind of get away with testing a lot of different things. But usability and accessibility would certainly have to wait for 1.1 to expand that type of testing.

But, in either case we need to clearly, clearly reduce the cost of this testing and I think that the self-certification is clearly the way to go.

DR. KING:

Okay. Brad, you are the lone representative today of the thousands of voting jurisdictions out there, both state and local, so the weight of the world is on your shoulders.

MR. KING:

Well, thank you Merle, I'm humbled.

[Laughter]

MR. KING:

I want to begin by thanking Brian and the entire EAC staff for the work that's gone into these proposals. I think they're significant and they reflect a very responsive attitude towards the comment, criticism, and questions that have been addressed towards the certification program over the years, so once again, my applause and thank you for that.

I think from the perspective of state and local election administrators, anything that simplifies the certification process, reduces costs, and reduces the timeline is obviously a benefit. Each year state and local election administrators are presented with a multitude of statutory changes, rules, litigation that requires modifications to how voting systems work. And so, many times we have no control over the implementation date of those requirements. So, having systems go

through the certification process in the most timely manner possible to permit software changes that address administrative and legal changes is of high importance for us.

I think the other piece that we need to keep in mind is the fundamental basis for our efforts in voting system certification, which is that we want to ensure that the voters cast their ballots on systems that are accurate and accessible. And we know that sometimes our best efforts are not enough. No election administrator expects to see a headline in the paper on Wednesday morning, which reads “Election runs flawlessly.” We don’t have that experience. So, it’s important for us, in considering modifications to the certification process, to make certain that we don’t lose any aspect or any opportunity for enhanced public confidence in voting systems.

To focus on one example that Brian talked about in his presentation, the declaration of compliance and its impact as a cost-saving measure sounds like a great idea. One scenario I would want to think through carefully would be that if we did encounter a problem with a voting systems functionality, that when we have voters, media, and others interested in the process, come to us, we don’t want to be in the position of election administrators to be puzzled about the question, “You mean to tell me you just took their word for it”? No, we want to make certain that we can say, “Yes, there has been extensive testing by a variety of sources and so, yes, we have justifiable confidence.”

With regard to the declaration of conformity, I certainly haven’t looked into the Federal False Claims Act, but I would say that one approach that we’ve taken at the state level is to just simply require that applications for approval be submitted under the penalties of perjury. That

sounds serious and it is serious. And so, I think that sort of approach, to keep in mind the need to maintain voter confidence in the voting system, is the key behind the entire process.

And I don't know whether now or later you'd like to get into a discussion about the relevance issue that Brian raised, but I'd have some remarks to share on that.

DR. KING:

Please do, because I want to give Brian some warning that, just like the rest of you who have talked about how this would impact your organization, I'm going to ask him in just a moment how this would impact the EAC should it go forward. But, please continue with the...

MR. KING:

Oh, thank you.

DR. KING:

...relevance.

MR. KING:

Yes, I think election administrators heartily support the need for voting system certification at the EAC. There needs to be a federal entity that conducts the sort of testing that we have for voting systems that are used throughout our states and localities. I think that does not necessarily preclude the states and others from taking a more active role in addressing items of particular concern to them.

I feel hesitant talking about this program in the presence of Merle, but Kennesaw, of course, has led the way with regard to state levels -- or state efforts on voting system testing, and as part of the state certification process. And it's been through his efforts that other states, like Indiana, have developed our own voting system technical oversight program,

VSTOP, that's administered by Ball State. And I'm pleased to report our new state budget provides for full funding of VSTOP for the next biennium.

DR. KING:

Excellent.

MR. KING:

So, there's a widespread recognition in our state of the success of that program. So, I don't think that the EAC should view state efforts in this area as any comment on the relevance of the certification program that it -
- that the EAC conducts.

DR. KING:

Okay, thank you, and now Brian, the relevance to the EAC?

MR. HANCOCK:

Thanks Merle. Let me first follow-up and touch on a point that I think is very important that Brad touched on, is that the confidence of advocacy groups out there, as well as election officials, you know, on that information, the declaration of conformity. You know, certainly, the information is there and whatever process we put in place, you know, we would do, you know, random audits, you know, to make sure that those test cases are actually in use and all the documentation is there.

And the other thing I would say, is that the use of this type of conformity assessment scheme is fairly common, particularly in the European Union, but in other areas in the U.S. as well, I mean, including the FAA and others, you know. And so, it's not something that's completely new or we're not really breaking any ground here in conformity assessment, only in its use in voting systems, you know. And so, I think there is some confidence to be gained from its use in other industries.

As far as how the changes would impact the EAC, I think the most important thing, and we didn't really mention it before, but it's probably fairly obvious, that none of these changes, even if we get buy-in from the entire community, can be implemented without EAC Commissioners, you know. It will be a major policy decision and it will change the way we operate our program, certainly enough that it would require a Commission vote. So, that's important to keep in mind, as well.

But what we want to do is to be able to, you know, first of all, have this conversation today as a first step, right? This isn't the end of the conversation, this is only the beginning of the conversation, you know. Assuming everybody in this room is fairly positive about the proposal, you know, we'll bring it forth to larger groups of manufacturers and election officials and others. And once we get community buy-in on the concept, you know, we would certainly put a program manual together and hopefully have it ready for the time that we do get Commissioners.

So, those are sort of the immediate steps that we would take.

DR. KING:

Okay. I have a next question that I'd like to address to the panel, and it deals with once these changes are defined and implemented would it produce the results of less time, less money. But, before we go there, and give you a moment to gather your thoughts on that, I'd also like you to think through, in addition to the stated goals of reducing costs and reducing time, are there other unlooked for benefits of this? And I'm going to turn my question to the two manufacturers at the table. And certainly, one of the things that's occurring throughout the voting system industry, right now, is some horizontal integration with vendors, and certainly, Juan, that would tie in, perhaps, with your initiative, and the need to ensure that

acquired companies or acquired partners share and engage in the same testing methodology, the same level of commitment to testing. And so, to me, one of the benefits for this, is that rather than isolating the testing responsibility into a relatively small sphere, which is the VSTLs and the EAC, that we're pushing the culture of testing back through, not only the manufacturing organization, but the subsidiaries and the partners and the potential partners.

So, the thing that I'd like to ask the vendors to comment on is, as you look at candidate companies to acquire, they may have a unique product that you would like to add to your portfolio, or there may be potentials for partnering, where in the discussion does the discussion about your common testing culture come? And, is that something that you perceive would be facilitating for acquisitions? It would certainly give you a common point to discuss. Or are there potential challenges there that the election community would be interested in?

And because I started with McDermott last time, Steve, if I could start with you, and then, we'll go onto that other question.

MR. PEARSON:

Okay, and I'm not sure I'm going to answer your question fully. I'm not sure I quite fully understand it. But, one of the changes that we've made in our company is to push these requirements down to all of our partners, whether it's another company that we do business with, or if it's a manufacturer that we subcontract to. So, it is their responsibility, then, by contract, then, to meet these minimum standards. And I think at the end of the day as we integrate those components into our systems, we hold them accountable for those things. And so, we're doing those things today and we would continue to do that. But ultimately, we take, you

know, responsibility for the performance of the system and the level of conformance and compliance. So, we have that responsibility. But, we will -- that is a practice that we have implemented. And when we choose our partners, we choose them very carefully, and they understand, you know, really, by our virtue of our contracts that they have a responsibility, and then we have measurements in place to ensure that they fulfill those. So, I think we're moving in the right direction here, and I think that we can show evidence of conformance, you know, along the way, as we move into this area.

So, I'm not sure I answered your question, but those are the thoughts that came to mind with me.

DR. KING:

I know that often in an acquisition there are many points of corporate culture that you look for intersection on, and my question, is testing a part of that. And I think you've answered that question that that's one of the elements you look for.

MR. PEARSON:

Yeah.

DR. KING:

McDermott?

MR. COUTTS:

I think one of the key elements is quality. I think that there's always challenges, again, when you're looking at some of the rules that we have about source code review is you're trying to bring a product in and allow it be testable, rather than just meeting your standards of quality. And you've got a big benefit there if there is bringing an outside product up to a testable standard. But as far as what you're looking for in an acquisition is

really the quality of the product and does it, as Steve said, does it meet the metrics that you set for what the product is supposed to do and how it's supposed to fit within the product line you're supposed to be producing.

DR. KING:

And, of course, quality is not accidental. There has to be intentional processes back behind it.

MR. COUTTS:

Quality is never accidental.

DR. KING:

Okay very good. Well, let me -- Mark?

MR. SKALL:

I was just going to say, Merle, if I understood the question, you are looking for sort of unforeseen consequences of this. And sort of piggybacking to what was just said, one of the things we're always pinging on the manufacturers for, is to give us a system that's, you know, worthy of certification that's been tested. And I think the manufacturers are doing, the ones at the table, a very good job. But there will be other manufacturers that we don't know yet. And any program which imposes more testing on the manufacturers, during the actual certification phase, means they're going to have to do more testing before that phase, as well. So, I think one of the consequences is we will get systems that are more testing ready when it comes to us, and will thus, even before we go to the self-certification, that alone will reduce the time and cost of testing.

DR. KING:

Okay, good.

MR. COUTTS:

Merle, if I could bring up one point.

DR. KING:

Yes, um-hum.

MR. COUTTS:

...is that the certification that we're going through at the EAC, which focuses a lot on the accuracy, the reliability, the security, and auditability of the system is only stage one of certification. An EAC certification just simply says, okay now you can go to the states and ask them if you can be certified in their states, in some cases.

DR. KING:

Um-hum.

MR. COUTTS:

And so, we get a second round of testing, some much more rigorous than others, afterwards. And a lot of the usability, though not accessibility, a lot of the usability testing occurs at that level, because the states know exactly how the system is supposed to work for their state.

And you've got a lot of situations where a test lab will look at the documentation and say, okay, you support this, this, this and this. We're going to mix them all up together. Well, no, in a state, that actually would never happen. You would use these sets, these sets, these sets. And I'm trying to get to the point of saying, I know what a state is looking for, and to be able to merge that in with the EAC testing, as much as possible, to get a lot of this done all at once, to be able to have the lab say, yes, we're also looking at Indiana, we are also looking at Ohio, we are looking at this and saying you meet how they do their elections.

DR. KING:

Okay.

MR. COUTTS:

And that's one of the big benefits that we're seeing.

DR. KING:

Okay, thank you. Well let me toss that question then out to the panel, the question of do you believe that the proposed changes, if implemented correctly, and that correctly, is what we're, at least, trying to define the goals of correctness of that process, would it achieve the desired results of more efficient and timely testing and subsequent certification of the systems? In other words, is there enough potential here for that to merit further research? On the surface, does it look capable of delivering those two goals? And Traci, I'll ask you for your reflection on that.

MS. MAPPS:

You know, I think I commented on a lot of that with the last time I spoke. I think that, you know, definitely, I think that this could be -- could help to promote a more efficient way of testing, you know, with the VSTLs. I think that there's just some things, that I had pointed out, that we would need to consider, you know, like the documentation review, and how do we work with the vendors to come up to speed on the systems, really understand the ins and outs of the system. Source code review, you know, like I said, there might be some things that we miss that are critical in the functionality testing, in the functional testing, because we didn't have the inside view of the source code. I think that in working with the vendors and coming up with processes or, you know -- and with the EAC, I mean, I think there's potential for making it more efficient. I think that there's just some things that we need to take into consideration.

DR. KING:

Okay, Steve.

MR. PEARSON:

My answer to your question is absolutely. But, I do want to comment on the two points that Traci has raised, and really, the first one on the technical data package.

The initial system we submitted to the EAC for certification, there was over 175 documents that had -- that were required to be submitted. Now, we've made an effort to streamline that and make that a little more efficient. But nobody -- we have an obligation to provide our customers with user manuals, maintenance manuals. We're not suggesting, I don't think Brian is suggesting that anybody would forego those. And we would deliver those documents. You would need to use those to develop your test cases and learn the system. And when you test a system you would do it side-by-side with those manuals. I don't think anybody is saying we want to eliminate those, because we can't. We have an obligation to our customers to provide that level of training and instruction and support.

MS. MAPPS:

Oh, I agree.

MR. PEARSON:

Yeah.

MS. MAPPS:

I think that -- sorry, just real quick.

MR. PEARSON:

Okay.

MS. MAPPS:

What I was trying to point out is that during the documentation review, we simultaneously do training.

MR. PEARSON:

Yeah.

MS. MAPPS:

And we also develop our test modules, and so, that would need to be something that we could continue to do...

MR. PEARSON:

Sure.

MS. MAPPS:

...when before we were doing it, in parallel at the same time.

MR. PEARSON:

You would have those.

MS. MAPPS:

So, to reduce the time since we were doing it the same time as we were doing the doc review, I guess, I would need to look at how much time that would save.

MR. PEARSON:

It's the other...

MS. MAPPS:

Does that make sense?

MR. PEARSON:

...135 documents that I have a problem with, that nobody ever looks at ever again after a lab looks at them. And, to me, that -- it goes back to, is there really value there? And we don't think there is.

MS. MAPPS:

Oh, I don't disagree with you.

MR. PEARSON:

And then, on the other point on the source code review, and this is a rough number, but 90 percent of the issues that we have are related to

code comments, and header comments, which have no impact on the logic at all. And literally, I'm confident to say we're right around that number, as far as the number of issues/discrepancies we get during a million lines of source code review. It's really not -- or maybe we -- and you know, there's some indentation that we didn't do quite properly for readability. But those things don't have any impact on the accuracy and reliability on the security of a system, you know.

So, that's my only point on there, that distinction that I think that there's -- it's certainly not commensurate with the cost, I mean, of that exercise. The value is not commensurate with the cost of that exercise, so we support these suggestions.

MS. MAPPS:

If I can just...

DR. KING:

Yes.

MS. MAPPS:

I totally agree with you. I mean, I think we're the first ones to say that there's a piece of source code review that could easily be removed, you know. I'm the first to agree with you there. I think that there are pieces of it that are valuable that may -- that we may want to consider to keep within the VSTL for review to assist in our security testing that we do, and to assist in identifying risks that we might want to keep in mind when we're doing our functional testing. I agree with you, Steve.

MR. PEARSON:

Okay, thank you.

DR. KING:

I want to ask Brad to respond to this question, but I want to add a little bit of additional information. For state and local election officials, cost and time are related, but we often separate them out. And when we have a crunch in an election, the cost criteria gets suborn to the time criteria, because we can't change the calendar. And one of the most common areas where the time crunch impacts us is in ECOs, in getting those processed through, in time.

So Brad, in terms of the two stated goals of this modification to the certification process, improved time/improved cost, could you talk about whether these changes have a potential to impact those positively for the state, and how it might impact one differently than the other, and what's important to the State of Indiana or to your other colleague states that you interact with through NASED and other organizations?

MR. KING:

Yes, I think certainly the proposals that have been brought forward, as refined, are worth pursuing. I think we're certainly in agreement on that.

With regard to the impact on election administrators, at the state level, particularly, the potential efficiencies are significant, especially in the time crunch that you mentioned. What we've experienced in the past, in several states, is that certification issues suddenly become hotter as we get to the critical tipping point, when local jurisdictions have to either purchase or install upgrades to their voting systems, and the election process is underway. So, we want to not have dramatic changes required in our voting systems during that part of the process for the sake of public confidence.

You mentioned the engineering change orders, the ECO in particular, and I think that's an excellent example of how we've been able

to achieve some efficiencies in the certification process. In Indiana, in particular, we've developed, through the Ball State program, a process for expedited review and approval by our state certifying authority, of engineering change orders. And it's not as efficient as it could be, it's dependent upon other factors such as the scheduling of meetings, but to say that, yes, we recognize, as a policy matter, that ECOs should deserve expedited consideration as part of the overall certification process.

DR. KING:

Okay, thank you. Juan, any insights as to whether these changes might impact those two factors?

DR. GILBERT:

Well, I agree, I think it's worth exploring. I will be a little skeptical from the human factor side. I do think the DOC, I predict, some of my colleagues will not like that. I think it goes back to what you were saying, "We took their word for it." So, there is a group of colleagues, Merle, you shared these people with me, that are from the academy, they do security research, who probably won't like that idea. And I don't know what the implications will be from that group, but I could see a great deal of pushback, and taking the word as the way they would see it.

I also like to think about the question of a contest that is close, and someone contesting, and then there's this person, some computer scientist somewhere, that says there's a vulnerability in the code, and we believe that exists. That whole scenario is, in my opinion, probable, but not favorable to this process. So, that's something I think you want to get ahead of, is that criticism that will come forth from those security experts and computer scientists who have caused, in the past, issues and concerns about these, you know, the validity and accuracy of elections.

And I just know it's going to come. I can see it coming. So, I would try to get ahead of that.

DR. KING:

Okay. Let me pick up Brian, then Mark, then McDermott, on that.

MR. HANCOCK:

Yeah, let me sort of talk about Juan's comment there. And I agree with you that there is going to be a certain percentage of the community out there that's going to see this as a negative. But truly, you know, working with a lot of academics, and participating in some of their conferences, like USENIX, and some of those things over the last several years, and getting to know these folks, the vast majority of them understand that the current source code review process isn't any guarantee of security of the system. They understand the limitations of the current process and I think would be for what we're doing, you know, assuming we also move to another standard and bring some other areas of testing around and make them more robust. You're never -- I think we all know, at this table, that you're never going to get a hundred percent buy-in by everybody. And I'm not sure that's even a reasonable goal. But I think those folks that really understand the process, understand voting systems and understand the technology, would also understand the benefits of what we're trying to do here.

DR. GILBERT:

Yeah, let me make it clear that I wasn't speaking for myself. I was expressing a perspective that I know exists.

MR. HANCOCK:

Yeah.

DR. GILBERT:

And so, it's not my opinion at all.

MR. HANCOCK:

Yeah.

DR. GILBERT:

I'm in favor of moving this forward, and I think it's a good thing, but I just think you should be ahead of that and expect that and have -- be prepared for that to come. That's all.

MR. HANCOCK:

Absolutely, absolutely.

DR. KING:

All right, thank you, Mark, and then McDermott.

MR. SKALL:

Yeah, I want to sort of tack on to what Brian said, but make it much stronger. If you actually read the software section it is -- those coding standards really have nothing whatsoever to do with security. And having the manufacturer test that section would not obviate the need for the labs to look at the source code for security glitches. In fact, I would say that -- and that comes under really the security section. I would say that this would free up more time for the labs to actually do more of that, than less of that. So, I know that's not your complaint, but that's the answer to the community. We're not looking in that section for security glitches. We're looking, like Steve said, for the coding things, you know, readability, and variable names and commenting lines. But under the security section, the labs can spend more time actually trying to find security flaws in the source code.

DR. KING:

McDermott.

MR. COUTTS:

And again, the security of the voting system is not entirely based in the technology. In fact not -- a lot of it is in the auditability of the systems. And that's where you really focus in on things like the common data format program putting together a common log file, so that you can have multiple entities going through and making sure that the audit of the election is correct, because that's where you're going to find out if there was a problem. And as you stated earlier, there hasn't been an incidence yet of a hacked election.

DR. GILBERT:

Yeah, and I'd like to comment on that. I agree with you, I think that is the key. And, again, my whole motivation was just to have you all preparing for that and be able to state it. But I actually -- McDermott, I like that comment. I think that is very important. Even if there are flaws, not saying there have been, we haven't see any, but if there are flaws, and you have the ability to audit appropriately, or count the election appropriately, I think that does help in a lot of the potential criticisms, so, good point.

DR. KING:

Okay, the next question I have for the panel has to do with the potential scope of this program. And anytime you unfreeze a process, there is some churning, there is some change before it can be refrozen and re-institutionalized. And Juan's comment made me think about the dependencies that we have in elections of so many systems beyond the voting system. And right now, although a specific company may be restricted in its market to vote capture and vote tabulation, the trend really is towards integration of both, from a technological point of view, where

we're seeing ballot marking systems integrated with the voting system, Election Night reporting system, ballot on demand. And there's clearly this consolidation of technologies.

So, the question that I have is, probably, initially a program like this would focus on these three components; TDP, the source code change, and hardware, and it would all be mapped back to the VVSG. But, as that culture begins to settle in where the manufacturers become comfortable with the notion of formally attesting to the correctness of systems, in a way that is easily observable, easily measurable, is there the possibility that this practice would then begin to enlarge into other areas within that organization, and other systems within that organization, and become a part of the culture? And would that be beneficial to the election community? And what are the potential complications of -- and normally, the term scope creep is a negative term in systems, but in this case, there could be some benefits from the scope creep of this notion of conformance -- attesting to conformance and compliance.

So, let me throw that question out about where could this thing go, and what are the potential positive and negative consequences of that? Steve, I'll start with you.

MR. PEARSON:

The way that we look at systems, and the obligation that we have to our customers, is to provide a solution. And it's more than just the voting system, but it's the entire process. With or without the EAC program, or a state certification approval, we're still held accountable, at the end of the day. And it always comes back on us. So, these practices of moving forward and us taking accountability for, not only the voting system, but

the entire voting solution would not be foreign to us, because that is what we do. So -- and we accept that responsibility.

DR. KING:

Um-hum.

MR. PEARSON:

So, I don't see it changing. We would like to -- we're a little concerned that the evolution of the standards are not going to be able to keep up with, you know, the voting process. So, I would think that that would probably give some latitude there to help the industry get to where it needs to sooner without the constraints of, you know, standards that aren't being, you know, moved forward.

DR. KING:

Okay.

MR. COUTTS:

I think that -- I think you'd actually find a larger group of people coming into the voting industry simply because this is what they would expect. This is -- this would be more normal for them than to -- than what we're going through now. I can't tell you the number of times I've talked to colleagues who are not in the voting industry, but in the software industry, and they said you have to do what? So, in that respect, I think that we'll find a lot more variability, a lot -- well, not variability, but a lot more companies coming into the industry.

Again, coming into some of these points of transition like we've talked about with the ballot on demand, poll books, things that are currently outside the EAC realm, but they're going to start coming in. And at that point, hopefully, they can be able to be brought into the same level

of accountability. So, I think that we've got a huge benefit here, if we can do this correctly.

DR. KING:

I know McDermott, that there's been some criticism of the VVSG process as creating barriers to entry, and that's one of the explanations why we've had so few new players come into it. So, you see the potential here that it could help lower, at least, some of the barriers to entry into the market?

MR. COUTTS:

I think it definitely would.

DR. KING:

Okay.

MR. COUTTS:

I think when the HAVA was first passed and you got to the IACREOT conferences and the number of people who were trying to break into this industry was legion. There were hundreds of vendors displaying there, and now ten years later we're back to the same base companies more or less. Plus one.

DR. KING:

Exception duly noted.

[Laughter]

DR. KING:

Brad.

MR. KING:

I'd like to follow-up, first, before addressing your scenario, with a dystopian future, but it's based on an observation that Steve made. And that is, I think there's a great deal of concern among the state and local election administrators that we're not going to see, because of the EAC

Commissioner issue, and what flows from that, significant progress with regard to updating standards. And so, I think that's just a fundamental truth that many of us wrestle with.

But, I'd like to turn back to your scenario where we may have some unexpected benefits in pursuing this process, and some unexpected disadvantages, perhaps. I agree with McDermott. This can set appropriate levels of expectations for vendors who are both contemplating going into the voting system business and others who are in it, but perhaps not devoting the resources that they should to some areas that we're addressing here. In particular, I'd like to mention with regard to mission creep, if you will, that Indiana has enacted, this year, the first statutory standards for electronic poll book certification, and set up a parallel certification process for those e-poll books, in the same manner as our voting system certification. So, there is an example of where we're following up in related areas at the state level. And I would expect other states and other localities to take that approach in similar situations.

DR. KING:

I would say, based on my phone calls, that many states are going in that direction.

Brad brings up an important point and that is, the movement towards testing and certifying election systems outside of conventional voting systems is going forward, and one of the great advantages that states have on the certification of voting systems is their ability to leverage the work of the EAC. So, whether the jurisdiction requires a federally certified system or not, they're all benefiting, they're all leveraging from that. The difference is when you begin looking into things like electronic poll books, or ballot on demand systems, where that body of work doesn't

preexist, and we can learn something from the procedures. But what I see as a marked advantage is if the same quality of internal testing programs and documentation of the testing programs that the vendors provided in support of this statement of conformance for their voting system that that same standard was then applied to other products, then states would have access to those documents, and the symmetry of that testing would give us more confidence as jurisdictions, and it would also, I think, be more legally defensible, in terms of the rigor that we're bringing to that testing process. So, I clearly see that this would grow and it would be beneficial to states and local jurisdictions, particularly for systems that we can't even yet imagine, that eventually will be harnessed into elections.

DR. GILBERT:

Yeah, and that's a question I wanted to kind of pose, I guess, towards Brian about this concept. Is it nimble? How do you see this as being nimble? In other words, I think there is a potential tipping point in election technology, and we've seen this in other areas, where there comes a point where it's easier to create the technology for elections, that that does exist, but if the certification process is not catching up with the innovation, then, you know, you don't have more people entering, and you may have more people leaving. So, that's a question that I would ask is, is it nimble, and if it is nimble, how do you see it being able to handle that? So, in VVSG, there was this area of the innovation class. That was set aside to be nimble and allow these innovative things to go that route. How does that fit in this paradigm?

MR. HANCOCK:

I'm not necessarily sure there's a direct correlation there, you know. We have the extension clause in the current VVSG that does allow innovative

systems to be put in, you know. That clause moves forward into the next iterations of the VVSG, regardless of what technology those might already contemplate in their requirements. So, I'm not sure there's a direct effect, you know. The nimbleness of this process, and perhaps extending it to other areas, would depend on a lot of things. It would depend on the success, obviously, of this initial rollout of things we've been talking about today, you know. And of course, going back to the big depends is on you know the quorum of Commissioners, here at the EAC.

DR. GILBERT:

Right.

MR. HANCOCK:

...to get all of those processes moving forward.

DR. GILBERT:

Let me give an explicit example that we've been wrestling with in discussions. So, currently in voting systems, I can select two candidates for a contest, two out of ten or whatever. If I want to change the selection, I have to deselect. Now, this came up earlier, deselect, then select, which makes sense in some context. But, on a universally designed machine where everyone is voting on the same machine, if you have an audio prompt for a person that's visually impaired, who's voting, you know, using sound, to do that deselection extensively lengthens the amount of time to vote, because I have to go back somehow to the one I want to deselect, and then go to the one. So imagine, I'm on candidate one, I want to deselect candidate one, and I want to select candidate five, where what we've been doing, and we've seen this more usable, is allowing them to select candidate five, which automatically deselects candidate one. So, there could be research that could show this is a more effective, more

usable approach. But if there's a standard, and we had election officials tell us, you can't do it this way, it has to be the deselect, you see, that's an example of what I'm saying that something that could be beneficial and be proven through research, that could be stopped. And it's necessarily being stopped, but right now, there is pushback because of the perceived standard.

MR. HANCOCK:

Yeah, and I mean frankly, I think that's a topic for another roundtable, you know, because it's really not related directly to what we're talking about today. But I agree with you that it's a problem, and what you're talking about is more the nimbleness of the TGDC process, that was envisioned by the Help America Vote Act, which we've had to go through in developing standards. And, you know, Mark can tell you that, in every scenario, standards development takes a long time, you know. I think IEEE 1622 group is finding that out right now, you know. And so, you know, maybe, you know, at the point where we get new Commissioners and a reconstituted TGC, that's something we talk about as perhaps how to make that process as nimble as possible to get, you know, changes in the standards, or corrections to the standards documenting in place much more quickly than we can under the current process.

DR. KING:

Okay, Steve.

MR. PEARSON:

Yeah, I'd like to make another comment on this. I can tell you that this program has made ES&S better. And I can tell you our voting systems are better today than they've ever been. And that would not have happened, I don't believe, if it wasn't for this program. And we fully have

embraced this program, all along, you know. And it hasn't been easy, I mean, but we see the value and the merit in this program. And so, lowering the bar to open the door for entry, I don't think that's the right direction to go. It is what it is. We need to run safe, secure and accurate elections at the end of the day, that are auditable. So, I mean, that -- it is what it is. To get into this industry, it is a tough one to get into. But the bar is high, and I don't think it serves anyone well, any of our voters and our counties and states, well, to lower that bar. That would be...

DR. KING:

Um-hum.

MR. PEARSON:

...my concern.

DR. KING:

Okay. Brad.

MR. KING:

I would just take a moment to echo Steve's thoughts on this, and that is, it is remarkable to think back to the implementation of the Help America Vote Act in 2002, and to remember how many potential individuals and companies were interested in getting into the voting system market, how many of them stayed, but how many also left. In one case, a Wisconsin firm went out of business and left three Indiana counties without any technical support to conduct the elections using their voting systems. So, there is a real potential problem that we're avoiding by having the standard set for vendors to get into the elections community and provide voting systems.

We've seen a little bit of the same thing with the certification of electronic poll books coming up. I think I've probably made 12 new best

friends, or people who would like to be best friends, from folks who are interested in getting into the e-poll book market, who are not voting system vendors. And so, I think it is certainly a very real phenomenon.

DR. KING:

Yeah, I think anybody with a laptop and Excel thinks they can get into the e-poll book business.

MR. KING:

Yes, yes, that is true.

[Laughter]

DR. KING:

You know one of the -- I'd like to say that this phone is just a prop that I carry, but in fact, this is my cell phone. And it -- what makes it unique is that it won the design award for technology innovation in 2006, which, not coincidentally, is when we capped the state-of-the-art of voting system design with the VVSG. And so, I like to remind people when they ask why is it important that we get Commissioners seated, is that, we are -- we're building these to a standard that was established in 2006, and there's such a latent demand for innovation out there, whether it's the things that Juan is doing, or the things that you guys have on the drawing board, the things that you and I need in our jurisdiction that...

MR. HANCOCK:

You don't need that, is that what you're telling us, that's not what you need?

DR. KING:

No I need this, but I need it for various reasons, not the least of which is the prop.

All right, so I want to ask a question, now, of Brian. But I think I'll be interested in how the vendors see it and how the testing labs. When I first read this proposal and I thought I know a little bit about these companies, I can kind of envision how they would be working it, internally, how we would see, you know, the manifestation of their testing programs in these reports. Then I got to thinking, it might be more cost efficient for the vendors, the manufacturers, to use third party testing and outsource that testing, pull it back in, as their own internal reports. So, that's one of the questions I have, Brian, is, are there any perceived problems with -- let me restate that. Are there any assumptions that we're making that we should be exploring about how this might actually be implemented, and is there still a role for third party testing, even within this manufacturer's statement of conformance?

MR. HANCOCK:

Sure, yeah, I mean, absolutely. And I think I touched on it, you know. Hardware, I don't think any of the manufacturers have the ability to do that hardware testing in-house. It's just too specific machine intensive, you know. I don't think any of you guys have a shake table or an environmental chamber anywhere in your facilities. You might, some of them might. But, the point being that, yeah, obviously, that type of testing is currently, and I think Steve brought it up, you know, in your sort of pre-certification testing, you already do that with third party labs.

MR. PEARSON:

Right.

MR. HANCOCK:

I'm sure McDermott does, as well, you know, and that would just move forward in this program. I guess, if they wanted to, they could have an

outside party come in and look at their source code, certainly use the automated tools that NIST is developing to do that, as well. But under the ISO 17050 document those -- you know, that third party testing is contemplated, so it would be allowable.

DR. KING:

Okay. Juan?.

DR. GILBERT:

And that's where I think there's an opportunity, particularly, in the usability and accessibility area, is through the third party. And so, we're actually exploring some of that, now, with some of the vendors, to look at doing some of that. And I think that can be expedited at an affordable cost in using research. We've seen examples where states have worked with institutions, Indiana and Georgia. So, there's no reason why institutions of higher learning couldn't work with vendors in this capacity, as well.

DR. KING:

Okay. One of the things that election officials talk about a lot, recently, is what is the life of a voting system which we now conclude should be life plus ten years, right, the life of the election official plus ten years.

[Laughter]

DR. KING:

And the duration of the testing program should be instantaneous. Those are our two requirements. Neither are realistic. But a question that, I think, really is tangible to election officials which is, what is a reasonable time expectation for an end-to-end test of a system? And perhaps we can use that system that Brian used in his example, of a central count, precinct count, some accessibility device, et cetera, and -- because I think, to get the buy-in and the endorsement from the election community, we need to

understand what their expectations are. And I think Brian, you had, what, 35 months as the duration of a program which...

MR. HANCOCK:

For a full system.

DR. KING:

For a full system.

MR. HANCOCK:

35 weeks.

DR. KING:

35 weeks. What did I say?

MR. HANCOCK:

Months.

DR. KING:

35 months? I'm sorry, 35 weeks. So, let me start by asking Traci and Mark, because you're dealing with clients who are asking questions continuously, is it out, is it ready, what do you think is a reasonable time expectation for the end-to-end testing of a system? And then, a kind of before and after with these changes, and particularly, given some of the concerns that you've expressed which is you would have to be replacing the learning of the system that occurs by the TDP review with some other process to ensure that your staff was ready and prepared to do the testing.

MS. MAPPS:

You know, we just recently contracted with another vendor to do EAC certification testing, and we went through and developed a Statement of Work and provided an estimate to them on how long we thought that the testing would take. We gave an estimate of six months. That was based

on a number of assumptions. Assumptions, like, when they provided the system to us that there would be a certain number of discrepancies that were found during documentation review, a certain number of discrepancies that we would stay under for source code review, et cetera, that the system was basically production ready. We, also, in those assumptions, said that an automated test tool, which was something that the vendor had suggested, would be used for source code review on their end, that we would be able to review, as well.

You know, I think that – well, and some of the other things, even with the documentation review, you know, there are certain requirements in the VVSG that their documentation needs to meet. And a lot of times we go through the documentation and it's very difficult for us to find where those requirements are met in the documentation. So, one of the assumptions was that, you know, they would identify clearly and exactly where all of those requirements were met in the documentation. We gave them a vendor packet up front, you know, noting all of the things that they can do to help make the process smoother and more efficient and faster. And so, I mean, we truly feel that with the certification process the way that it is now, that if you put some of those responsibilities back on the vendor, and they meet those, we could meet a certification test effort in six months.

You know, if you were to eliminate some of these things, like source code review, and maybe it's not all source code review, you know. You had pointed out, Mark, that maybe there would be still some source code review that was done from a security standpoint. You know, we had said that, you know, when I was talking about coming up to speed on the documentation, we did that in parallel with our doc review. And so, it's not

like the doc review was a long pole, it was that we did it at the same time. So I'm not sure how much time could be decreased by doing that, because we would still need to come up to speed. We would still use the documentation to develop our modules and to validate those modules.

So, to come up with a timeframe for how long it would be, based on these changes, I'm not sure. I mean, it's kind of hard to say. I'd need to go back and do a little bit more research on my own. But, you know, I think, putting a lot of this back -- putting the responsibility back on the vendor is important. I mean, it saves you guys cost. I think that we've talked about that, you know, that it saves them cost, the more they do upfront. So, you know, by them doing an attestation, it's going to save a significant amount of time.

DR. KING:

You mentioned something that intrigues me, that you provide to the vendor additional checklists, if you will, where they need to help map their documentation to the requirements. And that seems to argue that perhaps in addition to the three items that's been proposed here, of increasing the vendor's role in the precertification process, that there may be other things that by looking closely at the VSTL work, that can be, and I don't want to use the word pushed back...

MS. MAPPS:

Um-hum.

DR. KING:

...but can be shared, the burden can be shared by the vendor to better prepare for the testing process. So again, there could be some synergies here by looking at the items that Brian has proposed, looking at best

practice in the lab, there may be other opportunities where we can accelerate the process and decrease the cost.

Mark, what's your insights into the time factor?

MR. SKALL:

There are many, many factors that, obviously, influence the time of a test campaign. Interpretation of requirements is a big one. Not everyone can read a requirement and be able to discern exactly how to test it. A manufacturer might interpret the requirement differently than a test lab. So, you know, one of the things we're working on, I've talked about this before, is to develop a common test suite. That would speed up testing dramatically. In lieu of a common test suite, at least, common test assertions that we're working on, where everyone would have a testable test assertion or many test assertions for each requirement. If we had that, that would certainly speed up the testing process.

Many systems come in that have stayed there a few years, to tell you the truth, in testing. And we have criteria we've put into a document, which is waiting approval for Commissioners again, what we call fail criteria, things that would eliminate a system that's been in testing too long, or has a certain amount of bugs at a certain level. That would all speed it up. So, these things that Brian has proposed will certainly help, but there are other things that are certainly just going to contribute to the same cycle.

I would say, under no condition should a test campaign be more than a year. I mean, that's sort of where I draw the line. And I think we could, perhaps, get close to six months, if all the requirements are clear, because I think that's going to be an issue. Sometimes that takes week when something comes up. We have to issue an RFI and that just stops

everything. But I think if we don't take into account, if a voting system has been withdrawn from testing, just look at the actual weeks, somewhere between six months and a year, I think we should be able to do, and I think with this -- with the proposed process we should get closer to that.

DR. KING:

You know, I think following onto Traci's comment that there may be multiple things, that once this process is unfrozen that can be looked at.

You mentioned common test assertions. Can you give some examples of what those might be and how those would accelerate the process?

MR. SKALL:

Yeah, I mean, I think the example I gave at the NIST symposium was one of the source code assertions, which basically said something like variable names should mnemonically named. I think that's a requirement. Is that about right? And, you know, so the test assertion went down to another level, and basically said, one should be able to infer the functionality from the name, and there were a whole bunch of other requirements that you actually could test for, because that's something that can be interpreted differently by different people. So, it's not necessarily that requirements need to be ambiguous. Some are, but most of them are not. But sometimes requirements are vague. They're at a general level, and the test assertion. So, if you look at a general level you have to break it down one level further to actually write tests, and test assertions would break it down to that level, and if every test that have had those assertions and every manufacturer had those assertions, you know. The big thing is the manufacturers need to understand the requirements the same way the test lab does or else...

DR. KING:

Um-hum.

MR. SKALL:

...you're going to have anomalies, you're going to have corrections, you're going to have processes back to the EAC to refine them. So, if we get down to the level where you could write a specific test case from a statement, that's what the test assertions do, we're all much better off.

DR. KING:

You mentioned, of course, the labs and the VSTLs -- I'm sorry the VSTLs and the vendors need to be on the same page. Is that true, also, of the technical data reviewers, the group that you represent and the state certification testers?

MR. SKALL:

Yeah, I mean, I think of the technical reviewers, in a way, as sort of an extension of the test labs, because we review what the test labs do. We look at the test plans. We look at the test reports. So certainly, certainly if we view a requirement differently than the test labs and differently than the manufacturers there is a problem. So, that's why the states...

DR. KING:

State certification.

MR. SKALL:

Yeah, yeah.

DR. KING:

Well, you know, I think, as we're looking at the downstream implications of a change in a program like this, hindsight being what it is, I think, for those of us who do state certification testing, we did not quickly, fully understand

the scope and the implications of the VVSG and the federal testing program. And it seems prudent, if we make changes this time around, that that information is made available at the state certification level concurrently with changes at the federal level, so that we can be kind of synchronized in moving forward with that process.

Brad, as a state election official, what are your thoughts on the time to test? This is end-to-end testing on a new system.

MR. KING:

Thanks Merle, you've given me an excellent segue to a comment I wanted to make, not so much on the number of days, which...

DR. KING:

Um-hum.

MR. KING:

...I think experience will bear out whether they're realistic and attainable goals, but more on the point in the cycle when the testing is occurring and the certification is completed. I was negotiating in a contract with a vendor last year on matters unrelated to voting systems, and the vendor proposed to provide services within "X" number of days. And my response was, well, that would ordinarily be a reasonable number of days, but this is a Presidential election year and not every day is equal. And I think we have the same phenomenon with voting systems, in that, the state and local jurisdictions who are going to be the ultimate purchasers of these items have to go through a fairly lengthy process themselves, whether that's the approval of their budgets to have funds to buy equipment, the procurement process to select a vendor, and then last, but certainly not least, the requirement to educate both voters and poll workers about how a new system works. And so, all of this has to be built into the decision

making process. Now, of course, that will vary from jurisdiction to jurisdiction, but I think it's safe to say that we all know that the next Presidential election will be in November 2016. And so, I think it would be interesting, from a statistical point of view, in addition to the good work that the EAC staff has done in analyzing past test campaigns, is to look at the frequency and location of when applications were submitted in the cycle, and say, when should we expect a bump if past experience is a reliable guide, in the applications coming in for either full system certification, or modification, and to perhaps set some realistic expectations, not that they can be ironclad, of course, but to say, "Vendors, if you expect to have a system useable in November 2016, working back, here is a realistic goal for you to have to get it to the EAC."

DR. KING:

Um-hum, okay, thank you. Brian.

MR. HANCOCK:

Yeah, just a little comment on that, I think Brad, it's a little bit of chicken and the egg, because what we see, in my experience, generally, is manufacturers bring something in, and they're telling us, well, you know we have a pending sale in state A, B, C or D, and so, that's when it comes into us, when one of your jurisdictions is ready to buy. And so, you know the pendency -- it's a very circular type industry that we're in right here.

MR. KING:

If I could just say quickly, yeah, Brian is certainly correct to say that, with all respect to present company, that vendors are a lot more interested in the progress of their application when there's a pending sale, for obvious reasons. But, again, I think that's where we need to be certain we're

looking beyond the table here and remembering that out in the final destination of these products, those time factors have to be built in.

MR. HANCOCK:

And one other thing, and I've brought this up before in certain areas, I mean, some of the changes that you all require in your state are mandated by, you know, legislation, or Courts, or a number of other things. And there's nothing any of us can do about that. We have to go ahead and move forward with that. However, a large number of the changes that we see are changes, you know, a jurisdiction wanting their reports to look this way and look that way, you know. And while that's all well and good, I think local jurisdictions need to be aware that that affects everyone. That affects everyone, because these folks have to make those changes, and it affects their process both at the state level, and not only in the state that's requiring those little nuance changes, but in other states, as well, you know. And I think that's something that's not understood or appreciated perhaps as much as it could be.

DR. KING:

I agree.

MR. KING:

If I could just say, I agree entirely, I think everyone involved in the process, and certainly on the election administrator level, as well, has to engage in expectation management, to make certain that what may seem like a very simple modification in how a voting system works has a cascade effect that we don't always see or appreciate.

MR. HANCOCK:

Absolutely.

DR. KING:

All right, Steve.

MR. PEARSON:

I'd love to comment on that. I do want to touch, first, on Brad's comment regarding timing. And we are very sensitive to it and we do push hard. I mean, we push -- we're all pushed hard, internally, to get things done by a certain timeframe, you know, because we -- in order to stay in business we need to make money. And so, we are market driven, and so, there are pressures to try and get through the certification program at the federal level, and get it state certified and delivered to our customers. But we would never do that at the risk of any of our customers. I mean, they're partners to us, so we would never put that in front of running a successful election, or jeopardizing one of our partners, you know, and our customers too. So we're very sensitive to that. I mean we're so close to our customers that, you know, we're part of them. So -- and we share in that. We share in that risk, you know, with them.

So, a couple other factors on the time to test, I'm real encouraged now about the throughput and I think it's going to get better. One of the things that we've decided we need to do is come more often; smaller releases and more certifications. So, we can increase our throughput that way. One of the things I'm concerned about is VSTL bandwidth, their ability to handle multiple vendors and multiple projects from multiple vendors. Today, not really any of the vendors are really staffed to be able to do that very well. It's difficult for them. Also -- then, we also experience -- it's the experience level in the lab, and when you have multiple vendors and multiple systems with -- they share the resources, it's hard to retain people with familiarity with systems. So, that's going to impact, you know, throughput too. If you got new people they got to get trained.

They don't know anything about your system and how it works. We've seen that have a negative impact on us as well.

And also, at the EAC, we think it's really important that you retain the team that you have, retain the technical reviewers that have been involved for a long time, because there's been a lot of ground covered, and a lot of decisions made, and good practices that are in place that would go away. So, we're all fearful of that. We don't -- none of us want that to happen.

But lastly, I'll make a point, and I really encourage the fact, that in discussions with Brian and the labs, you know, we have found an instance where there was possibly an opportunity to get a system, an upgrade done in one to two months, where it's a very minor fix that we could get in, so whereas in the past, we don't think that that would have been possible. So, it's encouraging that, you know, small scale changes we can get through quickly. If we're ready, we go in, we nail it, and hopefully, we can get through those -- some of those in 30 days or 45 days, you know. But on the outside, you know, I'm fully confident. We just came through a test campaign where we introduced a brand new EMS and two new tabulators, and actual time testing was just over nine months. And that's just all attributed to our readiness, and also, the commitment of the EAC and the technical reviewers, because what we've seen is improvement on the frontend for test plan approval, and on the backend for test report approval. Typically, those were two to three month timeframes...

DR. KING:

Um-hum.

MR. PEARSON:

...on the frontend and backend, and those are killers, you know, potentially, to a timely certification. So, we appreciate the effort that they've made and stepped up to help us get through that process quicker.

DR. KING:

Okay.

MR. PEARSON:

So...

DR. KING:

Let me -- I want to ask the question of the three legs of the stool here; the VSTL, the EAC, and the technical data reviewer. I think Steve makes an excellent point, which is, if, as a community, we ask the vendors to take this on, take on this additional responsibility of documenting and sharing internal test documents through a conformity statement, what is the capacity planning capability of the technical data reviewer, of the labs, of the EAC, to do something like Steve has proposed, which is, in order to be more responsive to the jurisdictions who are asking for these incremental changes in time for the election, rather than queuing up large, comprehensive changes, going through with smaller batches, more customized batches, the ability of the infrastructure to expand capacity to absorb that, because unless we can actually get those systems through, it's not that relevant that we're changing the process underneath.

So, I'll start with Brian, and then go to Traci, and then Mark, kind of talk about how you could expand capacity, how you do capacity planning, and how you coordinate with the vendors to get that information of what's in the queue.

MR. HANCOCK:

Sure, well I think, you know, it's dependent upon everyone. And I think Steve touched on it, and we've sort of touched on it, that the capacity of the VSTLs is really critical, you know. Right now, we have two EAC accredited VSTLs. We have one VSTL that's sort of been accredited by NIST and the EAC, that's, again, waiting for Commissioners to get their official accreditation. I think three is a pretty good number of VSTLs. I think we all know this industry isn't big enough, and it's not ever going to support probably six or ten VSTLs. But, you know, a situation where there's only two, as we have now, I think were working well. But if something happens to one of those VSTLs, then you're in a situation where you have a monopoly, right, and I don't think anybody, except perhaps whatever VSTL that might be, would really want that.

[Laughter]

MR. HANCOCK:

And so, I think three is a good number to shoot for. As far as capacity is concerned, I think, initially one of the reasons for the lack of throughput was because we were seeing brand new voting systems from every single manufacturer that was coming in, right? Now, we're seeing more modifications and we're getting those out quicker. And, I agree with Steve, smaller campaigns will make it easier for everybody, you know. When we have a big campaign, it's resource heavy for the reviewers and for all of us. You know, modifications, we can move staff around and, you know, get a little more throughput that way. And so, I think it's really important, you know. Modifications, you've seen, we can get through fairly quickly, you know, depending on the extent of the modification.

DR. KING:

Okay, good, Traci.

MS. MAPPS:

You know, the first thing I want to point out, as far as expertise goes, in our lab, I'm probably the person with the least tenure. And I've been there for five years. All of our core individuals have been there for five years plus, so they've all got a good deal of experience on all of the manufacturers' systems. We don't have a single core team player in the VSTL that's been there for less than five years. So, I think they've got pretty good experience.

As far as capacity to take on additional work, we would love more work, to be honest with you. You know, we have actually set up -- when you introduced me, Merle, you had mentioned that I also run our EHR, electronic health record certification program, that is also a 17025 accredited lab. Part of the reason why we brought that on and we wanted to start that work, was so that we could leverage -- in the 17025, for the EHR certification, we could leverage what we did in voting, and use some of the resources that we have in voting, we could use them in another area, because we didn't have the work coming in at the time, and we wanted to keep those resources on staff, so that we could, you know, be ready for any of the voting work that came on. So, now we leverage many of our resources from the voting side with this EHR certification testing that we do, which has helped us, so that we can -- you know, so that we have the capacity to bring on extra work.

We also have, through our HR department and through recruiters, we've got a bench of employees or, I should say, people that we bring on in a temporary staff to do source code review, to do document review, who has gone through -- they have all gone through all of our training. We've got training records for all of those individuals. But we have searched for

people who are not interested in full-time work, because the overhead of keeping employees on full-time is very difficult to do when we don't have ongoing voting work. Voting is kind of like this for us. And so, we've got a bench of people that we're able to bring on to handle any extra work that we have and to handle that capacity.

DR. KING:

Okay, I do know that all the VSTLs voting systems are not their single line of work, and that, as companies, they have to be able to sustain revenue. And I often think that the election community isn't fully aware of that, and doesn't really understand the episodic nature of voting system testing.

Mark, your insights into the capacity/ability of the technical data reviewers.

MR. SKALL:

Yeah, the reviewers, as we've been together, and the same ones, or a subset of the same ones have been together for three, four, five years, we have developed really a database of knowledge and expertise and, I mentioned before, requirements. So, you know, three, four, five years ago problematic requirements came up, and we would all decide this is the way we're going to do them. And the next time, those are not an issue because we had already decided. Likewise, we review test plans, test reports, and we've worked, you know, with Wyle, more than SLI, but I'm sure the same thing would happen with SLI. So, with Wyle, we've had many, many iterations of test plans and each time we'll make comments, they'll incorporate those comments. So, the template changes and the second time and third time, there are less and less problems, because these things have been incorporated. So, I agree with Steve that the

stability of the review is very important. If someone replaced us, not because we're so smart, not necessarily because we're so smart...

[Laughter]

MR. SKALL:

...it would be a huge problem starting from scratch, without having this database. And I feel pretty comfortable now that we can handle an increased workload, because of the fact that it's -- there are less and less of the same things we've did in the past will come up again. So, I feel pretty good about that.

DR. KING:

Okay, well, I want to now kind of put back on the big hat, or ask you all to put back on the big hat, which is, we've talked for some time now about a specific recommendation, which is adding a manufacturers' statement of conformance to the VVSG certification process, as a way of reducing time and reducing cost, and possibly some additional benefits that we've identified. But, as we mentioned earlier, if you're going to change a process, if you're going to unfreeze a process, the overhead is the same, whether you make one change or two changes. And so, related to this proposed change of manufacturers' statement of conformance, are there other recommendations that the EAC should look at, related to this change, related to the process? I know, Juan, you had already identified the importance of looking at shifting the resources to accessibility and universal design criteria, if possible. But, let me throw that out as a topic, and this is an opportunity to think a little bit larger than this specific topic, but related to this topic.

Traci.

MS. MAPPS:

You know, we've done international certification, and one of the things that we did -- because the international organization that we worked with didn't have requirements of their own, and so, one of the things that we did do is look at the VVSG requirements and we looked at where the highest risks were. We looked at what was the most important thing to cover in the testing, and we took a subset of the VVSG and added -- and used that along with some very specific requirements that they wanted us to test, as well.

You know, I don't know if there's already been research done, Brian, but, you know, I guess, my question would be, have we looked at, not just how much time it's taking to do, you know -- what are the areas that take the most time, but what are the areas where we find the most problems? You know, where are the highest number of discrepancies being reported by the labs? What are the areas that we should really be focusing on? And maybe, maybe, it's a subset of the requirements that we come up with, instead of looking at it as source code review takes, I don't remember what the number was, 40 percent of the time, you know, of the whole certification process, instead of looking at the time that one area takes, maybe looking at where are the real problem areas and focusing on those, instead, and coming up with a subset of requirements.

You know, when we did this for this international organization, we were able to get through certification testing for them in four months. And that included a logical analysis of the source code, rather than going through and looking at all of the formatting, all of the commenting but, you know, really looking at, you know, the requirements that deal with co-complexity, and how different types of logic get implemented, you know.

Those were some of the areas that we hit on, so, just throwing that out, that that might be something that we look, as well.

DR. KING:

Brian, any thoughts?

MR. HANCOCK:

Yeah, we kind of did that in reverse, right? So, what we're looking at here are areas that we knew, or -- knew from experience, weren't giving us the bang for the buck. I mean, discrepancies aren't always the key, right, because there's always a lot of source code discrepancies. But, are those really important discrepancies? We've pretty much determined, and we've talked this one to death, that the majority of them aren't really, really important to the security, accuracy, and reliability of the voting system. You know, hardware testing discrepancies are going to be found, you know, whether it's a third party lab, or one of our VSTLs. Those are pretty basic. I mean, they either, you know, meet the chamber requirements or they don't, you know. And we've sort of talked about TDP, as well. But, certainly, you know, if we want to include other things in this area, or, you know, perhaps streamline the process, additionally, then maybe, you know, looking at areas where, you know, we do see some discrepancies would be a good idea.

I think the other thing that we haven't really talked about that's implicit in this discussion, though, and is a big change from where we've all been before, you know, starting with the Standards Board, TGDC, and everybody else, is that we've looked at the VVSG before, sort of, as a holistic document, and the fact that each and every one of those requirements were just as important as another requirement. And, in fact, what we're saying, right now, is they're not. Those requirements are not.

They're all important, but they don't have an equal importance. And I think it's really a seed change in the way we're looking at things, but I think it's probably a more realistic and a better way to look at things.

Mark, do you disagree with that?

MR. SKALL:

I think we've, maybe, made a determination that these sections are not as important, but I think you can easily make the argument that just because you impose these -- this testing on the manufacturers, and ask for a declaration of conformance, that doesn't necessarily mean they're any less important. They are being tested. They're being tested extensively. And that type of testing is under review. So, although, perhaps we've separately made that determination, at least, about source code review, I'm not sure about hardware testing, I don't think that that's a necessary conclusion that one has to draw.

DR. KING:

I'm going to attempt to restate Brian's point, but it's going to come back to you as a question. I think what we've discovered, as we've looked at the testing process, is that not every component manifests the same level of a risk. It's not that they're less important, but they have different levels of risk associated with them.

So, I'm intrigued by the campaign that you conducted for the international company, kind of a risk-limiting approach to testing the system. Was that something that you derived with them through interaction? Or is it something they brought to the table? And how could we learn from that process?

MS. MAPPS:

Well, we did that with them.

DR. KING:

Okay.

MS. MAPPS:

I think that we looked at -- you know, we sort of did an analysis of where we found the most discrepancies and where we found the high risk discrepancies. And we brought those requirements to the table, first, and said, of the VVSG, this is the subset of requirements that we think are important. So then, in addition to that, they looked at that and said, we agree with you, but there are these other areas that we would also like to include that weren't necessarily a part of the VVSG. The big thing for them was the logical analysis of the source code. They didn't want to take the time to do the commenting and the formatting and look at all of that, but look -- you know, doing a source code analysis, and looking at how the logic was implemented across the board, and kind of the flow, was what was more important to them, you know.

And I think that what we could learn is by looking at the problems that they had, or lack thereof, when they actually implemented the system for their election. And they've come back to us, now, for three separate certifications, and we've gone through the same thing with them.

DR. KING:

And they also leveraged the VVSG, in terms of some of the core structure? Or did they...

MS. MAPPS:

Um-hum.

DR. KING:

Okay.

MS. MAPPS:

Um-hum.

DR. KING:

Well, I think that's an excellent case that ought to be written and disseminated, because it illustrates, not only, you know, how the VVSG has become, not only a de facto standard here, whether you're an EAC jurisdiction, or not, you're going to get a system that's built to that, but perhaps even internationally. But then, what we can learn from other organizations that are coming in, and saying based on our experience, here are the risks that we want mitigated and the testing. So, I'd be very interested, and I think a lot of people would be interested in that.

MR. SKALL:

I was just going to say, doesn't it depend on the criterion that you presumably documented with the customer for how you define high risk? I mean, it depends on your perspective, right? Some people think of security, other people think of risk and usability, wrong answers on Election Day. So, it's very important to decide what it is you want to accomplish.

MS. MAPPS:

And that's a good point. I mean, in the country that we worked with, security was huge for them, and so, that was where they put most of the focus. And so, I think that's a good point, you know. It's all in the eye of the beholder, right?

MR. SKALL:

Right, right.

DR. KING:

Well, let's kind of move around the table, then. If you can, see if you can help identify additional recommendations for the EAC to consider as a part

of these related changes to the testing process within the VVSG. I'll go to Brad.

MR. KING:

Thanks Merle. This is an area that the National Association of State Election Directors, NASED, has looked at, and has had very good dialogue with EAC staff. And so, I'm borrowing from some of those previous discussions.

One particular area of concern that we might want to address, in terms of further changes, would be the threshold review of applications. Many times state and local election administrators will be told that the reason that the promised product has not gotten through to them -- or through the certification process, is because of problems identified but not responded to by the vendor, or new requirements or questions raised by the EAC. And I think having, as some have proposed, the idea of a clear, uniformly applied categorization of deficiencies, as part of the threshold review, would be very helpful from my perspective. I think it recognizes the truth that, yes, not every potential defect in an application is equal either; that indentation of caption headings may not be of the importance of some other things. And so, I think that would be an area for valuable consideration.

DR. KING:

Okay. And Brad, would you say that applies, not only to new systems and modifications to new systems, but ECOs, kind of across the board?

MR. KING:

I think my comments were directed toward, you know, full scale...

DR. KING:

Full scale.

MR. KING:

...system campaigns. I think there's a point where subjecting a relatively insignificant ECO to that type of analysis is not worth the cost. But, I think, presumptively, that's a good way to start.

DR. KING:

Okay, thank you. McDermott.

MR. COUTTS:

I realize that I'm going to be introducing complications with this, but I think it's been very clear that certain areas do not move at the same speed as the VVSG. We have certain areas that are fairly static. We have accuracy, auditability. Security, while its requirements is static, the things that we have to do, in order to keep a certain level of security, change. As we heard earlier today, accessibility and usability is changing at light speed compared to what we're doing here. And I think that certain things need to be a little bit unhooked from the VVSG. And I realize there's going to be some issues, again, talking about Mark and trying to put together assertions for something that could be changing a lot more often than the VVSG, but I think it has, to just making sure that we can keep up with technology. Technology moves fast. Security moves fast. Again, we were talking earlier about the lifespan of the voting system. Well, what is the lifespan of a laptop? It is much less than a voting system and we're trying to keep it that way. But, it gets harder and harder because that's what drives the market.

DR. KING:

Yeah, I think you make an excellent point, McDermott, which is, that within the portfolio of subsystems that we assemble to run elections, the volatility of change is not uniform across those platforms, and yet, our standard and

our testing methods are -- they're moving at one speed, and we have this churning within the system or within components, and getting that synchronized would produce better systems, faster for us. That's an excellent point. Don't know how to do that, but that's an excellent point.

[Laughter]

DR. KING:

Mark.

MR. SKALL:

I don't really have anything. I mean, I think if I thought there were other things we could do, I would have told Brian, and it would be in his presentation. So, I think we're good.

[Laughter]

DR. KING:

Well, as our generation used to say, Mark, you're either part of the problem or you're part of the solution, and I just gave you your choice.

Steve.

MR. PEARSON:

Okay, I got four items. Yeah, four things kind of came to mind. One is, continue to be open to design reviews, you know. Before we come into a test campaign, just having the opportunity to meet with the EAC technical reviewers and do a deep dive on a complex area of a voting system is beneficial, because what we have found sometimes we're entering into an area in the standard that hasn't been entered into before. And what is found is some ambiguity there and some interpretation. So, it's always best, you know, to not find out, you know, eight months into a test campaign, it's better to find out eight months before the test campaign

starts. So, you know, I would ask that you guys continue to be open to that with us.

I would also suggest more face-to-face meetings. I've just seen that when we work together, we're in a room, I think that we can work through issues in a much faster manner, in a more, I would say, cooperative manner. So, I think that there's real value in more face-to-face.

The third thing is, all parties remain committed and be accountable for their performance, meaning, we've got three entities here. We've got a manufacturer, a lab, and the EAC. And if any one of us has an issue with performance or quality, we have a responsibility to take care of that issue. So -- and to help with that is having a lot of open exchanges where we can talk straight, and so that we can voice our concerns, or I can hear your concerns, and we can take action. I think that's the best way to solve that, because a lot of times we'll just get at a standstill and we'll butt heads, and we've just to get through that. And a lot of times it's over personnel, or just something. Usually it's communications.

And the last thing is, just remain open to continuous improvement like this. This is fantastic. It's really encouraging. So, those are my four thoughts.

DR. KING:

Thank you. Juan.

DR. GILBERT:

Well, I'll just ditto McDermott. He said exactly what I was going to say. I have nothing to add, it was a ditto.

DR. KING:

Okay, all right. Well, I'm going to ask Brian to kind of summarize, again, what the proposal is, and really talk about what the appropriate next steps are for this group and for other constituencies who may have been following or will become engaged in this. And then, I'm going to make a couple comments, and then Alice is going to wind up the afternoon for us.

So, Brian.

MR. HANCOCK:

Thanks, Merle. Yeah, I mean, our general proposal is to improve the efficiencies of our process, to introduce conformity assessment process for technical data package review, source code review and hardware of a manufacturer declaration of conformance, whereby you all, yourselves, or through a third party, would attest to meeting the VVSG requirements in those areas through, again, your own testing or third party testing. You know, we think this is going to provide some significant efficiencies and address some of the issues that we showed, via the numbers, there, in our sort of average current test campaign, you know. I think we've been at this long enough, now, where we see where a lot of the inefficiencies in the process are, and see some areas of the VVSG that we think can -- where the requirements can be met in a more efficient manner.

What we're looking for, and I think we, basically, have it from this group, is agreement that this is at least -- this proposal is at least ready to go to sort of a broader community of election officials, manufacturers, and others to get their ideas on it.

DR. KING:

Yes, Mark.

MR. SKALL:

Can I, as we used to say at my Standards geeky days, propose a friendly amendment to what Brian said? I think it would be better if we talked about the software section, than say source code review, because source code review can occur in other sections. But it's section, I always forget, three or five, that we want to actually document as the one that we're talking about.

MR. HANCOCK:

Sure.

MS. MAPPS:

That's a good point, because I had some misunderstanding there, thanks.

DR. KING:

Yeah. Well, first, I want to thank everybody for their contributions, and I want to particularly commend the EAC, not only for this initiative, this discussion, but one that preceded it a couple of months ago, about the innovations clause. And I think there's clear evidence that the states are being listened to, the certification community is being listened to, and the EAC is working within its constraints to find ways to improve and bring the necessary innovations into this program.

Some of the things I've heard today are very reaffirming of this proposal, but I want to commend Traci for bringing to the table the viewpoint that there are always unintended consequences. In elections, we talk about that all the time. Our friends in the Legislature have a vision, and it always doesn't work out the way it was envisioned. And I think it's important that voices that remind us that there was some initial benefit, at least the developers saw the benefit of this, and that if we pulled this out, if it creates a vacuum, that creates a deficiency like an increased learning curve, we need to be aware of that, and we need to

help mitigate that. So, I commend you for that. And, as these discussions go forward, and our understanding of the benefits and the costs associated with this change increase, I think it's going to be important that we continue to look at the intended benefit, and keep attempting to measure that and drive towards it, but also make sure that if we're taking something off the table that we backfill that in some way.

So, again, I thank all of you for your attendance. And Brian, I particularly thank you for the presentation that helped us see how these pieces will come together to improve this process.

Ms. Miller .

MS. MILLER:

Thank you. Let me just make a statement -- or make a couple of comments before I get to my general thank you's, which, you all know I'm going to do.

So, with that predicate, I just want to state, you know, we want to be clear, and I think we all agree that this is not an attempt, in any way, to lower the bar, but, instead, to find a way to expedite the process without compromising requirements, the expectations, or the efficiencies that we all know we need.

So, having said that, you know, I hope that a process such as self-certification or conformity statement, however you want to put it, would provide a means for the manufacturers to take additional pride in the products that they ultimately produce and put out there and "disseminate." Obviously, the last thing a manufacturer would want to do is to have to answer to election officials, candidates, members of the public, media, what happened, or, more importantly, what didn't happen that was supposed to happen, because I've seen that. And when anomalies and

things occur that shouldn't occur, and there's no answer, it is not a pretty picture. Everybody takes a hit for that. Election officials have to answer, the manufacturers have to answer, and at the end of the day, you know, election officials, I will say this, and I know this, are a very close knit community. If they suffer, everybody suffers. And you don't want that. They communicate, they talk, they exchange information, and if they're not happy because of something that's happened, you know, with a product that didn't do what it was supposed to do, it falls from the top. So, we do want to make certain, you know, that this is not in any way skipping over anything. We want to make sure that everybody is happy with the end product, that the end product does what it's supposed to do.

To Juan's comment about being nimble, I appreciate that. The changes, obviously, that are put in place, we always continue to evaluate, to assess, and to listen to stakeholders, to see how in fact we can make the process better.

Brian began this second segment by saying that we've had problems with certification, with the certification process, and so, to that I want to say, I don't think we have problems, we only have opportunities to excel. So, this is more of an opportunity to excel and that's what we're looking at. Obviously, we're limited to the extent that we have no policymakers in place, right now. And so, everything is being in queue, so that when they get here, there are things that they can look at and make a decision on how we move forward. This is the discussion phase, it is the beginning or middle or however we want to put it. It is part of a continual discussion that we will have, not only addressing this, but other matters that Commissioners are needed for in order to get things finished, finalized, settled, you know, and make a decision on.

So, having said that, I then will move to my general thank you's, and I do indeed thank everybody for participating this. Juan, I called your name out once, I'm going to call it again, only because he has been here for the first panel and agreed to stay on the second panel. So, he has been with us for about five hours, and I see you fighting sleep over there. I don't understand why, but...

[Laughter]

MS. MILLER:

...but clearly we are grateful for you for continuing to sit on. Everyone on the panel, obviously, has a lot to add, and we appreciate your expertise and your willingness to participate in these matters. Without your help, we don't make any progress, obviously. So, it's very important that -- to us, that you're willing to come. And I always say this, no one ever says no to us. So, we're really happy about that. Let's continue that routine, that mode. That's how we get things done.

I want to point out that before we started, about 30 minutes before we got started, we had no Internet access. I was told that and I wasn't worried, because I know we have a wonderful IT team, and I knew that Mohammed Maeruf, and his assistant Henry, would bring that back up. He has left. I don't see him in here. But we work on the backbone of GSA, so while we have our own IT department, GSA is -- provides a lot of the backbone that we use, and I knew that he would get on GSA to get that up and going. We have had Internet access since we started at noon. So, I do want to recognize their efforts for that.

Always, as we always do, Emily is sitting in the back there. She gets everybody here safely, gets them home, and gets this meeting set up. And she probably worries about this more than I do. And I don't worry

about it, because she's doing it, so I want to thank her for that. Bryan Whitener, our Communications Director, obviously, gets the word out, recognize him. And for our first panel, which I did not do, Monica Evans and Pat Leahy, who obviously were significant in pulling that panel together, which I think was a very significant group and added to the discussion that we need for accessibility and transitioning over to this panel, as well.

Also, of course Brian Hancock, thank you. He was very, very, very, very important with putting this panel together, coming up with the idea, and doing the presentation as you see. Much of the information that he has disseminated has come from his group, and working with the testing and certification division and the technical reviewers to try to come up with a means to move forward and to have something waiting for review once Commissioners do come into place.

Also, our transcription services and our Webcasters, thank you all for continuing, again, to work with us. And Jessica, she's back there tweeting away, I don't know if you all see her, but she's been here for the whole time, as well.

And last, but not least, Merle, couldn't do it without you. I say it all the time and I will continue to say it, we really do appreciate your help, your support, your willingness to come. These things, as I said earlier, start off with little of nothing, but an idea. We work pretty closely together. Merle, the brains behind the outfit, I'm not going to say that I am because it's him, he comes up with the questions, we kind of go back and forth, and we have an end result which is usually very, very successful.

So, once again, you know, thank everybody. Truly appreciate everyone's time, your effort. And I know that there was

-- there's always prep work that goes into this. You don't just show up and, you know, try to answer questions and respond to issues. So, I appreciate it. And, you know, on behalf of all the staff, and anyone who I forgot to thank, I'm sorry, but I thank everybody. So, thank you all.

Merle, once again, anything?

DR. KING:

That's all I have. Again, thank everybody, safe journeys and we're adjourned.

[The United States Election Assistance Commission (EAC) Roundtable Panel "Transforming Election Administration, Voting System Accessibility and the Certification Process" adjourned at 5:20 p.m. EDT]