

United States Election Assistance Commission

Commercial-Off-The-Shelf (COTS) Products Roundtable

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Suite 150

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VERBATIM TRANSCRIPT

The following is the verbatim transcript of the Commercial-Off-The-Shelf (COTS) Products Roundtable of the United States Election Assistance Commission (“EAC”) held on Monday, February 14, 2011. The roundtable convened at 9:04 a.m., EDT and adjourned at 4:24 p.m., EDT.

COMMERCIAL-OFF-THE-SHELF PRODUCTS ROUNDTABLE

DR. KING:

Good morning, welcome to the EAC COTS roundtable discussion. It's a pleasure to be here today, and I'm looking forward to two days of a very productive discussion on what has turned out to be a very, very important issue in the design, integration, testing and deployment and maintenance of voting systems, and that's COTS, the common off-the-shelf, components that are used in voting systems.

There's a couple of ground rules I'd like to talk about this morning before we turn the opening statements over to Brian. And the first is dealing with cell phones and BlackBerries. And if you would, please mute the cell phones. But on the BlackBerries, because of the WiFi hum that comes back through the speakers, if you wouldn't mind turning them off. I know I would appreciate it.

As we go through our first session this morning, and we will be taking a break about 10:30, we will start with getting folks to introduce themselves. And when it comes your turn to speak here today, with a small group eventually I'll do a good job I think of managing the interaction, but if we get a whole bunch going at once if you wouldn't mind putting your tent up on the side. That helps me remember that there's a person who wants to jump into the conversation, and I'll try to grab people in the order that the tents go up. So I'd appreciate that regard.

So, with those few small ground rules, I'm going to now ask Brian Hancock, who is the program manager for the Certification and Testing Program at the EAC, to make some introductory remarks, and then we'll have introductions and go forward. Brian.

MR. HANCOCK:

Thank you, Merle. Good morning everyone. Good morning to those of you in the audience. We really appreciate your time this morning in coming together to talk about this important subject. I will welcome you on behalf of the United States Election Assistance Commission, Commissioners Gineen Bresso and Donnetta Davidson and our Executive Director Tom Wilkey. I'm sure they'll be in and out listening to this conversation over the course of the next two days, and those of you here will have a chance to meet them.

We also appreciate the distinguished members of our panel coming together today taking time out of what we know are very busy schedules to try to assist us on this issue, and certainly once again stepping into the breach, Merle King as moderator for this session, as he does for all of our roundtables. So thank you, Merle.

DR. KING:

My pleasure.

MR. HANCOCK:

Issues surrounding the use of commercial off-the-shelf products have reared their head about as long as I have been dealing with election systems and been in this industry. They get a bit of lip service from time to time, but up until today I don't believe anyone has really dedicated the time that really needs to be dedicated to

this issue. We know that the use of commercial products is only increasing in voting systems, as it is in many other industries, and it's certainly well past time that we find a way to define exactly what we mean in this industry by commercial off-the-shelf, or perhaps, if that's even the term we should be using. Maybe, that's sort of a term of art from other industries and we need something special for the voting industry. I don't know, but we'll certainly discuss that today. And we need to begin to look at a way forward, at a way to move forward incorporating these products, but having a good handle on the quality of those products, and how they should be used and implemented into the future.

So, that's sort of the basic agenda for us over the course of the next two days. We expect that there will be follow-up meetings to this, bringing other folks together, that are interested in this issue. But this is the groundbreaking work over the next two days, so we thank you for your time.

DR. KING:

Okay, thank you, Brian. What I'd like to do now is to ask the members of the roundtable to introduce themselves, provide a little bit of background about your experience with either system integration, COTS, voting systems, whatever it is that brings you to this discussion today, and that will help us understand a little bit of the contextual information as we go forward.

And I'm going to start with McDermott, and then, we'll work our way around the table.

MR. COUTTS:

Thank you, Merle. My name is McDermott Coutts. I'm the chief architect for Unisyn Voting Solutions. I was the primary architect for the system, writing most of the software -- a lot of the software with my team. And so, we had to put all of our software on the hardware, and so we -- this is how we come into the COTS discussion.

DR. KING:

Okay, thank you. Paul.

MR. STENBJORN:

I'm Paul Stenbjorn. I'm the Chief Technology Officer for the DC Board of Elections and Ethics. And prior to this, I actually served as the IT manager for the Virginia State Board of Elections, as well. So, I've actually seen COTS products come in, both from the State level, when it comes to a State HAVA VR system, and also at the local level as we implemented new DREs and an optical scan system this past year in DC. And we've had to struggle. We've struggled with the idea of where that line is drawn between what is COTS certified -- what is certified equipment and what is COTS equipment and how we can integrate that altogether. So, I think this is a timely and needed discussion.

DR. KING:

Thank you, Paul. Pete.

MR. MARTI:

Hi, my name is Pete Marti and I'm a consultant for the U.S. Navy. I come to you with about 35 years experience in the commercial industry qualifying products on EMI and safety. What I'm doing for the Navy is actually looking at COTS. It's being forced upon them,

the U.S. Military, to use COTS wherever we can, but we have to be very careful because the area of spectrum and E3, which is my specialty, that's the number one thing. The military has different problems, but I'm here today to help in any way I can. I've got ISO 9000 background and understand exactly where the manufacturers and integrators are coming from and to learn about exactly what the product is and all the processes, and possibly to give you some insight of things to possibly go forward on.

DR. KING:

Okay, thank you, Pete. Ed.

MR. SMITH:

Good morning everyone, my name is Ed Smith. I'm with Dominion Voting Systems, where I lead our certification and compliance efforts. I've been in this industry for just about ten years, now, with a few of the different manufacturers generally involved in hardware and later, in certification. So, I've been kind of on both sides of the COTS issue, as a manufacturer, and then, as folks who have fielded voting systems working with the customers to deal with COTS on the receiving end of those systems, once they're deployed. So, it's a pleasure and honor to be here today, thank you.

DR. KING:

Thanks, Ed. Glenn.

MR. NEWKIRK:

Hi, my name is Glenn Newkirk. I'm President of InfoSENTRY Services. We specialize basically in four areas; project management and quality assurance, and that's where a lot of the

quality control work comes in that we do. We also work in security and disaster recovery business continuity activities. On the quality control and testing, I've been working with voter registration systems -- or voting systems since the mid 1980s. You can see the lash marks and scar marks on my back and bullet wounds from all of those activities. But primarily the work we do now is in the area of testing. The way the lifecycle of everything that has occurred after HAVA, there was the big rush to do purchasing, and at that point we were involved in defining requirements and writing RFPs. And then, as it moved on, we moved into the quality control activities of testing and certification, which I have done for a number of local Boards of Elections, as well as State election authorities, including currently working with the Pennsylvania Department of State as one of their two certification examiners.

DR. KING:

Okay thank you, Glenn. Bill.

MR. HURST:

Bill Hurst, Chief of the Technical Research Branch at the FCC, Federal Communications Commission. We are heavily involved in conformity assessment in the laboratory division. We have an equipment authorization program where we approve products. We rely heavily on the industry through third-party certification and testing laboratories. My group handles the accreditation issues, standards issues, and looks at a lot of different testing and approval of products.

DR. KING:

Thank you, Bill. Luis.

MR. TORRES:

Good morning everybody. My name is Luis Torres and I work with the Orange County Supervisor of Elections in Florida. Basically, I manage the programming of the computers and the telecom. I'm on the other side of the fence where I actually get into the hardware logistics and stuff like that, and making it work, and bringing it together. I do work with the Division of Elections in certifying equipment in the State of Florida, so I look forward. I have 14-1/2 years experience with the Elections Office.

DR. KING:

Okay, thank you. Welcome, to the members of the roundtable, and also, welcome to those of you who may be viewing on the Webcast today.

We have a transcriptionist here, and usually, one of the things that's helpful for them is if we will define acronyms as we introduce them, and there are a lot of acronyms. And I think we've already addressed COTS, but as we go through the discussion today I may ask you if you wouldn't mind to help our transcriptionist group with the definition of acronyms.

And my name is Merle King. I'm the Executive Director of the Center for Election Systems at Kennesaw State University in Georgia. And I'm involved in State certification, and also, overall election administration for the State of Georgia.

Glenn mentioned something in his opening comment that I think is a good starting point for us, which is, where does the consideration of COTS come in the lifecycle of voting systems. And, as we all recall in the 2002 ramp-up for rapid deployment,

COTS really wasn't a discussed issue. It was there, but it was dormant, and it's only as we've seen voting systems that have been deployed now for almost a decade, start to age and go into maintenance related issues, that it seems that the COTS issues have really surfaced. And the realization for many jurisdictions is it's a sleeping giant. It has the ability to impact cost in the jurisdiction, it has the ability to impact the viability of the certification, and it has the ability to impact the doability of elections as we become aware that some of the critical components, particularly consumables, are, in fact, running on their own lifecycle, a lifecycle outside of the management of the voting system.

So, I think it is appropriate that we come to this topic in kind of the maturation of the voting systems that are currently in the field, but more importantly, to take the lessons learned from the deployment of the last cycle of systems and carry them into, both the design, the integration, the testing, and the future maintenance of voting systems. So, I think this is a very timely topic, and I think it's one of the most important things, certainly, in the State of Georgia, that we're looking at for the future of our voting system, and then, the subsequent next voting system that's selected down the road.

So, there's a collection of questions that I think everybody has in front of them and received as a part of the preparatory of materials, and we're going to use those questions as a guideline to go through. If we look at question number one, it's a very innocuous question, which seeks to ask, what is COTS? Well, I think probably half of us did the Wikapedia.org move and saw that it

is, in fact, common off-the-shelf components. But, of course, that really doesn't tell the story of how COTS impacts voting systems. And so, the first question, do we have a precise, acceptable definition of COTS? And acceptable meaning, does it add value to our understanding of voting system design, deployment and maintenance issues? Does it help us identify strategies and tactics for managing it? Does it alert us to issues that are related to COTS in the voting system? And then, secondly, how would we enhance and focus that description of COTS? And, I think I'm leaning more towards the term description rather than a definition, because we need to understand the attributes of COTS in the context of voting systems, and then, more importantly, what are the implications of those attributes.

So, this first question is really, also, an opportunity I think, particularly, for Bill and Pete, who have come to us from outside of voting systems, per se, to talk about COTS within your industry, its implications there. And that's going to help the election officials that are watching, and here today, take away from lessons learned from industries and applications that have been dealing with this much longer through several product lifecycles.

So, to that end I'd like to open up the discussion to the first question, which is what is COTS as it applies to your industry, or as it applies to voting systems? Break the ice Glenn, thank you.

MR. NEWKIRK:

Well, I think it's a relevant question, a very important question because -- and I would say, I guess, the short answer is, do we have a precise, acceptable definition of COTS, you know, beyond

Wikipedia? I think from a standardization point of view it would be useful to accept a common definition that would come from NIST, for a fairly simple reason. I mean, they have an important role to play in this. And they have a very high stake in arriving at a good definition of what is COTS, because they are involved in the final testing and certification in great detail, not just in voting systems, but in a bunch of other areas. And in their security publications they do have a definition of COTS, which is a very commonsense definition of COTS. It is the Wikipedia simple definition.

The real question, I think, once you've done that, once you said, "Yes, there is a definition of what constitutes COTS, there is a definition of what constitutes MOTS," which is the minute you've touched it and modified it, it becomes modified-off-the-shelf software, and it allows you to distinguish NOTS, what is not-off-the-shelf. And so, I think that's a very good reason for having a common, agreed upon definition, at a high level. You need that to begin with because then, I think you're right Merle, after that is the description. And then, you say, "So what? Where we do go from there?" And when do you break away from COTS and get into another area.

The reason I think it's so relevant is you're exactly right. In the lifecycle, probably 75 percent of the discussions I have with people, now, is -- and I think the vendors would agree with this -- "Well, we have a new widget. It's COTS. We need to replace it, because widget minus one, the one we've been using for five years, is no longer supported by the manufacturer, and we need to replace it." Okay, what do you have to do with it? Is it really COTS

then? Do you need to test it? Do you need to certify it? So, I think, you know, once you say, "Okay, we accept the high-level definition of what constitutes COTS," what hardware, software, network components, whatever, we can agree on that, and then, move to what constitutes then, NOTS or MOTS, when you get into the actual design development on the end of the manufacturers, what's their responsibility, and then, what's the responsibility at the local and State level, when they have to come in and do something with it, because that's where the money and the pressure will hit the local governments. They will, ultimately, end up having to make a decision, "Do we have to retest because somebody somewhere has made a definition that this is COTS?" That's why the definition is important.

DR. KING:

Ed.

MR. SMITH:

Thank you, Merle. And in the absence of such a definition, there's certainly some interesting behaviors out there. For instance, replacing an existing hard drive that's 80 gigabytes, because that was an economical suit spot size in that marketplace a few years ago, with a now 500 gig hard drive. As that jurisdiction runs out of space on their server, it becomes very interesting where you have some States, and one could argue, even in the EAC program, down to a part number, level of disc drive that, of course nobody does this, but would essentially force people to go out on eBay to look for disc drives, to one that says, "Yes, we can accept commercial-off-the-shelf," in this case perhaps meaning that you can go to a retail

or an online computer store and purchase a shrink wrapped hard drive of 500 gig size, or what not, to put into that system. And then, again, that raises the issue and the folks who support the part number level of COTS regulation, "Well, how do you know? How do you know that that 500 gig drive really is compatible where that 80 gig drive existed?" You know, electronics are faster now, you know. It's always the better, stronger, faster, \$6 Million Man adjectives there. How do you really know? And so, that drives the approach that we've seen, in some jurisdictions, with, it's got to be an exact part number replacement. But, I submit that that's untenable, because those part numbers simply don't exist anymore, whether it's resistors and capacitors on a board, up to, completely configured Dell servers at, you know, PowerEdge 3100s, for instance, nomenclatures, model numbers that just -- they simply don't make anymore and may not make six months after a jurisdiction purchases them. So, to Glenn's last point, the money and the headache ultimately falls to the jurisdictions and the manufacturers attempting to support them, if they're still under warranty or under contract for support. So, how we define COTS is very important.

It's -- one last point is, COTS is more pervasive than you think. Take a top cover on an optical scanner or a DRE, it wouldn't matter, but a molded piece of plastic. Sure, that molded piece of plastic, if I set it on this table and I survey the people in the audience in this room, they're going to say, "That's not a COTS part, because it has a Dominion or a Unisyn or an ES&S part number." It may even be embossed with our logo, but that non-

COTS molded plastic product probably came from a GE or a Huntsman plastic alloy of PC/ABS, or what not, that is an off-the-shelf product. So it's -- it's far more pervasive than you think. How we define it is very important. Thank you.

DR. KING:

Thank you, Ed. Paul, and then, McDermott.

MR. STENBJORN:

Thank you, Merle. And, actually I wanted to follow-up on some of the comments that Ed was just making.

I think from an election management standpoint there's a dividing line even in considering COTS. There are COTS products that affect certification of equipment, like the mother -- like the chips on the motherboards of our voting equipment. And then, there are COTS products that are peripheral, that we all need to purchase, but that don't sit within the stack of items that are certified as part of the package, but still affect the overall performance of the package.

Let me give you an example. We use ES&S voting equipment, and one of the peripherals that are required for us to be able to run our opening and closing tapes is an external printer, which is a COTS printer. This COTS printer is not part of the certification stack for ES&S with the iVotronic. However, the fact that the only system available with COTS, right now, is this legacy printer that actually is the vein of our poll workers' existence on Election Day, because it happens to be very dated and challenging to use.

Coming up with some definitional component that might exclude or include components that are used commonly in

elections from that COTS definition I think -- actually it almost sounds like there are two different definitions; the one definition for those items that we have to purchase that are peripheral to the actual operations of the systems, and those things that will need to be purchased, hardware and software, that will fundamentally modify the certification stack for any of the voting equipment. And so, when I'm considering this, that's what I'm particularly thinking because then on the software side I'm actually thinking about our EMS, our election management system, that comes from our vendor that also -- that requires components that are, essentially, if we were to need to replace them they would be eBay. And they affect the hardware that we can run the software on, because it still requires the installation of a COBOL engine on these servers, and there's certain incompatibilities with operating systems that we -- and other -- and related software systems that we could possibly use for it. But that's part of the certification stack.

And so, what I'm -- again, just to recap, perhaps there's more than one definition that we're going to need for COTS itself.

DR. KING:

Okay. And, certainly, I think, Paul, what I heard you say is that the role that the COTS components serves within the context is extremely important to understand...

MR. STENBJORN:

Yes.

DR. KING:

...whether it's peripheral or part of the core stack.

MR. STENBJORN:

Yes.

DR. KING:

Okay, McDermott, and then Brian, and then Luis.

MR. COUTTS:

What I wanted to discuss was to follow-up on what Ed said, mostly anecdotal.

We were working with a hardware vendor who is huge.

They make millions and millions of units every single year, and they flat out told us, "If we can save a fraction of a penny on any component within this product, we are going to do it and we're not going to tell you. The part number will stay the same, but it will be different." So, the question is -- the part number's the same. As far as we know, everything should work exactly the way we expect it to. So -- but where do we go from there? And the bottom line is that the scale of a voting system is not enough to make a vendor of that size make any changes to their process. They -- that fraction of a penny will save them hundreds of thousands of dollars.

So, it's just one of the things that just complicate it. I wish I had more of an answer.

DR. KING:

Okay. McDermott, do you have a sense of how pervasive that practice is of retaining part numbers for inventory simplification, ordering optimization, but changing the COTS component underneath?

MR. COUTTS:

I don't have a great sense of that. That's actually a different department than where I work in. Right now, I know that the

vendors that we are working with are under strict guidelines to say, "Please, contact us if you change something. Let us know." And, you know, we're not working with anybody quite that huge anymore. But still, it's a -- they -- so they do let us know. But, it's still a scramble, once they say, "Oh, guess what? We're stopping," and you've got three -- we've got three months of inventory and you need to be ready to go with the next thing within three months. And if we have to go back through certification, three months is an eternity.

DR. KING:

Okay, thank you. Brian, and then Luis, and then Ed.

MR. HANCOCK:

Thank you, Merle. I guess, I just want to try to bring us back a little bit to a definitional discussion, you know. We started out talking about commercial-off-the-shelf and, you know, generally, the definition we think of is commercial or something that can be sold to the general public, you know, it's out there.

So, you know, I guess, I have a couple of questions. One, can the majority of voting system COTS components, today, be purchased at, for lack of a better term, Best Buy, Radio Shack, wherever, you know, wherever people go to get those type of things? And two, if we're going to use that definition, do we think that all COTS manufacturers are created equal, right? Do they all have the same quality, the quality that we're looking for? Because, you know, McDermott, you just brought up a good point. The voting system industry is very small. However, realistic or not, there is an expectation that the quality of these systems be the

same as in mission critical systems. So, it's very important to deal with that.

DR. KING:

Okay, thank you. Luis, and then Ed.

MR. TORRES:

Well, I want to just touch base a little bit on what Glenn said. In the earlier discussions he called it MOTS, and I think that's a very interesting term that he used, because it's -- the practice is out there, modified-off-the-shelf products. Basically, when you have a product that's been developed, like a CF card, a thumb drive, or whatever the case may be, a lot of these vendors are modifying them, so you can't pull off-the-shelf thumb drive, CF card or whatever the case may be. And, at that point when that product is modified, you couldn't put the label COTS on that particular product, because it's a modified -- you can't go and buy it off the shelf.

So, I think when we're discussing COTS, we have to be a little bit careful, in the elections industry, because, like Paul said, there's a lot of peripherals. There's printers that don't have to be certified that work in conjunction with ballot layout, and stuff like that, BOD. So, when we're discussing the COTS components, we want to be a little -- I think we have to make it so that the vendors realize that if we're going to label it, it has to be labeled that it can be purchased to the general public, or commercial, versus being a proprietary piece of equipment.

DR. KING:

Okay, thank you. Ed.

MR. SMITH:

And to your point, yes, or commercial. To answer Brian's question, no, it's not Radio Shack. But it is the commercial/industrial outlets, whether they be distributorships, or what not, that allow you to obtain those components, typically at a commercial/industrial level, not a household level, because those just -- they can't withstand your testing program and its requirements and results. And they can't withstand the sort of use that you see. I mean, as we all know, an election is a gigantic public experiment. And, in every election the poll workers find new and imaginative ways to utilize and abutilize, if that's a word, the equipment. And so, no, it's not Radio Shack.

But, to get back to your comment Brian about getting back to a definition, as I prepared for this meeting and gave this some thought and thought about what's in VVSG 2.0, NIST was mentioned earlier, and such, just as they did on the software side with defining COTS, MOTS as we're calling it today, modified-off-the-shelf, software that is inside, software that's at boundaries to, perhaps, COTS, or to the outside world, and what not, I would not be surprised if we too -- and Glenn alluded to this earlier -- came to some sort of a spectrum definition or some sort of definition in words followed by a table and a chart that had a few columns, not very many, I suspect, and a few rows, once again, not very many, that defined the universe of COTS in voting systems, because it's not just hard drives, and it's not just software libraries. There's just a number of things that underlie, everything from resistors, capacitors and plastic alloys, that I've mentioned, up to fully

configured servers and a number of things in between, including those pervasive software libraries. So, I suspect, as it's been alluded to, that we'll end up at a spectrum point. And particularly, where that definition, then, the rubber of that definition meets the road of testing and certification and deployment, a spectrum, I think, is going to be required.

MR. HANCOCK:

I agree, and I think that, right there, answers my question, the fact that we really aren't talking about COTS, and COTS isn't the definition, you know. It's not the right term, perhaps, for exactly what we're talking about. So, I think we can move from that -- from that point.

DR. KING:

Okay. Bill.

MR. HURST:

Yeah, just -- interesting discussion. I wanted to comment as to some of the experience that we have with FCC and our certification program. As we look at definition of terms, I think a lot of the discussion has been, you know, what really happens when you change a part of the overall system, and how does that affect it? We have, basically said, in our certification program, that you can make changes, we call them permissive changes. And we've defined three different types of permissive changes. The class one is, it doesn't impact the system, so the manufacturer is free to make that change. A class two change, it does impact a parameter that is critical, and as a result, it has to go back through, at least, some form of certification. And recently, we defined a class three which

deals with the software changes. As we look at telecom products, software is becoming more and more of an issue, where, let's say, you upgrade the operating system of your computer that's running the system, how does that impact it and who are we allowing to actually do that? And so, we deal with those as a class three permissive change. If it meets a certain definition of being substantial, it actually has to go back through a brand new process of approval and can't be done through a permissive change.

And so, I think that may give some insight as to how we have approached it from the telecom perspective, that changes, whether it's a resistor, whether it's a hard drive, whether it's another basic part of the system can have a major impact on compliance. And, it can get complicated on how you handle and manage those.

DR. KING:

Okay, I'd like to follow-up with a couple of questions. It's very thought provoking. On the three classes of changes, how is it determined that a change fits into a class? Does the vendor itself assess or is that part of your agency's function?

MR. HURST:

The -- basically, the vendor will self-assess and, of course, they always need to do that and look at it. We have oversight and do enforcement to make certain that, in fact, products do comply and so we will do that. But we will give guidance. We provide guidance to say that, "If you make certain changes that -- that you need to go through this particular type of approval process." And so, we've given that guidance where that supplier or the manufacturer can then look at that and make a decision as to what action it needs to

take. If they -- if they change a model number, that's a class one, we don't care. If they change the power circuitry of a device, we care, and it has to go through a class two. And so, we will give them basic guidance as to -- as to when they need to do a renewal.

DR. KING:

Okay, all right. And you mentioned that you've recently added a class three, which seems to indicate that your model is evolutionary; that it started, and as you've learned and reflected on it you've made adjustments. Could you talk about that transition from the development of the COTS management model to its subsequent iterations?

MR. HURST:

Yeah, an example there was, we've started to look at software defined radio as something that is coming -- becoming far more common and how do we manage the upgrading, changing of software. One, that software could be changed in the system before it's even sold, and that could be looked at. But what's becoming more common is -- in the area of radios, is, you have a radio that's in the field and you want to upgrade the software; add new features that may add a new spectrum, new frequencies it's going to be able to operate on. How do you manage that? How do you control to make certain that only the manufacturer has control of that software being uploaded into the system, so that others can't get it? What kind of security is there and available? And so, we're continuing to look at that. And, as you say, it is an evolving process, something we're continuing to look at and expect to do additional rulemaking in the future to address it.

DR. KING:

Okay, that's very interesting. Pete, I'd like you, since we've heard now from one non-voting system entity, I'd like you to share your perspective on the COTS issues from your application.

MR. MARTI:

Okay. As you know, the military has the same -- the same type of problem of, what is COTS? It is -- basically, the military takes it that any modification of anything coming from the commercial, any modification takes, it goes to MOTS, and it becomes specialty, and when it does that the cost escalate. COTS, to the military, is basically looked as not modified in any way, shape or form and used to do the exact function, or a different function. The function can be different, but it's not modified in any way. Any modification happens, now you bring in the MIL standards, MIL 461, 464.

And also, the big thing is the environment that you're putting it into to the extent. And they basically look at what is being bought. The control of components, that is the big thing that I see here that's different than I've seen in a lot of situations, where you're controlling the disc drive, the idea of controlling the function in future discussion. But COTS, basically, is definitely cut and dried. It's either COTS, it can be changed to MOTS with a minor modification to meet the military standards, because the military has a total different ballgame for the environment that you're putting commercial equipment into. It is very important to the military because we are working with lives. We cannot have failures. We have to do extensive testing, because if you can't -- if the radio will not communicate, we're basically dealing with lives. And that's why

it's very dear to our heart, on, if we start using COTS to reduce costs, which has been dictated to the military to do, and I think it's great, but we say, especially from certifications E3 and Spectrum, we have to be very, very careful, because we -- no matter what we use from the commercial industry, it's dealing with lives.

And we definitely have a lot of COTS parts. Most of them are system software or whatever. We're using COTS everywhere. But the -- first analyzing it, we have to say, "Where are we putting it?" Is it going on a shore station or is it going on a ship?" Two different environments. Much more stringent, it's harder. But COTS, to us, it's definite. If it's available from the commercial market, whether it's bought -- be able to be bought by anyone on the shelf, that doesn't make any difference to us. It's a commercial thing built by a manufacturer, and that's the big thing that we look at. COTS is not necessarily anybody can buy it. It could be a specialty item, but it's a manufactured item for a particular purpose, and we are buying that particular thing and molding it in without any -- without any changes. But more times than not we have to convert it to a MOTS. And so, the government has bigger costs because that happens.

Using COTS definitely could reduce a lot of expense in the government, especially when you look at the environment , things on shore stations like PCs, printers, things that are not costing any lives or are any part of a -- any kind of a weapon system. But right now, we are looking at COTS, also. It is being infiltrated that our providers of the function, whether it be a radar system or whatever,

they're implementing COTS. But we have to be much more careful than anybody.

Now, as for the voting machines, the definition of COTS, exactly what it is, that's basically what it is from the military point of view. Any change that is produced by manufacturers, we'll say, in the United States, is a COTS piece of equipment. Whether it's readily available, you know, that doesn't matter. And, depending on what the item is, for example, Mr. McDermott was talking about a disc drive, what did that change affect the performance or the safety operation of that particular thing, the change he was going to be doing? Did they inform you what -- you know, they make a commitment of, what was this change going to do? I mean, did it change a resistor, change the bias? What's it going to do, affecting the performance, if he made that change? And if he comes back and says, "It doesn't change the performance of anything, we could more readily do this, our MTBF is going down," then, what do you really care if he changes it? We don't look at it. It all depends on what you're talking about, whether it's a component or a system. What -- what does it do? How does it affect your MTTR and TBF? Those being time between failure. What is the effect to the system that you're presently manufacturing? If he changes a disc drive, what is it going to do? And, I think that's what I want to have us take a look at, because I think that's important. We're looking at function, we're looking at a voting machine, and the bottom line is, you want mean time to repair very low, MTBF, you know.

DR. KING:

All right, thank you. You introduce an interesting criteria, which is the application. And my initial reaction was, well, we only have a single application. But, I'm not sure that's true. I think that going back to Ed's observation that perhaps a spectrum approach with a matrix beneath to illuminate aspects of the spectrum, I think there is a difference in how we apply these systems. Who touches them, the environments they work in, that may also be a factor.

I've got Glenn, and then Paul, and then Brian. Glenn.

MR. NEWKIRK:

Yeah, I think what Bill and Pete have mentioned, and going along with what Ed said about the spectrum approach, is very important because what we're -- what we're moving from is the conceptual definition of COTS, which I think we can all agree on. That's what Pete was talking about; it's COTS, or it's MOTS, or NOTS. I mean, we can agree on the, you know, the Wikipedia and even the NIST definition of COTS. That's -- that's useful to do. And, I think it is useful to do because a lot of people would argue, "Well, it hasn't been done and nobody knows what they're doing." You agree on that definition and move forward. The real key, then, becomes the operational definition, and I think that's what Bill was talking about, becomes very important. And that would be the real benefit, both to the EAC, and to the people in the state, and local election offices, who have to then implement it, of having some sort of a class distinction, or class definition, would be very important, because the phone calls I get are along the lines of, "Vendor A has -- they have come up with" -- these are the easy ones actually -- "they've come up with a new printer," or something like that. "Can

that be attached and not affect the State certification"? Those are usually pretty easy, pretty easy. Again, it still requires a spectrum. The difficult ones are when they come up and say, "We have a new software library component. The vendor who used to make this one is no longer in business. It's one that we've used, it was part of the certification package, but now, we're going in for certification or we are going to -- we see the need now to implement this in all the counties in State Y. Does it need to come back through certification?" That's the hard question. And, if there is some sort of a relatively, relatively straightforward set of guidelines that the EAC could both use and recommend to the certification and testing operations in State and local areas, it would be tremendously valuable as a shortcut, if you want to call it that, to keep the cost down, and yet, keep the integrity the same of what's been certified. Because right now, my only choice is, frankly, particularly if it's software, my response is very simple, it's -- it is moved from COTS to NOTS, and my response is, "They need to come back in for recertification." Then, the next question is, well, do they have to recertify the entire system, or can they come in and just do tests on this particular component? As the people who know me here, my usual response is, they've got to take a look at -- you know, we can -- we might be able to do a little bit of shortening on some parts of the test, depending on where that DLL, that software library component, depending on where it resides in the operation of that system, in the functioning of it, I'm going to say, "We need a test" because, otherwise, it's very hard for me to write that final little paragraph in my report that says, "I, therefore, recommend

certification on behalf of my client." I think it would be very valuable to have something. I think it would be useful to take a look at this notion of how they actually operationalized the definition of COTS, through class one, class two, class three, key word that Bill introduced, "permissive." I mean, the ability to have a set of permissive plug and play definitions or components would just be very, very useful.

DR. KING:

Okay, good, thank you. Paul, and then Brian.

MR. STENBJORN:

Sure. First of all, I want to agree entirely with what Glenn just said of the idea of our coming up with a matrix of what components -- what are the characteristics of components that wouldn't require recertification from the election administrators would be extraordinarily helpful. Functionally, what I'm hearing when we get to what those definitions are, are some of the following: What I hear from Pete's definition that the military has adopted, is essentially, if a component could be used in a system that is not used for elections it would be a COTS. If it could be taken out of this system and used in a different system for another purpose -- for another function doing the same, then it would be considered COTS. And I think that's a functional definition, but that doesn't get us closer to what -- how it would affect the election -- the administration of elections and certification of equipment. That's where you actually get into the other component that Pete was talking about, which was to understand and identify what those roles are that that hardware or software does. And then, that's

where we get into what Bill was talking about, because I think that would really allow us -- because I don't want to open a can of worms here, because of what you just said, because what Glenn was talking about with the idea of some sort of component level certification would be enormously valuable to States and localities.

We're -- I mean, a very specific example. We are in discussions with our -- the manufacturer of our election management software about incorporating one additional component into the software package that we have, that would permit us to dramatically improve the functionality of exportation of election information, both candidate and election results information. However, if we did that, we'd violate the certification standard for that software package. We know that. And, if we did that, then we'd then violate the certification standard for our voting system. And so, we -- so functionally, we can either choose to go with an uncertified system or to move forward with this uncertified stack. And I would like to see a method that we could address, of how we can take something that is really COTS, or even MOTS, and incorporate it into a certification standard with some flexibility in that certification model that would permit that.

And one last thing, and this talks to what Ed was mentioning before, it does sound like we're talking about two different classes of items when we talk about COTS. There's one class of items that essentially I'm going to call "inside the box." And those are the chips, the motherboards, the components that the manufacturers would use that may not be available at your Radio Shack or your Best Buy. And then, there's a whole array of external COTS

peripherals and software that are used by election administrators that certainly can be bought at -- we buy them at the Staples, right up the street here. And so -- but they -- they could affect the overall quality of elections. And while elections don't affect people's lives and battlefields, and that certainly is more significant, they do affect the integrity of our democracy. And so, there is some -- there is real criticality in ensuring that all the components used have some minimum level of functional -- of public assuredness of working correctly with the system for which they have been deployed.

DR. KING:

I just wanted to comment on both Paul and Pete's observation about the application of the military systems impacting people's lives on the battlefield. The election systems are used to elect the people who make the decision to send those people to the battlefield.

[Laughter]

DR. KING:

And it has -- there is some connection, yes.

I've got Brian, and then Ed.

MR. HANCOCK:

Thanks, Merle. I just wanted to get back and sort of ask a follow-up question to Pete. You mentioned that the military doesn't necessarily consider COTS as being necessarily products you can go out buy at a commercial store. So -- you were talking about industrial grade suppliers and things like that. But again, back to my question of how do you determine the quality, right, as you're looking? What do you look for, in quality, from a COTS

manufacturer? Because, again, I presume they're not all created equal.

MR. MARTI:

Right, it all comes down to what you're trying to buy. If it has clock, if it has a fundamental clock, like a disc drive or whatever, if it has clock or it's a passive component, like a resistor or a capacitor, big difference. If it's got clock, does it have any approvals, say, we'll take a disc drive, is it UL approved? Here, in the States, has it been FCC tested? Is a part of the components' program, which is only in the United States, which isn't worldwide. Most of my dealings have been both, because the military operates worldwide, and so does -- when I was in commercial industry, the same thing is getting the CE mark, et cetera, et cetera, which you're lucky that we're just talking in the U.S. But if it's a disc drive, does it have clock? What's the fundamental frequency, et cetera, et cetera, everything. Somebody associated with EMI. Does it have a license? Well, there's a QC procedure -- or a QC process that is normally done by the manufacturer. If he has a backwards UR mark, "I am a safe product," I've got, "I declare basically" and he has a good Q, you know, if it's got -- got an EMI and a safety mark on the component. such as a disc drive, it's different than somebody having a resistor. So. it all depends on what are you selling, what are you buying? If I see a product and someone said, "Gee. we've got this disc drive." "Oh, okay. Well. I know I can get five." And also to handle technology, which is going to go, I'm going to quality either three or four or I'm going to say, "Here's the functional specifications I have and whatever you decide disc drive

you put in it's got to have a ULCSA, it's got to have an FCC. And that's up to the manufacturer of the device to obtain. They can help you by specifying that because you're buying into their QC system further down the road and you don't have to worry about it. And it's left up to the manufacturer to get the functionality that matches that is being requested by the whole system, voting system.

This is what I have done. I've taken many products from -- medical products, bone densitometers, or whatever, through the U.S., as well as the European standards, and helped the manufacturer. Like, I show up at a test lab with my copper tape and my Dremel tool, and I come out of there with a report that passed. But the next thing is, I've got to go back and sit down with the manufacturer and say, "Hey, I built Faraday shields around your PC board. I did everything to meet the EMI. Now, we're going to make it a manufacturable product. I've got the report, that's all you have to do, but we've got to roll that back into a manufacturable product." In other words, I've got to make the changes, so you can state, "I meet these standards" so you know the engineer, that whoever looks at it, at any level, like the manufacturer looks at it and says, "Yep, it's got a safety in EMI, it's already been looked at, it meets a standard. It's below the requirements." That is the important thing we look at, whether it's -- it depends on what it is. The smaller the component -- is it an active device? That's the critical. Printer; there's many things you look at a printer. Any component that has clock, I try to make it as simple as possible, that brings in the FCC, that you basically look at, that -- that's the world that I've lived in. And those are the important things,

because in the military, you put more different frequency, more different emitters in a combined area and we have to do extensive more testing to make sure the sonar works, the radar works, they don't interfere and it doesn't interfere the missile systems, et cetera, et cetera.

In the commercial -- in this case, you have the same thing as if you put any one of four disc drives in and implementing QC procedure, increasing the quality, automatically, by -- that's invoked by the manufacturing process by saying, "Okay, you're going to supply a disc drive to me? Then, I need to have this component mark on it, and this FCC. That tells me the manufacturer went through a particular level."

So, it's very complicated intertwining, depending on function, on what you can accept. Because, I hear from all levels, the stopgap of getting a system out there is that you have one disc drive. And I just bring up the question, why weren't four qualified? I don't know enough of your system and what you've lived with and got you here, to look at it, but I just -- I'm learning a lot about what you're living with, and it's very interesting.

DR. KING:

Well Ed, if you'll hold for just a second, I want to follow-up on a question for Pete. You used the expression "if a component has clock." What's the rationale behind that criterion?

MR. MARTI:

Basically, if it has clock, it's got -- it's got the fundamental clock, you look at the harmonics, and that's where normally that component or that PC board will emit. Does it affect the operation of any other

equipment by having that level of radiation either conducted down the power line into the power grid, which is conducted and then radiated? They're two basic components, and basically, what the FCC looks at. That's what all the agencies, as far as radiation. So, they -- how they will affect other things, how do other things affect the operation of it. For example, if you take your voting machine and you roll it in alongside a mainframe, or a high-powered generator that's got a big turbine or something, a voting machine might not work. It's called susceptibility. So, that's part of the certification process, at the "system level", that I've been accustomed to looking at and looking at the importance of the environment you're going to put it in, is really important. And I think it's really important to voting machines also. You should be looking at, how am I affected by other things? What cabinet am I putting it in? Is it all plastic? It's going to affect everything that you put in there, on the amounts of shielding, et cetera, from radiation, both directions. I don't know how -- it's very complicated, but it's -- I'm trying to put it in layman's terms.

DR. KING:

Bill, go ahead.

MR. HURST:

Yeah, let me -- I can just add to that. I mean, in a world of electromagnetic radiation is what we're talking about, is, it's really driven a lot by the speed of your computer, so digital devices, computers, and so forth, have a clock in them, at different frequencies. In the world of EMC, that becomes critical, because if you change that element, it can greatly impact the radiation that's

being emitted by -- by the digital device. And so, I think as we apply it to voting machines we can look and say, "What are the critical things that really affect the voting machine?" In our world, it's the speed of the computer can greatly impact whether or not the product complies. What are the key elements in the voting world that are critical? And then, we can use that in our definition, as to when those change, that we need to do certain things.

DR. KING:

Okay, good. Ed.

MR. SMITH

Let me make one short and one long comment. The short comment revisits some of the conversation earlier. And Merle, you asked a question that I'll respond to, and that is, nobody carries inventory anymore. Inventory is cash and cash is king. Nobody carries inventory, whether it's, generally, the manufacturers minus some amount that is absolutely necessary to maintain our servicing. But certainly, in the world of electronic component distributors, the big manufacturers, the HPs, Dells, and such of the world , nobody carries inventory anymore. One of the metrics that those procurement organizations are graded on very strongly is inventory turns, meaning how -- how much inventory do you have around? For instance, if you keep a week's worth of inventory every year, your inventory turns over 52 times, because there's 52 weeks. If you keep six months of inventory, you have two inventory turns a year. And that's a huge metric, because you tie up cash in inventory. And so, once something ceases to be manufactured at the subassembly level by a Toshiba, if it's an LCD, or a Samsung,

the biggest LCD maker in the world, once they quit manufacturing, it's generally flushed out of the supply chain fairly quickly, because nobody wants to carry inventory, you know. Periodicity of business cycles is becoming less and less, meaning the business cycle occurs more frequently, and the up-ramps and the downturns of the business cycle are more violent than they were, certainly, 30 and 40 and 50 years ago. So, nobody carries inventory, because you don't know next week if you can get rid of it. So, that's -- that is one of the reasons why we have this issue. It's not a definitional issue, but I wanted to just bring that to light because it touched on some of the earlier comments.

But back to definitions, you know, as I envision this table, in my head, there's a bottom row of the table that would be in an EAC program manual that would say, "Okay for this different -- across this different spectrum of COTS, what is required testing, or what is required reporting? Is there some block that says it can be manufacturer self-declaration all the way to, as someone put earlier, full system retest and recertification? That's the obvious spectrum, is manufacturer only to full retest, there's blocks in between, too.

So, I would ask Pete, Bill, and Glenn what they're doing in real life, what they're seeing and maybe what they think would be an ideal if what's going on in their worlds is not the ideal situation.

DR. KING:

Okay, Bill.

MR. HURST:

Yeah, I can comment. The -- you mentioned supplier declaration of conformity versus certification. That's very much a real part of what we look at, as well. And we really look at the risk of the -- of the product interfering and make that determination. So, we have -- we have actually said which type of products fall within each category. As we look at a supplier's declaration of conformity right now, we allow computers to be approved through a manufacturer's declaration of conformity. That wasn't always the case. When we established rules for digital devices and computers, we did the more difficult certification process. But if we go back, at that period of time there was a great deal of problems and interference coming from computers. As the industry was able to understand how to write the tests and design products that complied, we were able to move those types of products into a supplier's declaration of conformity. And so, a lot of the products that the FCC regulates the manufacturer can make the declaration and that is acceptable.

If it's a higher risk type of product, if it's higher powered transmitters, intentional radiators we call them, those types of devices we still require certification and we go through a third-party process. So, the government isn't doing all the work, that would be too much for an agency to handle, but we then authorize third-party independent certification bodies to do that work. And so, we're going to look at the risk of interference and make that determination as to what category these products fall into.

DR. KING:

Okay, thank you. Glenn.

MR. NEWKIRK:

Merle, Bill has just introduced formally what we've all been talking about, but been afraid to call it, and that is it needs to be a risk-based matrix that we're talking about here. The notion of risk underlies everything we've been talking about. It's how much risk are you willing to accept whenever you make your declaration of is it COTS, NOTS, MOTS, whatever term you want to use. That -- and you are absolutely right. I mean, the risk that election officials take are four block long lines waiting to get into the voting place because "a" component has failed which translates into 72 point type above the full front page headlines of election failure, incompetence, fraud, malfeasance and everything else that can be put into play at that point, as well as real and genuine failure of confidence on part of the people who were standing in line and who heard these messages undermining the free and fair nature of elections, which is what this is really all about. So, I would encourage anything that occurs on the operational definition in coming up with this kind of a spectrum definition, operational definition of COTS really needs to take a good, long hard look at what risk is being absorbed as you move from each category to the other.

Again, it might sound like an interesting set of discussions about radio frequency and what does it have to do with elections. Answer, very simple, go into many polling places today. They have electronic poll books. They, in effect, create small, wireless networks that exist in the polling place. And we have been -- I literally spent days on behalf of one client trying to figure out what the problem was that was causing an electronic poll book to hang

periodically, apparently at random. I mean, you know, my gosh Merle, we were wondering if people walking in the door with pacemakers were causing the thing to hang. IPods versus Androids, I mean, it was really getting down to the hard thing and we'll talk more about that later. Brian talked about the issue of quality and do the vendors have a handle on this.

But again the real key, the advantage that Bill talked about, the advantage that Pete talked about is, they have in their rules and regulations required, when it comes to a self-affirmation of COTS, they know that there is better be, that there had better be a long track of testing and documentation back in the manufacturing laboratories, because if they ask for it and it's not there, that vendor has a great deal to account for. It's a big market that they can deal with. That's not necessarily always true in the elections business, it's a very different situation. But I would just throw out that risk is the key. How much risk are you willing to absorb? If you say "none," you can't afford that, you know, it's just that simple. It's how much risk can you afford, is the question.

DR. KING:

Okay, good point. Luis.

MR. TORRES:

Yeah, I just want to touch base on what Glenn said. Yeah, risk is a factor. And I know throughout the election industry there's many struggles. One of those struggles is, you know, there's a piece of machinery that's made and a lot of the components are proprietary and they have a sole source, and that sole source doesn't support

that particular product, it's hard to get the product to make that particular machinery function.

And I had an incident last year in Orange County. Glenn touched base on e-poll books, prime example. They're networked inside polling place locations. There is an e-poll book out there that -- many vendors sell e-poll books, but one of the things that we're hearing is that their components were proprietary, you couldn't buy off-the-shelf components to make this thing work, they weren't supported. So they're basically outdated. You got a product that costs, five, six, \$7,000 that you can't use anymore. So what Orange County did was create their own version of the e-poll book where you can actually go out there and purchase anything off the shelf. Does that impact the tabulation of a vote? No, it's -- it actually doesn't impact the tabulation of a vote, doesn't need to be certified.

I think when -- Pete talks about saving lives, you know, their standards in developing buying COTS off the shelf products and converting them to MOTS is because of the lives -- you know, they're saving lives. And I think the election industry, basically, we take that analogy too where we're saving someone's vote, and every vote counts. And so, we want to keep that risk-based matrix in place. And with the classifications like class one, class two, class three, does it impact the voter's vote and the tabulation of votes?

DR. KING:

Okay. One of the things that we have to work into our schedule today is a break for the Webcast folks, and so, we're going to take

a break at 10:30 this morning. And we've got about 15 minutes. And I want to drill down through a couple of points that came up in this first discussion and use those 15 minutes to really try to wind up this first question.

And one of the things that Bill, I'm very encouraged by the description of the FCC model, is a phrase that we've heard a lot in the elections community, which is, "don't permit perfection to become the enemy of the good." And the fact that you have, within that agency, developed this iterative model of certification where you looked at what you had learned and revised it and moved forward, I think that's very encouraging, as opposed to the notion that something has to be designed that's perfect coming out of the box.

But, to that end, I wanted to follow up with both you and Pete on a question, which is, once a product has been classified, in your case in the one, two, three, or in your case designated as a COTS or a MOTS, et cetera, how is that decision revisited? What triggers a revisit to that decision? How many times do you have to touch that decision?

MR. HURST:

Yeah, just in looking at probably a couple of different aspects to that question, as I look at it, actually, we continue to look at how the process works with regards to how we define things, how certain products -- because industry is very innovative and always finding new ways to do different things. A lot of our time is spent actually on the phone and e-mails answering questions with manufacturers as to -- as to how it actually fits into our definition. So, there's a lot

of interaction there to make sure that they understand. And as they come up with new, creative things, we can give them some guidance, so a lot there.

With regards to our overall equipment authorization program, we do go through a formal rulemaking process to make changes to that. The last major change has now been ten years ago. We're continuing to look at that and, actually, currently looking at some of those issues right now and how we can improve that process. As part of that, we look at the different types of products and say, "Based on the history of that product, do we need to change the category of authorization? Do we need to be more restrictive or less restrictive?" And so, we continue to look at that, and it's a very evolving process. As you can imagine, the world of technology and communications has greatly changed in just the last few years, and so, as we get those products we will -- we will look at those and need to make -- make decisions daily as to how to handle those.

DR. KING:

Okay. Pete.

MR. MARTI:

I think the biggest thing -- this is prior to the Navy in commercial, and that's what's relevant here -- is the CE mark whether it's here in the United States or in Europe. Basically, the CE mark is a declaration that I've got everything in place, I'm producing a perfect product. I would say an infraction is the first thing, is, all at once something happens, and that's when you question all the testing if they made a declaration, okay. For a system or a component I think that's the first thing, the infraction. But when they first got

qualified and made the declaration, we also look at what quality do we have to trust the manufacturer producing this. What quality system does he have in place, ISO 9000? What does he have to ensure that number one or number 20 that is built is like number one whether it's for the military or whatever? But as far as the military, same difference, we say, "What's in place to ensure it's on the manufacturer's shoulders that what are they providing to us the quality procedure? What have they got in place? What do we know about the quality procedure, ISO 9000 do as we say, you know, et cetera et cetera? That's the biggest thing that you look at is the quality of whatever you're buying. If he has a mark on it, what does that tell me? What has he been through to make that declaration that I've got my FCC approval as a component. I've done my UL. Well what does that say? Understanding all that on the commercial side is an education process to the military engineers. And that is what I do a lot of. But reinforcing exactly what those marks, what's in place to put the onus on someone else. And I think that's a big thing.

QC is the biggest thing in whatever you buy on how do you trust the manufacturer, what his track record is, what's his QC process that he has in place to ensure when you look at that disc drive I've got the two marks on it. What does that say? And normally, they're going to be very good and have their technical files built, all the test reports or declarations from the engineer and why they decided the way they did. So, that's the biggest thing, is looking at the sub manufacturers. And even all the way down, integrators on down, what's their track record? What's their

philosophy? And it's to produce good product and, of course, to make money. That's my rule. That's business. But the big thing it's very complicated because you're talking components, systems and you have to look at each one whatever one that you're going to control it. What's the best place to look at the QC? I think quality is the number one that needs to be looked at at all levels of whatever you're going to specify. If you're going to build a voting machine, you've got to be able to count those votes consistently, accurately. And we've got to live with technology that's moving on. All the pieces to do that is what we've got -- is the trick is how are we going to stay with the technology and keep moving on.

DR. KING:

For the voting manufacturer system manufactures here, Ed, McDermott, taking Pete's comment about looking for evidence of quality assurance systems within COTS suppliers, what are the practices within your companies in terms of that criteria triggers that you look for -- Pete mentioned infractions are evidence that further investigation was needed. What is the state of practice within your companies regarding the QA with suppliers?

MR. COUTTS:

We're an ISO 9000 company. We do extensive background checks on our vendors and, of course, we do our own testing in-house to basically -- and so, we are tracking our vendors. We own the database. We are watching our vendors, and seeing, do you have a violation with us, as well as watching what they do outside of when they're dealing with us. A lot of it is just covering -- or just

making sure, within our own house, that what we get is what we're expecting.

Part of the problem is that we're looking at these components and they're coming in with CE and UL and all of the stamps, but that's not enough. When you get into the VVSG, the levels that it gets you through, CE and UL, don't get you through VVSG. And so, you know, where does that -- that leaves with an interesting conundrum.

MR. SMITH:

And those CE and UL marks, and such, only address a small portion of what's in VVSG, even if it's a computing device, it's just a computer and, you know, it's only meant for that single purpose function.

But what we do is actually similar to what Pete mentioned. It depends a lot on what the component is, who the vendor is and where it's going in the system, you know. Any of the COTS/MOTS software is going to be integrated, it's going to be made into a build and it's going to be tested, whether it's a voice synthesizer, of which there are really only about two big ones out there that are incorporated into voting systems. Servers and client -- computers that you can buy, you can go to dell.com or hp.com configure and purchase, those sorts of things.

In a sense -- in actuality, the QA department and the engineering department are making risk-based decisions whether that's a very quantifiable criteria or whether in some cases it may be a combination of quantitative and qualitative data, you know. Name bands do mean something. It means that that's, you know, a

substantial organization with wherewithal and known test labs and good solid developments themselves. But then again, software components, whether it's Microsoft down to smaller vendors of libraries and such, all of that's going to get tested regardless. So, we are doing something similar to what Pete offers up, and that is a risk-based, function-based approach to the level of testing required for COTS and MOTS components.

DR. KING:

Okay, very good. Well, I think it's time that we take a break, and to that end, if we can take about 15 minutes. And when we rejoin, I'd like to recap if there's any issues that we still want to reflect on regarding this first question. And then, we'll move onto the second question on the list and move forward. So, let's take a 15-minute break.

[The roundtable panel recessed at 10:26 a.m. and reconvened at 10:45 a.m.]

MR. HANCOCK:

Welcome back from our break. We appreciate everybody, once again, joining us for the second part of our morning's discussion. And before I have Merle resume, I would like to note that our Executive Director Tom Wilkey and Commissioner Donetta Davidson have joined us for the discussion this morning. So, welcome, good morning and thanks for coming down.

DR. KING:

Thank you, Brian. And I want to come back to one small piece of unfinished business from the first session, this morning, in a question.

What I thought we got to, at the close of the last session, was that -- kind of the agency perspective from the Department of Navy and the FCC from what it might be like to manage the COTS integration over an enormous number of products, a large number of vendors and a very large number of suppliers. We kind of took that down a level to our voting system vendors, single vendor, but still multiple suppliers. Now, I'd like to bring it down to the jurisdiction level, to Luis and Paul, and talk about, from your perspective as election administrators, how do you see that COTS issue and your expectation of the vendor management of the COTS issue as a jurisdiction.

MR. TORRES:

I see it as a big challenge for us. I mean, we've upgraded our system since 2006. And from 200 -- well let me step back a little bit. It started in Orange County in 1996, and we had a tabulating system that's an optical scan device. It was in place since 1990. We got rid of it in 2006, so that was about a 16-year span for that piece of equipment. You're not going to see those life spans in the newer technology that's out there.

One of the biggest obstacles is, prime example, you certify a piece of machinery that uses a 512 CF card. Well, as we learned today, CF cards are no longer supported. So, what do we do, you know? At a jurisdiction level, we're faced with the budget issues that everybody else is faced with. And in 2006, we purchased a

new piece of machinery. And now, we're actually going up against another issue, the HAVA Act, where we're going to have to purchase another piece of machinery within a short period of time. How can we justify the cost? And at that level, if we have this turnaround, I think it becomes an endless cycle.

With COTS, I don't see COTS in play with the type of machineries that we use, the vendors that are certifying these equipments, the more the versions of MOTS. They're being modified somewhat where we're vendor dependent, basically, where we have to get our components through the vendor in order to stay compliant, in order to stay, you know, with the certification process. So, it's a double-edged sword, you know. We could -- COTS components will always be in these units, but is it really COTS? And that's where we're discussing this question.

DR. KING:

If I can follow-up before I go to Paul. When your jurisdiction looked at your contract, or looking at a future RFP, does the warranty, which is an important component of the purchase, do you attempt to address the COTS/MOTS issue in the RFP or in the contract? Or is that kind of an understood function of the vendor?

MR. TORRES:

It's more at the State level, the certification process, at the State level. That's where that comes into play. At the local level, we don't really get into that level of RFP and all that and knowing the component levels. But going back to what Pete said, the classifications, like class one, class two, class three, I think that would be a better understanding from a local level. So knowing

that I can go out there and purchase a CF card to replace that, that's not -- I mean, it's commercial-off-the-shelf, but it's not a MOTS product. I think that at a local level is more acceptable.

DR. KING:

Okay, all right thank you. Paul.

MR. STENBJORN:

Sure. First of all, I do want to identify with what Luis said. We are all in dire straits financially, and so, we're always looking for ways to make our elections be administered with transparency, accuracy and cost effectiveness. And use of COTS products could certainly move us forward in that respect. However, when we talk about voting systems themselves, we're fairly hamstrung. We're hamstrung because what we've purchased and what we -- what our RFP process -- our RFP process, in the District of Columbia, specifically stated that it had to be an EAC certified stack of voting systems and voting system software. What -- where -- and so, there really is no -- there is no plugability from our perspective. It would be up to our vendor to leverage any cost savings, and at this juncture, beyond the contract and beyond the RFP there are no cost savings for us to leverage. So if, you know, ES&S, who is our vendor for election systems were to go out there and leverage COTS products to lower their overall operational costs on their equipment, that would be probably a benefit to them, but for us, it would just be a matter of still maintaining the same level of public integrity, which is really what our principal asset that we manage is. However, where I see this affecting local and state level administration is in the plugability of other products that are

required, products that are outside of the certification model. For example, VR systems. VR systems, and their peripheral items that go along with that, that are being able to purchase relatively COTS products or MOTS products to be able to plug in to what is available from the election system would be really beneficial and could actually drive overall costs of operations down.

The obstacle that we have, currently, is that with the current certification model we're working with equipment that is functionally, and I'm not exaggerating, now 16 years old in technology with some of the equipment that we're using. And so, obviously, technology has far outpaced any interoperability with the systems that have been properly -- that have been certified that we purchase. So I -- so I'm seeing -- again, there are multiple tracks, and I see a bit of a disconnect between the tracks, because we have a certification model within the voting system sphere that could certainly leverage the advantages of COTS, but then, it still is not going to be synchronistic with the non-certified equipment that is purchased, which may or may not be COTS, and the standards that we should apply as best practices in election administration.

DR. KING:

Okay. And I think what I've heard you say is that the COTS issue, and we're using COTS and MOTS, now, I think almost interchangeably, the COTS/MOTS issue is more pervasive than simply certified systems and that from an election administration point of view there may be -- there's clearly an advantage of managing the aggregate COTS/MOTS within the portfolio of

products that we're required to use, even those that are not certified.

MR. STENBJORN:

Yeah, exactly. It's highly beneficial for voting systems -- I mean, you know, again, just to revisit history, for a moment in 2002 with HAVA, the VR systems, voter registration systems that were on the market, I mean, their total cost of ownership were just extraordinarily high, I mean, for the type of system that they were. And, you know, we're looking at next generation, you know, that these are, essentially, CRM systems with certain specific configuration. But hopefully, the next generation of VR systems can leverage some of the -- some of the advances and customer relationship management modules that have been out there and create some plugability, and also, you know, help underscore the need for accommodative format that then, hopefully, would eventually, in order, benefits of the voting system manufacturers.

DR. KING:

Okay good, thank you, any other comments on the first question? We'll probably revisit that. In fact, I think at the conclusion of today's session we may even have a homework assignment for those of you willing to come back tomorrow, which I hope is everybody. Let's move on to the second question, I then.

The next question really seeks to kind of drill down through the relationship that the voting system manufacturers and integrators have with COTS suppliers. And it should -- for those of us who purchased those systems, it should illuminate the complexities of those relationships, the difficulties, perhaps, in

managing those relationships, I think, as Ed pointed out, the challenges in simply complying with warranty requirements that you may have with a jurisdiction as a result of COTS components being integrated into your products. So, we want to look at this, not only from the direct manufacturer to COTS supplier, but also then, our perceptions as either election administrators or agencies or testers, how we see that relationship, and see if we can kind of triangulate a clearer vision of the issues that exist at the integrators' level, and how we can better understand that complexity as we move towards, hopefully, clarifying the certification model for COTS, MOTS, and NOTS, which rolls off the tongue. I'm getting used to that expression.

So, question number two began voting system manufacturers and COTS suppliers: An assumption with COTS products is that the quality of the product is known to the industry. Are manufacturers actively investigating their COTS suppliers and making sure they are receiving the quality they require? I think, really, that was a point that Pete made earlier.

So let's start, if I could, with either Ed or McDermott, in talking about how you manage the relationship with your COTS suppliers, what you know about them, what you consider to be necessary to know about them. And we'll start with either of you.

MR. SMITH:

I'll go ahead then.

MR. COUTTS:

Okay.

MR. SMITH:

Merle, our management of COTS is, really, twofold. One, is to bounce out of the COTS technology cycles and develop our own proprietary custom solutions, motherboards, as one example, that I'll use later when I come back around to define that a little better. The other is, as I think both McDermott and I had mentioned earlier, we have testing schemes in-house to ensure the quality. And we pick from known vendors, typically, you know. Growing up through -- in my first experience as a manufacturer with Hart InterCivic, where the original crew of developers out there came out with medical devices. And voting systems have quite a bit in common with medical devices. They are high criticality, high reliability items. It's not lives at stake, as with, also the military, but it is our democracy, and so, there is a very fundamental and sacred nature to getting it right. And the long lifecycles, in particular, combined with that critical nature -- and critical model, actually, is very similar to medical devices where, once again, your surgical suite equipment, your blood/gas monitors and diagnostic equipment and such, is typically fairly long lived. You do have, in the case of medical devices, a little more controlled environment. It's typically not the patient's touching these things, but it's the trained professionals, which is helpful. But they, in the medical device industry, suffer from some of the same ill effects of COTS use, or benefits perhaps, from non use, that we do in that the COTS technology roadmap for the larger computing suppliers, the larger peripheral suppliers and such, is six-month cycles. And every six months -- and certainly, for products that can also be sold at retail. You're seeing, certainly, annual cycles in anticipation of the

Christmas holidays and the sales that center towards the end-of-the-year holidays that we have. You're seeing a far greater number of cycles within that than you do the voting systems lifecycle, where you've got Eagles, Sequoia Advantages, AcuVote OS's that have been out there for ten and more years easily, certainly in the case of the Eagles and the Advantages.

So, there is a lot in common there. And the way that the medical device manufacturers and some, if not all, of the voting machine manufacturers have gotten around that is to go to the class of suppliers that have longer lived components. For instance, the display -- LCD displays. LCD displays, you have vendors in that space that cater to the mass market; folks with PCs, laptops, fax machines, cell phones for the smaller devices. And those people are obsolescing panels after 18 months of life on the market, sometimes less. That doesn't work for us. So, we go instead to smaller manufacturers, and even some specialty distributors at times, that are keeping components through a four and five-year lifecycle. So now, I only have to endure two technology cycles within, let's say, a ten to 12-year voting system lifecycle, rather than perhaps eight, which is extremely painful. So, that's one way to handle it.

We talked earlier -- I spoke earlier of nobody carries inventory. Sometimes, as a voting machine manufacturer, you have to carry a little inventory. You have to not only carry the -- what you know will be your spares needs for the next election, the next few elections the next year, the next two years, what not, but take into account some technology issues and carry enough extra

inventory, over what you normally would carry, such that you can take care of your customers' needs for that particular part, that particular space, and through the lifetime of either a State or an EAC, or both, certifications until you can get the certification upgrade that you might need. So, those are some of the strategies that we use, to answer your question.

And back to the second part, which involves testing very directly, and not so much the business relationship, like -- I'll reiterate my comments earlier, that that is, essentially, risk-based in some sense, whether that's qualitative, quantitative or some of both, you know. Who is the vendor? Where does it go in the system? What functions does it touch? Those things then define the testing. And software gets tested all around. It's built, it's put through QA, regardless of what's going on, because it's always there, and every function ends up being tested in our program.

DR. KING:

Okay. I'm going to come back and ask you a question, but let me go to McDermott first.

MR. COUTTS:

Not a whole lot to add to what Ed said. I mean, we are using exclusively COTS products to build our -- to build our systems. And strangely enough, the cycles for voting tend to be opposite what everybody else is buying. Generally, they are -- when we're looking to buy a system, that's when they're trying to change things out because it's after the Christmas rush. So, that makes things a little bit difficult, especially when you're dealing with a real, commercial system like, for example, Dell. Recently, I've been working with

Dell Federal to try to come up with a program where we define, "This is what we've certified," and then they manage a track of this is how -- this is an equivalent system moving forward. Now -- and with Dell, there's a certain level of trust that if they put together a system of their components they're going to make sure that it works together. Now, whether it works with our software or not, or with the drivers that we have, that's up to us to determine. But that's just in its nascent stages, but it shows some promise as far as being able to track when things are going to be changing, how they're going to be changing, and what we need to be prepared for.

The unfortunate part about it was that I -- I put in -- I got my initial equivalent systems to our 2005 certified, and then two months later they had changed. The chip had changed, the motherboard had changed, everything is getting, you know, latest and greatest, which is ostensibly what people want. But again, does it all -- is it all going to work together? I don't know if it's going to work with my software right off the bat. Chances are pretty good, because it is software and it's meant to run on that type of hardware. But we have to look at -- we have to look at the operating system and everything -- everything about it. We -- you know, again it's risk management. What are we going to look at? And we have to -- and we have to look at all of it.

But again, it comes down to dealing with -- dealing with our manufacturers. Again, we don't deal often with very large manufacturers, more specialty houses, niche players in the point-of-sale market. And they tend to keep their products around for a longer period of time.

DR. KING:

Okay. Ed you mentioned, and I think you used touch screens as an example, of looking for suppliers that have particularly long-life products, so that the life of that product somehow comes closer to mirroring the expected life of a voting system. Within your management strategy for your suppliers, is there a difference, operationally, in how you address, for example, the acquisition of a touch screen for initial design of a new system, versus a touch screen for an ECO, engineering change order, that is required because of a component failure in the field? Are there different procedures that are in play? There's certainly different timelines, but can you speak about any differences?

MR. SMITH:

There are Merle, but for the context of this discussion, the supplier selection and the philosophy behind that is the same, because whether it's an ECO, you know, some few years down the road from initial certification it still needs to be a long-lived component. And we would still look to that same segment of manufacturers and/or distributors to provide to us products that will be in the market for some period of years rather than some period of months.

DR. KING:

Okay. And McDermott, the same question with a different qualifier. One of the things that characterizes voting system issues is that we can never delay launch; that we always have elections on the first Tuesday after the first Monday in November. And so, from a jurisdiction's perspective, COTS related issues, component issues that arise as you approach those unmovable deadlines become

very different, in terms of urgency, willingness to compromise what might not normally be compromisable. And so, within your firm, any difference in how you manage the QA concerns, or the selection of products, as you and your clients move close to those election deadlines that require the gear has to be in field and ready to go?

MR. COUTTS:

I'm not quite sure how to address that. I mean, if you are getting to the point where something -- if you're -- if you're at the point where something has to be replaced that close to an election because of an equipment -- a catastrophic system wide equipment failure, you're in deep trouble, and you wouldn't want to get in that position. And that's what the testing process is all about. That's why you run these tests. That's why we beat these systems up the way we do, at the VSTLs. And that's also why people tend to buy their election systems well before an actual election. So, if you got to the point where you needed to make a decision that close to an election, it -- you would be looking more to equivalent systems. Just what is the less likelihood of there being any differences between the two systems that would cause a problem? But, as you state, there's already been a problem in place. So...

DR. KING:

Um-hum, okay. I've got Glenn, and then Luis.

MR. NEWKIRK:

Let me -- I guess, you know, the discussion has been perhaps in need of a little bit of animation, so let me do a little bit of the animation. I would disagree with the assumption that's here, the

assumption that COTS products -- that the quality of the product is known to the industry. Let me disagree with that a little bit for the purposes of discussion and say -- let me issue two prefatory comments.

One is that there has been a high degree of variability among the vendors in the past about the degree to which they do know what's, you know, in the back stream of production. And let me say also that that situation has been improving significantly since the creation of the EAC and the VSTL testing regime. I think it has been very positive. There's been a very positive impact in reducing that level of variability because of the standards and because of the testing that has been put in place by the new regime. I think that's all been to the positive, and we've all heard Tom Wilkey discuss in great detail and with a great deal of accuracy about what existed prior to that and that it was a volunteer effort and the new procedures and the new regime, which we have to remember really -- it's really -- it's in its infancy. I mean, it's a relatively new situation that we're in in the time span of voting. I believe that there has been a high degree of variability. I believe that it is declining, but I don't believe that that assumption is a fully accurate assumption.

Vendors do not always know about their primary suppliers and their secondary suppliers and their tertiary suppliers. That has simply been my experience as a tester. And I never get those phone calls in January, I always get them in October of, "Oh my gosh, there is a change we have to make right now." And it always becomes a risk assessment effort, and it's always tied back to a

level of uncertainty and a lack of information frequently about those secondary and tertiary suppliers. That's where the question will always come in.

The vendors -- and I think you would agree with this, Ed and McDermott, I think you would agree with this, I think most vendors would -- you folks are really integrators by and large as opposed to being purely manufacturers in the sense of there is no such thing as a pure manufacturer, just like there's no such thing as -- there's no such thing as inventory. I mean, it is all a function of integration, and it's that integration that becomes the major problem. It's not does this component work? It's how does this component work within the context of the device I am manufacturing and selling and distributing and maintaining?

And then again, a final point, which we will come back to, and that is, that CRM model, that customer relationship model that Paul referred to, is the most difficult component of this. I wish I could sit here and tell you I have never seen a situation where a vendor didn't know what they were putting in the field during the course of maintenance. And we're not talking about -- in some small jurisdictions, maybe it's possible. In larger jurisdictions there is slipstreaming. For, you know, definitional purposes, slipstreaming is putting in the stream of manufacturing, or support of putting in COTS products that have a less established level of reliability. It simply occurs. And, frankly, I have seen it put vendors out of business when they did it, because then you have people like me who come along and say, "Can you provide me with documentation about all of the equipment you put in these devices

during a maintenance cycle?" The answer is "no." And at that point, from a certification and testing point of view, the red flags come out of the pocket. It simply occurs. And I think that's something that will have to be dealt with. And I bet Paul can give some great examples of that.

DR. KING:

Okay. Before I go to Luis, and then Paul, I wanted to follow-up on something you said, Glenn. You challenged the assumption that COTS products, that quality is known to the industry. Is it knowable?

MR. NEWKIRK:

That's a tough question.

DR. KING:

And that's really the degree of confidence to which any vendor can know, particularly, once, as you point out, you push past the primary provider.

MR. NEWKIRK:

Yeah, that is the question, Merle, is it knowable? Again, it becomes a risk assessment. I think the answer really is, yes, I believe it is knowable. Whether it's knowable to the degree we would like for it to be in the voting systems and voter registration industry, I'm a little less confident in that. The reason I say, yes, it is knowable, because there are industries in which it is known with a pretty high level of certainty. Again I'm speaking here of enterprise resource planning systems, you know. If you're putting out a payroll for 5,000 or 500,000 people, and again, in the software area, is where a lot of the real difficulty and variability comes in here, but yes, it's

knowable to the degree that it can be known, because of the testing and the documentation that goes behind it. Talking with Bill, I would love to have confidence and say, you know, in the voter registration systems that Paul and Luis have to operate with, you know, that barcode scanner, can I see the test results that I know that it works. Boy howdy, I would like to be able to say "yes" but boy howdy, I'm not really willing to. I want to see -- and if the documentation is not there, the only option that we have to fall back on in working for clients in the State and local industry is, say, "Then you need to test it." And it would be wonderful if I could walk in at the State and level testing and say, "I want to spend one week doing nothing but reviewing the documentation that exists, and then, I want to spend a half a day or a day testing for those peculiarities of legislation." And every State and every locality -- localities tend to have operational differences, States tend to have legal differences. And when I could walk in and say, "Okay, I'm going to spend half a day testing just for the legal differences, or just for the operational differences of the locality," in reality, I usually end up not being able to do that because that documentation is not there.

DR. KING:

Okay. Ed, you wanted to respond before I go to Luis.

MR. SMITH:

Thank you. And Glenn, you're right in where your comments are headed, you're absolutely right. I'd like to go down a level, because you talk about being an integrator and you're up at a system level.

MR. NEWKIRK:

Um-hum.

MR. SMITH:

But I have a memory board to build. So, if this is going to go in my voting machine, I've got -- I need to put more memory into that memory board. So, I'm going to integrate -- I'm going to integrate a bare circuit board with some solder paste, some heat, so that it turns into a solder joint and some NAND flash memories and a connector. That's what I'm going to integrate today, because I've got to build this memory board. And I have a factory, and it could be anywhere. Let's assume it's here in D.C. for a moment. And I know those people really well because they do the final assembly of my voting machine and its major subcomponents, at least those that I designed and that are definitely NOTS, for purposes of this discussion we've had. So I know a lot about them. There's some folks that build the printed circuit board, the bare printed circuit board. And they may be anywhere, but let's assume they're a domestic supplier. I might know a whole lot about them, too, because that's a fairly critical component. There's not that many people fabricating circuit boards on the planet, certainly not domestically anymore, and so I might know a pretty good amount about them. The solder place folks, Kester Solder, they're out of Chicago. I might know somebody. I might have seen them at a trade show. I probably don't know a whole lot about them other than the tester has been around forever, and they seem to make good products. There's a couple of competitors they have. And then my engineering guys, because they're smart, they specified Toshiba memory and Samsung memory. Both are name brands,

we've all heard of them. They tested both of them. They built boards with one, the other and maybe a mix of both to make sure and we ran that QA and we believe that it works in the system. We have test results that would suffice to prove that in the case of an audit. And so, I know the assembler really well, the people who are making the solder joints. I know sort of the people who are making the boards and the solder paste and the solder. I'm not going to go to Taiwan and watch the people build those chips. I don't know a lot about Samsung. I have a spec sheet on the product. I did some functional testing. I did some integration system level testing. I believe that it works in my configurations that I have certified or would then, but the -- I disagree with we don't know as much that it's going to work, but I would agree that the information about the vendors as we go to these tertiary suppliers is less. But I also challenge the assumption that that's not okay. In my opinion, I think that's fine. I don't need to go to Taiwan and watch them build from wafer to hermetically sealed chip, but I would like to see the end item assembly. And I certainly want to make sure it's going to work in my configurations, which could be many.

So, that's some perspective going down a layer from a system level where you were talking to components that end up being a voting machine. So, that's some thoughts that I'd like to bring to the table around what information you have, what testing you do, how do you assess risk? A Samsung chip, you know, I don't put a lot of weight in terms of risk that Samsung is going to botch the manufacture of that chip. They make millions of them a day and they're in everything. I mean, how many pieces of silicon

are on or under this table? They're there, so I don't feel a lot of risk there. Where my risk is, is does the timing and the circuitry and the involvement of that memory chip work in my system? So I test the heck out of that, but I don't worry too much about supply chain management at Samsung and their manufacturing process. And I think that's an okay balance, so just some additional thoughts going down a layer from Glenn's discussion.

DR. KING:

Okay, good. I've got Luis, and then Paul.

MR. TORRES:

Well, I want to speak to the local level. I mean, we're faced with this issue on a daily basis, when you spoke to McDermott about the changes, how frequently these changes are happening leading up to an election. Well, they do happen. And we're faced with, do we go to those changes from a jurisdiction level?

And a prime example in 2010, there was a -- there was two components in our system; one was a memory module, one was a battery issue. Now, these were fundamentally important pieces of machinery. They go through the testing/certification process in the State of Florida. These products are tested. When they're brought, because of the time crunch, all facets of the system cannot be tested. So, at the local jurisdiction level, we become the test database for the manufacturers. And that is the difficult part. And, you know, sometimes we make those decisions to go to the next version not knowing the impact that it's going to have on your election. And there's no turning the clock back. Once you commit, you can't go back. And that's what I have to deal with in making

those big decisions. Last -- in 2010 I made a big decision, and because of that decision we have some decertification going now on particular software, but we also -- the vendor is making changes to improve it.

So this is the -- it's got to be a balance of when that product gets certified and how much leeway time do you have to implement it so you can have your own testing criteria. And at the local level, there has to be testing.

DR. KING:

Okay, good. Paul.

MR. STENBJORN:

What I'd like to speak to is, first of all, Ed, I know from an election administrator's standpoint, we don't expect you to certify the supply chain management of the Samsung, you know. I think we can all understand that there are things that are beyond the threshold of what we're discussing. But really, in forming the idea of what -- how the use of commercial-off-the-shelf software impacts election administration it would be invaluable to know the legacy, as Luis was referring to, of systems and knowing real-world experiences and knowing which components failed and which -- in jurisdictions so it can be used at least as an informing piece of information for system selection. It was actually something that we requested from the vendors who responded to our RFP to provide some sort of substantive documentation about the legacy of these systems as deployed and known system failures and known component failures. None of them was able to present it. And, in fact, it's still written into the RFP with the one it was awarded. But none of the

vendors who responded to our RFP was able to present this. And it would be something that, again, that would be extremely valuable for us to know. And I would think that it would be valuable for the manufacturers to know to have some sort of data collection mechanism back from the field. We don't have a system for that right now. I mean, it's all anecdotally right now. I know that ES&S does maintain some functional database of known system failures, but it's not something that they can share readily with a client. And there is not an independent -- there is no independent oversight of the reporting of this information on whether or not it would be selectively reported. There's no formal data capturing mechanism for it either, so it would only be -- it would always be ad hoc data collection as well. So it would probably be skewed because, as you know, people are 95 percent more likely to report a failure than the success. So, obviously, just self-reporting doesn't succeed.

Perhaps this breaks down our protocol of our roundtable, but the question -- I actually have a question for the vendors which really discusses -- it bleeds over into question (b) in this question set here. I know that our market is very small. I mean, how do you manage relationships with COTS vendors when you're buying into such a small marketplace with such a limited -- I mean, where we have a long product lifespan and such a restricted client base? I mean, how does that inform and affect the way in which we work with COTS suppliers?

DR. KING:

Excellent question, Paul. And, you know, I'm reminded anybody who works at a State jurisdiction level, the State of Georgia buys

many, many times more Dell computers than all the system vendors put together, in terms of managing COTS.

So, let's take Paul's question as a segue into (b), which is, does the size of the industry, does the quirky nature of how purchases are made, how does that impact your strategies for managing the COTS supply?

MR. SMITH:

Do you want to go first this time?

MR. COUTTS:

With great subtlety, I think, is the only way to put it.

[Laughter]

MR. COUTTS:

Ultimately, what it comes down to is cost. You basically have to pay for that management. When you are dealing with the number of components that we're dealing with, we're not getting bulk discounts. So if we are managing a good relationship with our vendor, the chances are it means that those components will cost more. But again, people are -- cash is king. If you're willing to pay more for the components, then people are willing to work with you. They're willing to say, "We need to make this change and this is why we're making that change," and work with you through a transition. But ultimately, it comes down to cost, and also, just manpower, to track changes.

DR. KING:

Okay. Ed.

MR. SMITH:

A few strategies come to mind, and I spoke earlier to picking the correct suppliers, picking suppliers that are known to provide products to aerospace, medical device, other high reliability environments with longer lifecycles than the people who supply, let's say, only to fax machine vendors, where it's a little less critical. That's one way. And you're right McDermott, it may cost more. For instance, you may, instead of going to the Dells and the HPs of the world, skip out of that and go to a white box computer supplier, which is a specialty distributor that says, "We will build you this configuration of a box. It's this part number. That's your part number. And we'll build it for you for the next four or five years." But those are going to cost more because it's not a mass market, mass production situation. And then, as implied by, I think Paul, or maybe McDermott, let the customer purchase the goods. When Sequoia did the City of Chicago and Cook County deployments, I believe it was the city, it may have been the county, as well, purchased the servers and the client systems rather than from Sequoia, because the City of Chicago, like the State of Georgia, quite a number more computers this year. And so, that was one way to, once again, bounce of that cycle.

And I've used the verb "bounce out" for a number things. An additional thing is to bounce out simply of COTS to say, "I'm not going to put a COTS motherboard in my voting machine. I'm not going to use a COTS printer. Maybe, I'll go to a specialty designer/manufacturer of printers for something that's inside my voting device, and now, bounce out of a short-cycle COTS situation." But once again, proper supplier selection is a way to

leverage, not a given supplier, and not leverage for lower price, or better delivery terms, or higher quality, or this or that, but just to go to the right suppliers in the first place.

DR. KING:

Okay, I want to turn this question, now, back to the jurisdictions, because McDermott brought up the issue of cost. And in my mind, it is clear that effective utilization of COTS components can certainly enhance the margin for vendors. But, from a jurisdiction's point of view, as you put together RFPs, when you look at the purchases of systems, is it driven by cost, or is it driven by functionality? We have the same coin here, and I want to see if it looks the same on both sides, to the jurisdictions, in terms of when you structure your contracts, does it always go to the lowest bidder? Or is the contract structured in such a way that you ensure that the functionality, the deliverables are there, and then the cost is what it is?

MR. TORRES:

I think it goes to different avenues. One is the relationship you have with that vendor, if you had a relationship with that vendor previously. Another would be the -- from that relationship the benefits of -- that you're looking for in the system. I've always looked at the model of, when you go out for an RFP, the lowest cost might not be always the best in a product. So, no, we don't do it by who's lower. We go with, basically, the options that this particular device offers that the other one doesn't, and is it integrated easily through our system that we currently have.

DR. KING:

Paul.

MR. STENBJORN:

Actually, the answer I'm going to give you is different than it would have been three years ago. It's cost. In fact, our procurement office kicks anything back to us where we've chosen other than the low-cost vendor if the low-cost vendor has met the requirements in the RFP. So, a lot of that becomes RFP tailoring, and then, those does get kicked back because they're saying we're being too specific with our RFP process, that we're pre-selecting a vendor. So it's become -- it's come to the point where it's really cost driven. And our selection of our vendor -- our current vendor was entirely a cost-based decision. And it was true also with our electronic poll books. And if we chose other than that, and I have this experience in Virginia, we're going to have a big contest and we're going to be defending it in Court, and so, it's going to raise our overall cost of ownership because unless we -- so jurisdictions are really being boxed in to choosing lowest cost responding to RFPs these days.

DR. KING:

Okay, good. Let's look at part (c) of this question. Does having a single source for a COTS component affect the quality of the product?

Ed, let's start with you.

MR. SMITH:

Sure, probably not. It affects other factors of the business relationship and the procurement and deployment, but quality, not necessarily. If -- if a given manufacturer being a single source their

quality declines, then we would either work with that manufacturer or abandon them.

DR. KING:

Okay. McDermott?

MR. COUTTS:

I don't have much to add to that. That's basically -- it doesn't impact the quality so much. It's -- what impacts is your flexibility.

MR. SMITH:

Yes. So, you really try to avoid that in your system design.

MR. COUTTS:

Um-hum.

MR. STENBJORN:

Is there -- I'm sorry, Merle.

DR. KING:

Um-hum, go ahead.

MR. STENBJORN:

Are there suppliers that are so specialized for the election -- voting system industry, where a sole source could actually affect the quality of it? Or are you purchasing from suppliers who manufacture for a much broader spectrum so it wouldn't be affected by -- the quality may not be affected by a sole source?

MR. SMITH:

If you take the word "much" out, I would agree with you, a broader. But like I said earlier, we, really, are trying to target a commercial long-life cycle supply base, so not much broader, but broader than single source. I mean, there are always going to be sole source and long-lead time parts on your bills of materials and you have to

manage them. But the goal is to keep those to as few as possible. And generally, other than places where you may have designed yourself into a box, no, you won't find that.

MR. COUTTS:

Yeah, the same applies.

DR. KING:

Okay. Part (d) very interesting, and I think for those jurisdictions that have, what we call affectionately, legacy systems. The notion of refurbished parts has gone from being cost-saving options to a life-saving requirement.

I'd like to really start with Pete and Bill, from your perspectives, in looking at the role of refurbished parts that are being used to support legacy systems that you may be aware of, what are the concerns from certification, from quality, and what kind of experiences might you bring into the election discussion? And I'll start with Bill, and then go to Pete.

MR. HURST:

Yeah, the question of refurbished equipment has been out there for a long time in the telecom world. And we have generally looked at it from the complete product in the sense of being refurbished. And it can range from -- I remember spending time up in New York City with different companies that refurbished telephone sets, and pulled them off the market, cleaned them up, refurbished them, and resold them. And we were looking at what standards, do we put in place for those types of products, and running them back through the certification process as well. And so, often when things are refurbished, you know, whether it's, I don't know, a printer in a

voting system is refurbished, I mean, did they change anything in that refurbishing process? And that becomes an important aspect. As we look at it from our regulatory point of view, are they making changes to the system which would take it out of compliance? And so, from that viewpoint we want to make certain that as products get changed, get refurbished, fixed up and put back on the market do they continue to comply with our requirements. And so, as we look at this question of, is it equal in quality to the new product, it can be if you manage that system and make certain that the product continues to meet the original specifications.

DR. KING:

Okay, if I can just follow-up, Bill. I know earlier you had talked about your three-tiered classification of components. On the refurbished, do you have a model that addresses refurbished components, or is it only refurbished systems?

MR. HURST:

Well it -- as we talk about refurbishing, generally we're looking at the entire system. If we look at components, we're really looking at the same -- the same model as we talked about, the three classes of changes to the product. And so, whether that product is based on a refurbished component or not, is probably not critical. The same model would still continue to apply.

DR. KING:

Okay, thank you. Pete.

MR. MARTI:

Addressing refurbished parts, we concede they're equal in quality to a new part. I think – it's been my experience with refurbished

parts, if it is -- say it has a safety and an EMC license on it, and you're considering refurbished parts, has anything in the design changed going through the refurbished? Has anything that would affect the licenses? We're talking radiation, you know, any major things. We're talking about -- it all depends -- if you're talking just components versus a system which consists of components, like a disc drive, et cetera, you're basically looking in relationship to what the initial design that was in place. For example, if you took a PC, here's a refurbished internal "components." It's the same computer system, but it's put in a different cabinet. Well, that wouldn't be considered as a refurbished, if you see what I mean. It all depends on the complexity of it. If we're talking components, you'd be less to look at it, but seeing, has the design changed, or is it truly a refurbished part. And most of the time it's been cleaned and that's it. So, therefore, it should function as well, you know, emissions conducted or radiated the same as a new part. So, it being refurbished wouldn't be looked at. It all depends on what it is and how complex it is.

DR. KING:

Okay. Glenn, in your testing, are you asked to look at refurbished components as candidates for inclusion in existing systems?

MR. NEWKIRK:

It's been pretty rare so far, Merle. Again, that has -- that has to do more with the shortness of the time span we're talking about, within the past decade. On certain pieces of equipment, DREs, touch screens, you could conceivably start looking at refurbished

equipment for the actual touch screens, the pads themselves. But by and large, that has not been a big issue so far with me, Merle.

DR. KING:

Brian.

MR. HANCOCK:

I mean, I would just put forth that perhaps something to look at would be, who's doing the refurbishing, right? Is it the original manufacturer doing the refurbishing? That might be one thing, you know. If you're looking at some third party, you know, if your original manufacturer was ISO 9000, is this third party that? Do they have the same quality steps and procedures in place as the original manufacturer? You know, there are lot of things I think to look before you could say "yeah" or "nay" on that.

MR. NEWKIRK:

And Merle, I would agree with that. Again, I would -- my first instincts would be to go back and ask exactly those questions about, again, documentation, certifications that the refurbishing manufacturer -- or the refurbishing agent. That would be the first thing I would look at, in those instances.

DR. KING:

Okay. McDermott your systems are relatively new, is that correct?

MR. COUTTS:

Yes, they are.

DR. KING:

So, perhaps some of the legacy issues have not surfaced yet. But in your planning for continued support of those systems, has

Unisyn developed a policy or a strategy on refurbished components?

MR. COUTTS:

The policy test would be, at this point, it depends. I, personally, am a big opponent of anything that moves. I don't like moving parts. Of course, one of the benefits of moving parts is the fact that you can tell when they're wearing out and replace them accordingly. So, a lot of our plans revolve around defining equivalent systems and putting them through our own testing.

DR. KING:

Okay. Is...

MR. NEWKIRK:

Merle, if I could just add one thing on that.

DR. KING:

Yes.

MR. NEWKIRK:

I think we're going to see a lot more of these issues pop up. Again, I'll use an example here of high-speed scanners. That's where the importance of being able to use COTS parts and refurbished parts will become very important, because there you'll have -- we're down to the simple little things, those -- the little rollers that go through and pick up those ballots, they will wear out much, much quicker in a high-speed scanner than they will in, you know, precinct count devices. So, the ability to be able to use truly COTS replacement parts, as well as, I guess, potentially refurbished in some of those devices, will be very, very important because they tend to be used in a much higher speed, higher production. So...

MR. COUTTS:

We actually classify those rollers as consumables.

MR. NEWKIRK:

Right, exactly.

MR. COUTTS:

And we get them -- our high-speed scanner is truly off-the-shelf.

MR. NEWKIRK:

Right.

MR. COUTTS:

Well, you couldn't walk into Staples and buy one but...

MR. NEWKIRK:

Well, but still your point is absolutely right. I mean, whether or not I have -- my clients have to pay \$4.50 per roller or 25 cents per roller is a big -- that's a big issue, and so being able to classify them as a consumable is a very important consideration.

DR. KING:

Okay. Ed.

MR. SMITH:

Well, the ImageCast family is fairly young, too, and so we haven't really run into that. But I would agree with the summation that I've heard of the comments that the classification, the history, the legacy, the manufacturing and remanufacturing of those parts gives you an answer to that question. So, I would say it depends part by part.

DR. KING:

Okay. To that end, you had earlier talked about a spectrum approach with a matrix for COTS decisions. Do refurbished,

remanufactured components have a place in that matrix in your opinion?

MR. SMITH:

Perhaps, but I think the matrix is simpler in that it either meets the original specs, or it doesn't, or you can't ascertain that. And if it meets, then there should be a new part relative to the certification program. It may not be in terms of your business relationship with a given jurisdiction. That's a different story. But if you can't ascertain or know it doesn't, well, then, that's a new part.

DR. KING:

Okay. And then, finally, from the jurisdictions' perspective, where you are, as Paul pointed out, often now, cost driven, any perspective that you have on strategies, preferences regarding refurbished/remanufactured components?

MR. TORRES:

Recently, I mean, we're seeing a lot more refurbishing going on in our -- in our components in our voting system. Is there a reliability issue? I haven't seen it. I haven't seen it. Now I don't know the specifics, as far as if they go back to the same manufacturer that it was created, but yes we're seeing that a little bit more. And hopefully, those cost savings of remanufactured products are handed down to the local jurisdiction level. And just like they were talking about the high-speed scanners, I mean, those -- those rubbers, I mean, you know they're going to wear and tear. We've got to be able to purchase them at a reasonable price at the local jurisdiction.

DR. KING:

Okay. Paul.

MR. STENBJORN:

D.C. doesn't make a distinction between new and refurbished parts. A refurbished part has to meet the same service level agreement that we have with the vendor as new parts do. As Brian pointed out, it would be very nice to know where they were refurbished, but we actually hold the vendors to account for the performance or non-performance of the equipment. So, there's really no functional/operational difference between refurbished and new.

And I just want to point something out is, I almost have to recuse myself from this discussion, because Bill works at the FCC. Many years ago I used to refurbish PBXs that were then subsequently shipped to the FCC. So, I see the real benefit of using refurbished equipment. And, you know, if there are properly quality control standards, there really doesn't have to be a difference.

DR. KING:

All right, thank you. I'm smiling, I gave a lecture a couple nights ago and no student in my class knew that there was a day where you couldn't purchase a telephone.

[Laughter]

DR. KING:

And they were intrigued by that. All right, part (e) of question number two is -- and really I'd like Pete and Bill to take a first cut at this, if they would. Are there existing models for managing the business-to-business relationships between COTS suppliers and system integrators, that you're aware, in the industries that you

interface with, that may be instructive to the voting system industry? Any models that have caught your eye that seem to work well, high-quality products, low complaints, high reliability have been evidenced in those systems?

Bill, I'll start with you, and then Pete.

MR. HURST:

Yeah, I am not aware of the specific business-to-business relationships. We are really looking at the end product and how that actually meets the requirements or not. As I've thought about this, one of the things that we allow for is actually modular approvals, whereby a manufacturer, an OEM, can get a portion of the radio circuitry approved and that can then be incorporated into a larger system. Take -- take your notebook computer for example, whether it's the Dell, or the HP over here on the desk, many of them will buy the radio circuitry, the WiFi circuitry from another business and incorporate that into their computer. So, what we have allowed for is the manufacturer of the radio to get that approved through us, and then, it gets integrated into the system. So, it's a way that improves the speed of getting products out there.

DR. KING:

Okay. Pete, any models you're aware of?

MR. MARTI:

Not really...

DR. KING:

Okay.

MR. MARTI:

...as far as business models. I really can't think of any that would be relevant to what we're doing here today.

DR. KING:

Well, I had an opportunity in working with Dell to experience how they manage their COTS suppliers on power supplies for enterprise class servers. And I was very impressed, particularly given Dell's reputation for cost containment, that they invested so much effort in identifying their components, and particularly refurbished components in the system. And it was helpful for us in resolving, but I honestly had trouble envisioning how that could be scaled to the voting system industry given the small number of clients that are involved.

But, from the voting system vendors that are here, are you aware of models, things that you've seen in other industries that you've looked at, you've thought might be applicable, or at least instructive to your firm or your industry?

MR. SMITH:

I've seen individual company business models that cater to needs of this industry and similar needs across other industries, but not -- not anything that's in direct response to this question. For instance, the white box computer manufacturers I spoke of earlier, they are filling a need, and it happens to match our needs for long-life known configuration computing boxes. But there are other industries that require that as well, for various reasons.

DR. KING:

All right, any other comments on question number two regarding manufacturers and COTS suppliers? We're going to dig deeper

through some of this stuff when we come back after lunch, but I want to make sure that if there's anything that we didn't say within the context of the second question, that we address it.

Okay, well, I think then, rather than to start on the third question, we're right near the lunch break. And Brian, I'm going to ask you, if you would, give advice to anybody regarding where to eat if they're not familiar with the area before we break.

MR. HANCOCK:

Sure. There's a number of options for sandwiches in this area. There's a place right across the street here if you go out the door -- up the stairs and out the doors, on the back side of the building another option. We have Subway cater-corner to this building on the corner of 12th Street. For those of you that don't care about your health, McDonald's is right on the corner down there, and a number of others. But those are the closest ones for the next hour or so. I believe that's we have, is that correct?

DR. KING:

I think so. And this room will not be locked or will be locked?

MR. HANCOCK:

I don't believe this room will be locked, no.

DR. KING:

And so, if you have valuables, you may choose to take them with you.

But with that, let's adjourn for an hour, come back at 1:00 and we'll start in with the intellectual property issues associated with COTS and we'll go forward. Thank you all for your participation and enjoy your lunch.

[The roundtable panel recessed at 12:53 p.m. and reconvened at 1:07 p.m.]

DR. KING:

I think we're back. I hope everybody had a good lunch. And again, in order to accommodate the folks that are taping and transcribing today, we're going to try to take a break at 3:00 today. So, I'll be watching the clock as we move towards that.

Before lunch we looked at defining and describing COTS, and I think one of the takeaways that, certainly, I came away with, is, that there's more work to be done there in that the implications of COTS for testing at the VSTL level, at the jurisdiction level, developing contractual language that addresses it. We probably need to drill down more through that, but I think we may save that for tomorrow. And that may be a part of the homework that we come up with for tonight.

What I'd like to do, now, is to move onto the next question in the list of questions which deals with the impact of COTS on intellectual property concerns of vendors. I know, certainly, from a jurisdiction point of view, many of us are required to sign NDAs regarding software that we review. So, let me look at those questions and read them, and then we'll start through it. So question number three is, does the use of COTS components impact the intellectual property strategy of voting system vendors? Does testing COTS components impact voting system vendors? And then, there's an (a) and (b). So, let's first start with instances -- and I think that is one of the things that may be instructive for this

panel, but also for the people who are listening and will be looking at the transcript, is to try to add examples to what we're talking about. I think those instances can be illustrative of those issues. So, let's begin by talking, and I'm going to ask the two voting system vendors to kind of help kick off this topic, whether the inclusion of COTS products impacts IP issues within your firm.

I'll start with Ed, and go to McDermott.

MR. SMITH:

Okay. You know, let's look at hardware and software of COTS for a moment and divide it along those lines. The software of COTS, libraries, and such, are so ubiquitous, maybe endemic, so imbedded in the code base that you don't really notice a difference. You can't really distinguish the two, almost. So, from that standpoint, we would protect all of the code base, regardless of its inclusion or lack of inclusion of COTS components. We -- there are some intellectual property issues around the fact that that's other people's intellectual property. So, that certainly affects us from a compliance point of view. It affects us when we are asked to disclose source code. We can't disclose the source code for Microsoft Windows. In fact, we probably don't have access to it. Microsoft is, generally, much very much averse to it. And so, a request for full source code disclosure of voting system, where it runs on, for instance, Windows components, is not even possible because Microsoft is just not going to allow that. So, there are some pieces in the software realm that fit in. But how does it affect the intellectual property policy outputs and such? Not -- not to a great degree.

On the hardware front, there are some things around servicing and warranty that are affected by use of COTS. For instance, if you don't use the types of compact flashcards that we have tested, it can affect your warranty. Somebody mentioned the 512 meg, which we all know is far below the suit spot of the market today, where I don't even know if you can get 1 gig cards anymore. 2 gigs is probably about the smallest you can get and eight is probably the -- the suit spot is soon to be 16. So it affects -- it affects you in that manner, but not so much the intellectual property policy outputs that a voting machine manufacturer would think through as a management team and then output through its contracting and such. But it's more warranty and obligation oriented.

DR. KING:

Okay. McDermott.

MR. COUTTS:

We have not seen a change in the way we do business based on intellectual property with COTS. A lot -- the most important thing is your data. It's how do you move the data around? What are you doing with the data? That's the intellectual property. Everything else is just a tool at that point. And so, it's what you're doing with the votes that makes the difference.

So -- and from a hardware -- that's from the software perspective. From the hardware perspective, it's pretty much the same. I know that we share similar -- or the same technology, the same vendor with a number of different voting machine companies, and I'm sure that things we have come up with have made their

way into their products and vice versa, just because it is commercial-off-the-shelf.

MR. SMITH:

McDermott does remind me of one thing where we have common vendors, sub suppliers to the manufacturers, we may ask them to develop something on our behalf and we may endeavor to capture that such that they -- what they develop for us can't benefit the competition. So there's a piece of intellectual property strategy there, too, but it involves a sub-supplier, not the customer base or the outputs, per se.

MR. COUTTS:

That is true. And generally, what you do is you limit them to not being able to sell that particular function within the market, within the same market space.

DR. KING:

Um-hum. Glenn, in your testing of voting systems, do you see IP issues that arise out of the inclusion of COTS components?

MR. NEWKIRK:

Not really, Merle. The primary reason is I, typically, will have to sign a non-disclosure agreement going in, which means, I'm only going to disclose whatever I disclose to my client. The burden is almost completely upon them as to whether or not, and liability, is on them whether they disclose anything. It can run to a situation where if I'm writing a test result that involves a performance profile or a failure of a particular function, and again, usually it's software but not always, and there is a failure or a problem that, of course, I will note in my report. And my reports typically are a public record.

So, I mean, I've literally had it where vendors have given me non-disclosure agreements that said I couldn't disclose my results to my client which, of course, I didn't sign that non-disclosure agreement. But that would be the only kind of a situation where it would have any impact. But again, if that were a situation -- I've never run into this situation, but if it came to the point that where I really had to pinpoint something, a piece of functionality, the way it operated, and I was identifying something I knew to have proprietary status, because I have the TDP, so I'm able to see what's there. But, if I'm in that situation, I would still note in the report whatever the performance issue was, the failure or the passage. And then, I might have a separate discussion with my client, in more detail, about what that was, but it would not appear in the report. So, I'm governed almost exclusively by the NDAs.

DR. KING:

Okay, good, any other comments on that first question? Yes, Bill.

MR. HURST:

Yeah, I'd just comment on some of the confidentiality issues, intellectual property. I mean, from the testing perspective, I think that was part of the question, and often when you test, you need to know some of that information. And being from a government agency, again, we're also obligated to make our information public. But we do have confidentiality rules in our regulations, where certain documents can be considered confidential. And based upon the justification, if it meets our legal requirements, it can be kept confidential.

Perhaps the real challenge now, when we talk about COTS or, say, a system manufacturer using other products, now he's relying on that product to get his full system approved, and now it's going to require some relationships between those two companies in order to be able to provide the information necessary for someone to actually go in and do the testing and certification. So, there becomes issues to make certain that those doing the testing have sufficient information. It can be kept confidential, but how do you go about reassuring that other supplier that their information is going to continue to be kept confidential.

DR. KING:

Okay. Bill, you bring up a point that has surprised me on occasion, and that is the COTS suppliers are sometimes unaware that their product is being bundled up...

MR. HURST:

Um-hum.

DR. KING:

...for inclusion in certification, and the implications not only of the certification but, more importantly, of failure of certification. And I'm curious whether other people have had that experience where you will have third party providers that are not fully informed that their product is part of a certification suite, some of the outcomes of that.

MR. SMITH:

Well, I mentioned we've received requests over the years, in my travels, to divulge source code of products. There were third party products for which we did not have the rights to that source code, and those third parties end up having some peripheral involvement

in that request. Which may be certification activity, but it's usually through citizens looking for information or looking to analyze a third party's product and its possible effects on voting systems. So you do have that situation, especially with products that are just very ubiquitous, operating systems.

DR. KING:

Right.

MR. SMITH:

The operating system manufacturer may know peripherally that, yeah, it's probably being used in these types of environments, but not the specifics. And so, you can end up with some interesting situations there.

DR. KING:

Okay.

MR. NEWKIRK:

And I will say I do know of one situation in a State where a vendor was disqualified because they would not divulge the source code of Microsoft Windows. And that was a requirement in the RFP, that if you had anything, the other vendors in the mix happened not to use Windows, and to have written their own operating systems, basically. And they made it through. But this vendor, I mean, you know, somehow could not convince Bill Gates that it was in the infinite wisdom to divulge the source code of Microsoft Windows, so they were excluded from the procurement process.

DR KING:

Okay. Well, going onto the initial question about the inclusion of COTS components, look at 3(a). How does reliance upon COTS

components impact the internal testing protocols of the manufacturer? And then, while those manufacturers are gathering their thoughts, I'd also like to ask the jurisdictions how it impacts your internal testing. I know, Luis, you've talked about your level of discomfort of being an alpha or beta tester for vendors, but in fact, all of us do some testing, even if it's no more than L&A testing. But usually there's some functionality testing and how the inclusion of COTS influences your decisions about the scope and the depth and the rigor of testing.

And so, I think what I'd like to do is start with the jurisdictions, first, with that question, and then work backwards to the vendors, if that's okay. And Paul, if I could start with you.

MR. STENBJORN:

Sure. Well specifically, I mean, this dovetails on what Ed was talking about with the great beast out of the Pacific Northwest. The -- we had -- we actually contracted with SysTest, which many of you know well, to conduct, what we referred to, as a forensic audit of our voting systems pre and post-election. What they did was, essentially, they downloaded the firmware from the voting systems and also the election tabulation system. Where we actually ran into the problem was in trying to ferret out what was and what wasn't part of the election management system within the software deployment. And that had to do with software libraries that were not part of the original release, but were now -- had now been incorporated in it and what was inside and outside of the scope with Microsoft Windows, and not just Windows. But then, we also spoke about the other software, proprietary software that was required to

run in the system, you know, antivirus software, the Adobe products that are also loaded on it and how it affected the overall performance, and what was inside and outside of the scope of the test. So actually, we chose to push all that stuff outside the scope, you know. Functionally -- I mean, we're testing the functionality of the voting systems, and so, unless it was -- even though the voting software would not have run without the operating system or without some of these other libraries it was outside of the scope of the test. And so, that's pretty much what we classify -- how we classified it.

When it comes to the actual voting equipment and the tests we conduct on the voting equipment, really the COTS components that we are relying on, as local election officials, are external peripherals, but we will test those. And those are inside the scope of our test, but certainly, outside the scope of any certification requirement or any testing the vendor does evidently. And we had some issues with the deployment of electronic poll books that are, again, outside of the certification standard. But where some of the COTS products that were incorporated, substantially affected the performance -- actually non-performance of the electronic poll books, specifically they had these external printers that you would think would plug and play and universally accessible. Not, uh-huh. In fact, they were I mean -- I'm not going to go through all the gory details, but there was a specific liability to not having tested these COTS products with this specific software stack and that we needed to actually -- taking it through what was functionally alpha testing to the vendor, because they hadn't tested these specific

external peripherals that were COTS printers, you know, that were labeled printers that were attached to the electronic poll book. So those are just some fairly random thoughts.

Just to touch upon the IP stuff just for further inclusion, in my -- my question for the vendors is, have they encountered any IP considerations about things -- COTS products that they've incorporated where there might be a patent or a copyright holding on the component that was incorporated that may not have been considered in advance? Because there are some pretty broad patents out there in the election sphere right now, and I'm just wondering if that's coming back to bite anybody.

MR. SMITH:

I haven't been bitten in the elections sphere, but before I joined this specific industry and was in the manufacturing side of voting machines and other products, yes, where a particular technology that we and many others used on the manufacturing floor was the target of some folks who had patented, essentially made claims, back in the late '50s and held that patent in trust, and then came at us in the mid '90s and caused some issues. But that was not in this industry. In this industry, no, I've not run across that, at least, not yet. But, yes, I have experience with that exact situation in a different industry.

DR. KING:

Okay. Luis.

MR. TORRES:

Well, in a way, you know, having COTS components, you know, like a Windows-based operating system, which we know the

functionality of a Windows-based operation makes our testing slightly easier, because we're not going to test a Windows-based system for whatever it's doing. But what we do, is, we have to test the functionality of their software suite, their software stack. Like Paul mentioned, peripherals are our main testing platform because there's a lot of peripherals that go along with conducting a successful election. Ballot-on-demand is one of them. So, you know, to speak, is it easier or harder, I think I would have to say it's kind of -- it streamlines the process for us, and now we can focus our attention on, basically, tabulation and reporting.

DR. KING:

Would both of you consider your testing, and let's restrict it to the peripheral printers, I think, we should both mention, are your test protocols formalized? Are they articulated in the test suite is run through and the results evaluated? Or is it more of an informal evaluation of the functionality of that component?

MR. TORRES:

All our test protocols are a public record because we are a government. So, we do stuff by guidelines, by statute, but we also do other extensive testing, internally. So, you could say, yes, that we set forth guidelines. And actually, in Orange County, we actually make our guidelines a little bit stricter than other jurisdictions that are around us.

DR. KING:

Okay. Paul.

MR. STENBJORN:

We have a formalized test protocol for L&A, but it doesn't specifically speak to the peripherals, because the only outcome that we're statutorily mandated to provide is the accounting of the outcome of the L&A.

We are currently looking at creating a more robust testing standard, but really it's going to -- yes, we are looking to create an even more formalized testing process. But, no, currently, the only one that is formal is the L&A process.

DR. KING:

Okay.

MR. TORRES:

And if I may add to that, we create certain documents that are part of our testing criteria. As far as clear and test procedures on a tabulation piece of equipment, those are filed with the Division of Elections, so they know that this particular machinery has been through a quality, you know, test, basically.

DR. KING:

Okay. And in your attestation of the test, is there a signoff by the Supervisor of Elections? I guess, who attests to the conformance of the COTS components?

MR. TORRES:

Well, as the technical service manager, basically, I hire temporary staff to go through the clearing process, but then, there's also that QC process that we have to go behind our test to make sure that these things were done, because the amount of equipment that we deploy, we want to make sure that, you know, we have documentation for each piece of machinery that's out there. And

what we do is after that machine is done, they're signed off, it's dated, either myself or one of my assistants will go out there and QC the product -- QC the paperwork to make sure that everything was checked, and actually do a random test, and pull the unit off the shelf and test, and make sure. But in the whole realm of the testing process, we're covering from "A" to "Z" exactly what's going to happen on Election Day, no in-betweens. Not -- we cover -- if we're going to transmit on Election Day, we're going to transmit during our testing.

DR. KING:

Okay. And in both cases, the results of your test, I know you indicated they're communicated to the State certification department. Is it shared with the Florida State certification?

MR. TORRES:

Yeah, I mean, basically, yes. It's on file, yes, as part of our security procedures.

DR. KING:

Okay. And yours is on file?

MR. STENBJORN:

Well, we are our own State.

DR. KING:

I was going to say you are.

MR. STENBJORN:

So, we're both State and local for federal work.

DR. KING:

Is it shared with your vendors?

MR. STENBJORN:

Do we share our L&A results with our vendors? Or any test results?

DR. KING:

Well -- your test results of your peripheral components, are those...

MR. STENBJORN:

Well, it's only -- as I mentioned, it's -- our -- the formalized testing, and we do informal testing, but our formalized testing is essentially a binary, "yes" "no" on the peripherals. And do we share that with our vendors? Yeah, we share that but there's not a formal communications vehicle we use. We are required to conduct a public process where we publish the results of our L&A test. We do that. It's a public document. We do, informally, share these with our vendors, as well, if we have a concern about it. But, you know, things like our electronic poll books, for example, there is no formalized testing for them. There are ad hoc processes that are involved with those.

DR. KING:

Okay. And Luis do you share with the vendor?

MR. TORRES:

What we do is, like you mentioned, a public test. We conduct a public test prior to any election where the public can come in and test any piece of machinery that's off-the-shelf to see the functionality and actually if they wanted to go and do the, you know, kicking out blanks. But what we do is after a public test those specific results from the public test are actually uploaded to the Division of Elections as a conduct of election, basically. After the

election we submit a conduct of election. If there's any problems or issues, we document that to the Division of Elections.

MR. STENBJORN:

In Virginia, just speaking historically, there was a document of certification of conducting of the L&A processes in conformance with the State standards. There was no -- the data weren't transmitted. There was no format to transmit the data. Each one of the counties in Virginia many -- use many different voting systems and peripheral systems, so there would be no common standard to communicate, which is something that, hopefully, we might look to change in the near future.

DR. KING:

Okay. Well, as I kind of work towards the manufacturers, I'd like to pause with Pete and Bill, for just a moment, and ask,, in the spheres in which you operate are the test protocols for COTS components proffered by the COTS provider? Are they specified by the integrator? Are they existent in other bodies of either statute or rules and regs? And who sees those protocols? Who signs off on the protocols? Can you give us any insight into the things that you may be familiar with within your scope?

And Pete, I'll start with you.

MR. MARTI:

All that I've been involved with, at the Navy, is basically comparing it to the military standards. Because of the environment, most products if they're electrical nature, it just automatically gets tested to 461, 464, depending on what it is. Whether it's COTS or not, it's based on the application where it's going into. Is it part of a missile

system? Is it, you know, a war-faring system? Or, depending on what it is, there has been less testing in non -- I would say non-fighting environments, such as on a base, where you're going to have -- if I have a computer in an office, they primarily just automatically accept UL, CSA, you know, the testing marks and rely on the certifications that have already been done from the commercial market. So, in an office environment, it's almost everything that's been here in the States, unless there's requirements depending on the base on the country, because each country has their own determination what the requirements are based on what the function is. But I have been -- that's basically -- if it's based on where we're putting things, most of them are war-faring environments and, therefore, the military standards come into being. So, they don't rely on the COTS at all. They have to retest for a lot of reasons, mainly because they put a lot of things -- a lot of emitting items in a very confined area, and so it's a total different environment than you would see in a normal commercial. So, it's just a matter of -- if it's going into a military environment, they automatically impose the requirements. And because the standards are so much different in complexity, they just automatically test.

DR. KING:

Okay, good. Bill.

MR. HURST:

Yes, we look at -- equipment subject to FCC and testing protocols used there, we have a number of options. We do like to turn to industry, to develop consensus-based standards as much as

possible. So, that's where we generally work. We are working through various industry standards development organizations who will develop these procedures. Often, for some of the new technologies, the standards bodies aren't there yet, and so that becomes a challenge. And through the laboratory division, we have engineering staff who will do initial development of procedures, and we've put that out as guidance. It also may be incorporated into some of our rulemaking process as well.

And so, if you look at -- looking for examples, the ultra-wideband technology that is out there, using a very wide spectrum, as that came out new technology, as part of the rulemaking we address some of the measurement procedures, as well, as part of that rulemaking to allow the public to comment on that process. And so, we have taken various approaches. We would really like to see industry develop that, ourselves. But when that is not happening, not practical, we have an engineering staff who work on that and develop that. And that often becomes a basis for future industry standards.

DR. KING:

Is the velocity of change within the industry, that the FCC regulates, is that a factor in permitting the time for those consensus standards to be developed?

MR. HURST:

Oh, it definitely is. It definitely is. It's -- technology is changing so fast that it is changing much faster than the standards bodies can really keep up with. And so, that becomes a very real challenge, you know. A number of products that we deal with, the standards

bodies are still discussing trying to work how they're going to do it. And we can't wait, so as an agency we provide that initial guidance to help them get the product tested.

DR. KING:

And that's where your internal engineering support...

MR. HURST:

Right.

DR. KING:

..steps in? That's interesting.

MR. HURST:

Right, I mean, we may be -- it may be a matter of working with the individual companies that are developing the technologies to sit down and say, you know, "What is going to be an acceptable way to do that?" And we will have that dialogue, and then, we'll provide some draft guidance to the entire industry that's developing this type of technology, and then, we will finalize that. And that can happen much faster than the standards body can actually get it into a standard.

DR. KING:

Okay, thank you. Well, let me come to McDermott then, and ask the management of the testing protocols for COTS components from an integrator's perspective.

MR. COUTTS:

Well, I mean, change is inevitable. I remember when I first started the first version of our products, more years than I like to remember at this point, that 64 megabytes was the best USB drive you could

get. And that was all we need. And strangely enough, that's still all we need, but we use a little bit more now.

So, managing that change during the course of not just testing, but the development process, we've had things through the course of a development process just say, "Okay, we're not making that anymore." So by the time you're going into certification you've got to be using something else, the same thing with software.

We've had software tools where versions have gone out of play and we've got to decide, do we want to move up or do we want to work with what we've got and understand that we're going to be escrowing this and supporting it ourselves. Since most of what we use is open source, that makes things a little bit easier, but not ideal. So generally, we need to follow a solid development pathway forward. Luckily, we haven't had the situation where it changes in the middle of certification, but we -- that's more of a testament to the speed of certification than anything else. The -- but it becomes a little bit tougher when we need to sell something six months after certification.

We -- so what we wind up doing is, again, we're looking at both context and criticality of the thing that is being changed. Where is it being used? How is it being used? What is its importance to the overall function? And as we look at that, we've decided, "This is where we're going to test it." How deep of a smoke test do we need to do? How -- do we need to go beyond smoke testing? Do we need to go into some more in-depth testing and make sure that everything is working exactly the way we expect it to? So, from that perspective, again, we're making a

determination as to how deep do we have to test something when it changes in the middle of a process.

As far as when it gets past certification, that becomes something we communicate with the EAC. We say, "We have this, it has changed. What is our protocol? Do we need to go back and recertify? Is this an ECO? Is this -- where is this level of change?" It would be a lot easier if we could say, "We are using this set of specifications" and say, "This is what we need to function, and as long as we have this, we'll be good." The example of the hard drive, as long as we have this, it will work. So, at that point, it makes it a whole lot easier moving down the line that we're not locked into a specific size of USB drive or a specific model.

So, you know, that's where we start running into our challenges. It does -- it adds a lot as far as our testing overhead, the testing overhead is high, no doubt about it. But, you know, that's what we do.

DR. KING:

Okay. I want to ask Ed, and then, I'm going to come back, McDermott, with a follow-up question to you.

MR. SMITH:

Unlike McDermott, we have had COTS change in the middle of a testing cycle, Windows 2008 to Windows 2008 R2. And what we had to do was take QA resources from the programmed and project managed QA testing to regression test that change fairly immediately and co-developers, as well, and then QA went back to what it was doing once it had regression tested 2008 R2. So that does happen. And it actually happened fairly quickly into our

current VAC campaign. It was only about two or three months old. So it happens. And even if your certification is fairly quick, you still have the deployment which, you know, can be years and years and years and the situation is not -- the situation is that components are not available during that lifetime of that equipment, be it Windows server operating systems, laptops and servers that were originally certified, licenses that go beyond support, software libraries that move up and you can't get the original COTS libraries from years ago. There are just a number of things that can cause you to have to go back and do some testing and work with State authorities, and ultimately the EAC, to bring the system to a deliverable configuration that meets their requirements and is certified to.

So, it kind of goes to question 4(b), are there hidden costs of using COTS? Yes, there are. There are benefits and there are costs, too. And that's one of the costs is rapid obsolescence compared to a voting system's lifecycle, and then, the QA that results from that.

DR. KING:

Okay. Before I come back to you I want to get Glenn's perspective. So we've got the jurisdictions, the agencies, the vendors. From your perspective as a tester of voting systems, what difference do you see in protocols that are provided or available for testing COTS components?

MR. NEWKIRK:

Wide, a very wide difference. I mean, there -- face it, for most State and local jurisdictions prior to the enactment of HAVA, prior to the change of the regime from NASED to EAC, testing was, it wasn't hit

or miss, but it was less structured in many instances. And as a result, in the State and local jurisdictions they frequently had only one test requirement, and that was that it had to have a NASED number. And that was it. That was the test requirement. And from their perspective the whole thing was COTS. I mean, it was -- I mean, whatever came through the door was COTS. That has changed a great deal. And the costs have gone up. I think you'll find -- I think I'm right saying that probably within your own jurisdictions you've seen change over time as these protocols became more rigorous.

I currently work for one jurisdiction. We are philosophically of a like mind, and that is to say we are end-to-end testers. And that means, you know, we're fundamentally standing there with an electrical power cord. When they walk in, they're given a day to set up their equipment and plug it in, and what they plug in is precisely what they are going to be selling to the counties in that State. And that includes the printers.

And by the way, I think we need to, maybe, whether this is the time or whether we want to do it later, there are really two kinds of printers here. We need to be very careful in discussing these printers. There are external peripheral printers. Those are the HP laser jets and the Okidata.matrix or whatever. And then, there are the printers that reside in those optical scan devices and in the DREs that print, you know, frequently. That's what you want to print out of your L&A testing. Many, many states have a requirement, I know the ones that I work for right now and the local jurisdiction, you got to produce a zero tape. And that zero tape

must come from that device. It doesn't make any difference what the peripherals are.

So again, I guess, I would say the restrictions are getting greater, have been getting greater and more tightly defined in virtually every jurisdiction I'm working in now, you know, I think. And that increases the cost for everybody. It's expensive for vendors to pack up an entire system because, again, when I say end-to-end, end-to-end. The whole nine yards, we want to see the entire system. They have to pack that system up and ship it onsite for two days a week, two weeks, whatever it happens to be to go through that costing protocol. Are costs going up? Clearly.

DR. KING:

Okay. Luis.

MR. TORRES:

You know, when we're discussing this about COTS and the effect that it has on the local jurisdiction level, one of the things in Orange County, what we had to do was, we started looking at the type of worker that we needed to support this because, as we know, technology is great, but it also takes a certain type of person to support it. And we just kept on throwing devices out there. We kept on -- we threw a DRE, then we threw a digital scan, we threw e-poll books, we threw an IOP laptop with an air card. And one of the things that we have seen is our costs for supporting it has gone up.

And we're trying out a model where we used to hire -- by position we used to hire a poll worker to operate a DS-200, operate a DRE and all that. But now, we're going into -- we're going to try

out a model in our municipal elections on March 8th where we have a technical staff person at the polling place to be in charge of the DS-200s, DREs and all that. Well that technical staff person is not going to get paid the \$175 that day. It's going to cost us a lot more money and the training is going to be more extensive, where our poll workers, right now, we don't train. They don't get paid for training. They get paid to work Election day. So it is -- it's a difficult challenge at the local jurisdiction level because our costs are going up.

DR. KING:

How many precincts in Orange County?

MR. TORRES:

Orange County, we have 262 precincts. We have roughly around 624,000 registered voters around there, give or take. Don't quote me on that. It changes.

DR. KING:

Very good. McDermott, when you were talking about the costs associated with testing COTS components and how you've not yet had the situation where you had a component change in the middle of a certification run, because you're a relatively new company and don't have the legacy systems out there yet, in your design and specification of components for your system, is there a process by which the highly volatile components are identified as a part of the design process, that is, components that are likely to be swapped out early on in the lifecycle of that system?

MR. COUTTS:

We do. As part of our build materials we have identified those pieces, I mean, primarily the USB thumb drives, which are the ones that are moving more volatile. As Ed talked about earlier, we do try to choose vendors where the lifespan of their products are longer, you know, as far as the integrated printers, the touch screens that are connected to the in-precinct devices. Those products we deal with vendors that have a much longer life. But there are parts of the product that we identify as these are -- these are volatile. And, unfortunately, one of those happens to be the chip. The chips move fast. Not quite as fast as the USBs, but they do move fast. So, these are the things that we've identified and we have people who are watching all of our products on a continuous basis saying, "All right, what's happening here? Is something happening? Are we being notified? Do we see something that we need to take a look at and do we need to -- what is our contingency plan for it? And that's the other thing is we're always identifying what else we can be doing. What are our other options?

But again, the process of going back through certification for, if the change triggers a testable event, whether it be at a component level or at a system wide level, which, again, we haven't even defined the parameters for that yet, once we define those, you know, that's commitment. There's a serious time and dollar commitment to moving that forward.

DR. KING:

Okay. I'm curious, you identified chips and USB thumb drives as typical candidates for inclusion in that list. What other things do

you guys look at that might be instructive to the EAC, as they're trying to tighten the definition of COTS?

MR. COUTTS:

From a hardware perspective, those are the ones that keep popping up.

Software is actually an easier -- is an easier process because when it is -- once the software is escrowed out at the VSTL, we then, have access to it. So it doesn't need to be re-acquired from whoever it came from. In the case of open source, the licensing issues are not significant. So that makes software a lot easier from that perspective.

Databases, as James asked me not to discuss, the recent acquisition of Sun by Oracle in the MySQL database is a concern. MySQL is a very robust, very usable product. And so, we are watching that one very carefully.

DR. KING:

Okay. Ed is there a comparable list with you all?

MR. SMITH:

Yes, there is. There's, you know, a critical COTS watch list sort of situation and it's the items that McDermott mentioned, plus the things that interface to them; compact flashcard readers, USB readers. Those sorts of things change frequently to go on and off the market as technology changes. So those have to be careful.

I don't know that that really contributes to a definition of COTS, but it does give some perspective of what we as manufacturers have to watch very carefully and keep a constant and persistent eye on, as products fall off the market, new

technologies and products and brands emerge that, you know, either cause us problems because something dropped off or may be candidates for inclusion in a system because, you know, they've come on and it's better, stronger, faster in some way.

DR. KING:

Okay.

MR. COUTTS:

Solid state drives, that's something that's on my watch list, currently. Again I don't like things that move. So is it applicable? Are they going to be used? I don't know.

DR. KING:

All right, item (b) looks at this question from the perspective of the VSTLs. And I know we don't have VSTLs here today, but we have vendors and vendors work with VSTLs. Glenn and I work with VSTLs. So I think there's some perspective on that.

The question is, how does the inclusion of COTS components impact the design and implementation of voting system test labs' testing of a system? Does it shorten, lengthen, more complex, less complex? Do we, as often clients of the VSTLs have differing expectations of the length of testing when COTS components are present? So let's start with that, and I'll just open that up. I don't really have any instincts about who might best respond to that.

MR. COUTTS:

Well, if I could jump in on that. The testing, from my perspective doesn't really change whether -- for the in-precinct devices whether

it's COTS or not. There are standards that we've written down, and we have to meet those.

DR. KING:

Um-hum.

MR. COUTTS:

And the testing -- the VSTLs create a test plan and say, "You -- it needs to do this. Do you do that"? And that's basically where it ends. So it doesn't -- the only real challenge that we've come up against with the VSTLs, as far as certain COTS components, is them getting it directly from the manufacturer rather than having it come through us. And that's more of a logistical challenge than anything else. The high-speed scanners, we need to have them delivered from the manufacturer to the lab, and they know that it is untampered with, untouched by us so they know that they plug it in and off they go. But that's been the largest challenge, other than, of course, if something doesn't work. That's -- but that's, you know, that becomes more of a challenge if it doesn't work, because then you have to deal with the manufacturer rather than the board that you built yourself. You can go back in and redesign and do what you need to do there. Here you have to call somebody and convince them that it's important that the product work this way, or you have to go out and find something else. So...

DR. KING:

And the OS that your system sits on top of, is it Windows?

MR. COUTTS:

No.

DR. KING:

Open source?

MR. COUTTS:

We use a Linux.

DR. KING:

Okay.

MR. COUTTS:

A Linux derivative.

DR. KING:

Okay.

MR. COUTTS:

So, we built it ourselves. Actually, I take that back. The VSTL built it to our specifications.

DR. KING:

Okay, good. Ed.

MR. SMITH:

I look at what McDermott said and comment that the only place COTS that I can think of saves us money in testing is if, for instance, it is a high-speed scanner delivered straight to the lab and it contains proper marks, or the manufacturer of that high speed scanner can demonstrate to the VSTL that it has undergone environmental testing equivalent to the requirements in VVSG. And then, you can bypass those tests. Beyond that, there's really no place that I can think of and thought of in my preparation for this that it has really saved us money.

On the other hand using operating systems, such as Windows where there are a number of configuration settings, and if you have a number of configurations, even in your non-COTS

products, you can lose time and have expensive testing. All of the different configurations or securing the system, by some known configuration, getting it to that known configuration, that can actually cost you money and time.

But as McDermott said, everything that's in VVSG is going to get tested. It doesn't matter what the origin of the components are.

DR. KING:

Okay. For those of us who have had interaction with the VSTLs, any comments on this question? We kind of have to vicariously look at it through the VSTLs eyes.

MR. NEWKIRK:

Well, I'm going to think, Merle, that probably they have the same concerns in many respects that we would have working with the State and local jurisdictions, that is to say they're going to have to sign a piece of paper that said this passed a test. And to the degree that you include additional components in that testing, however you do it, whether it's through the VVSGs, or whether there's some additional requirement that you include a particular class of hardware or software peripherals into it that will probably slow things down a bit on the frontend of all this testing effort. And it will probably drive the cost of it on the frontend of the testing effort. But by the same token, it would probably drive our cost down a bit on the backend of the testing effort, and the time, if we could then pick up a document and it has all the appropriate stamps and certifications and we know it came out of the VSTL it has been appropriately reviewed, there's no need for us to look at that, down at that level of granularity. That we then can move ahead to the

functional concerns, the legal concerns and the operational concerns in the jurisdiction. So it's a question of where the costs are. And I would think from a vendor's point of view they certainly would certainly like -- I'm guessing -- they would really prefer to deal with the really big, mean, nasty bear up front of the VSTLs than to run in -- to have everything go just fine there and then run into several mean, nasty little bears on the backend who expect something else. That's a guess, but I would think that's where it is.

MR. COUTTS:

Well, it becomes a cycle, because if something happens at the little bear level, you have to go back to the big bear level again...

MR. NEWKIRK:

That's right.

MR. COUTTS:

...and then, back through. So...

MR. NEWKIRK:

That's exactly right.

MR. COUTTS:

...you only want to do these once.

MR. STENBJORN:

So, my question for the vendors is, how do you declare a COTS software and hardware to the VSTLs? I mean -- and to what degree of specificity do you have to provide? I mean, are you -- you're manufacturing your own boards. So are you giving them the solder manufacturer information that you're providing?

MR. SMITH:

We're giving the EAC that because they ask for your factories.

MR. STENBJORN:

Okay.

MR. SMITH:

But to your earlier point, the answer is "yes."

MR. STENBJORN:

It's a massive data dump to the VSTLs.

MR. SMITH:

There is in your technical documentation package I use Sestra (ph) voices for my voice synthesis. I use this sort of operating system. We use these libraries. There's a list that you must provide, of all the COTS software. And then, the VSTL goes and obtains those from public sources, if applicable, and then, they build the software, as McDermott said, to your field document, which you provide. And so, you include your COTS and your non-COTS into your election management system, your device firmware, what not. But, yes, you have to fully disclose all of those packages.

MR. COUTTS:

And where accessible, the VSTL will get it for you and to confirm, not only their structure but also their origin. So it all gets wrapped up together.

MR. SMITH:

Yes and that's interesting in that there is thus an implied definition of COTS...

MR. COUTTS:

Um-hum, there is.

MR. SMITH:

...that the EAC has been operating under...

MR. COUTTS:

It's something that the VSTLs can go out and acquire from somebody...

MR. SMITH:

...for a period of this program manual. There's a bullet point there.

MR. STENBJORN:

I would say that there would be a substantial impact on the VSTLs' tests, testing protocols then, for systems that were more heavily reliant on COTS. I mean, that's the question here, how would it affect the VSTLs. I mean it...

MR. SMITH:

Well, it depends on you define the testing protocols. The upfront work, yes, significant. The actual testing protocols...

MR. STENBJORN:

Well, the testing protocols themselves, no.

MR. SMITH:

Accuracy, volume -- sure. Accuracy, volume, reliability, different unit functionally, accessibility, what not, that's all the same. It doesn't really matter, because you have this thing and the voter's going to vote on it. So usability/accessibility testing is the same regardless. But the upfront work is very different and looks very different, if it's all COTS versus, let's say, you could have a system that's no COTS.

MR. STENBJORN:

Um-hum.

MR. SMITH:

It would look very different how they go about preparing to make that test happen. Source code review is different. Source code review -- no, they're not reviewing Windows' source code. It wouldn't comply with VVSG requirements anyway.

MR. COUTTS:

No, the code review is where you get your major savings, using COTS on the software end.

MR. SMITH:

Yes.

MR. COUTTS:

No doubt about it. It's worth the 128 pages of the build document to make that work.

DR. KING:

Pete asked a question earlier today, in a comment that he made about when a voting system is submitted to the VSTLs for testing, do vendors include multiple COTS components in anticipation of having to shift to different suppliers over the life of that product. And I think your example was hard drives, multiple different hard drives. Is that a part of the strategy or part of the discussion about strategies for configuring voting systems for testing?

MR. COUTTS:

It should be, if it is not. To my experience, it has not yet been. A lot of it just is a fear of the testing going into a course of sprouts where you, depending on where you make that branch, you've suddenly branched -- you've doubled, tripled, you've created some sort of exponential disaster area of your testing, because you've created a split at a very key point.

So, that's where the fear comes in is what happens -- I've told the story of the -- of a -- where in the first version of my product I included very ISO supported language and was informed by my then current lab that they would then have to create a ballot in each of those 120 languages. The -- my heart dropped out and the president of my company was saying, "I hope you brought your checkbook." So, it's that level of concern that rears its head. So I would love to be able to say that, "Here are equivalent systems" and this is -- and we will move forward with that with some level of reasonable testing, but to create 120 ballots, including Sanskrit, was just not going -- it didn't make sense.

MR. SMITH:

I kind of take a middle road to what McDermott said, where in my past lives, where we have controlled the bill of materials we have and where it would not create that sort of situation we have, or where we would work with the test lab to understand why they felt they needed to test all 120 and say, "Well, look, can we narrow this down to English, Spanish, some sort of an Asian character language like Chinese and a few others to try and cull that." But as McDermott mentioned, when you start bringing in varieties and brands of components, you can start exponentially multiplying your test kit requirements. On the other hand, servers, well, we don't control the bill of materials there. As we said, you know, the LCD on your laptop could be Toshiba today, and Samsung the next day, and somebody else day three. So we can't control those, and we really can't test multiple configurations within those devices that we don't control.

DR. KING:

Okay, good. All right, let's move onto question four, we're making good time. And the essence of question four is, looking at the pros and cons -- I think, Ed, you already kind of talked about the fact that the costs can go in both directions, as a result. But question number four has four components, the first being, what cost savings are realized by manufacturers and end users as a result of using COTS components? And I think I'd like to start with the jurisdictions on this question. From the end user side, when you are budgeting and trying to contain costs, how does the availability of COTS components -- how do you manage COTS components? What do you look for, from your vendor, in terms of the COTS components strategy, that might be instructive to this group? And Paul, if I can begin with you, and then Luis.

MR. STENBJORN:

Sure. The hope is that when COTS components, especially COTs peripherals are used, that they're generally available COTS components, and it's not something that is archaic or specific to this piece of equipment. What I'm thinking of, in particular, is -- are ES&S people still in the room here? With the iVotronic DRE, it has an internal voter verifiable paper trail, but that's not where the zero tapes are printed, or the results tapes are printed. It's printed to an external printer pack. And there's very -- and one would think that that would be a COTS item that would be publicly available. It's a simple serial printer. That's not the case. In fact, there's only one manufacturer that still produces a printer that will conform to its requirements. So, it actually makes it very restrictive.

So the cost savings we look for, are the use of actual peripheral and other COTS items that are available in the general marketplace. CF cards are another example of things that are, you know -- having some versatility and flexibility on the sizing of the CF cards would be really nice. We don't have that either. So we're fairly restricted to what we can purchase in PCMCIA cards that we use on our optical scan units. Again, those are things that you should be able to buy off the shelf somewhere. But again, there are certain specifications that are required for our op scan, so we can't just go out and buy them from any commercial source. So the economies that we'd like to leverage from using COTS it's -- the instances where we can actually do that are pretty few and far between. The only thing -- the exceptions being COTS non-technical peripherals, you know, like paper. That we can drive down the costs on, because we can competitively bid that.

DR. KING:

Paul, you mentioned something that when I reflect on it seems so obvious, and yet it hasn't been said until you said it. And it is that COTS must be commonly available, now.

MR. STENBJORN:

Yes.

DR. KING:

And your 64 meg thumb drive is no longer a COTS product, because it's not available now. And so, there's a -- there's a currency value to COTS that when we look at the availability of those components they may have been available yesterday, but not today. And that crystal ball gazing is very difficult to do. And

particularly, I think we've all seen instances where whether by design or accident, the backward compatibility in the COTS components does not exist. And so, the assumption that cheaper, bigger, faster will be better doesn't always apply and that it may not interface, at all, with a system. But good point about it must be available now.

Luis.

MR. TORRES:

I just wanted to echo what Paul said. Basically, we don't live in a world of COTS. We live in a world of -- dictated by the vendors. Example, Okidata 9600 printer developed commercial-off-the-shelf product. You can buy it. But one of the vendors sells -- they did a slight modification on the Okidata 9600 that has a plastic guide that allows ballot stock to not sway in the paper tray. Well, that modification now becomes part of the vendor's products, so I can't go to Okidata and purchase that 9600 printer. Now, I have to purchase it through the vendor to get that modification that they did for the vendor.

And I mean, I want to echo what, I guess, Ed said it earlier. You know CF cards, CF cards about four years ago were everywhere. And I know I could take a CF card and go to Staples and buy one and use it in our DRE equipment. But if I use a CF card from Staples, I just voided my warranty, because I didn't purchase that product through the vendor. So, you know, that's where it gets tricky. And for us, you know, yes, we know it's a COTS product, but some way or fashion. USB thumb drives, our machine uses a USB thumb drive. A modification was slightly done

to the USB thumb drive where the neck of the USB thumb drive is a little bit longer, and it sits in the machine, so you can't purchase a USB thumb drive off the shelf to use in your product, because it won't be seated properly.

So, you know, COTS products are being used, but the local jurisdictions are not getting the cost benefits of the COTS products being used, basically. So, in a nutshell, yeah, I mean, we're faced with that on a daily basis, knowing that I could just go out there and reach out to Okidata and purchase this printer, but I can't get that guide, you know, that allows me to print ballots, on demand.

DR. KING:

Okay. Ed.

MR. SMITH:

That is the same situation that was brought up earlier, particularly by Pete, and to a lesser degree by Bill, in that COTS products may not meet the MIL standard, so you have MOTS and you're testing it to the MIL standard and deploying it. We have VVSG, and my suspicion, my strong suspicion, because it happened in another context to me, is that the reason you have that guide is because the commercial-off-the-shelf scanner unmodified completely and available, you know, online or what not wouldn't pass the misfeed requirements and such, in VVSG. But with the addition of a guide to, like you said, help that ballot stock avoid a little skew and what not, it would then pass. And, thus, they had to put the guide on there to make it pass.

DR. KING:

Um-hum.

MR. SMITH:

So it's not always the vendor's doing. And that costs the vendor money, in fact, to develop that guide and get it rerun through testing to pass and to be able to provide to you. So, it's not always -- you run into that exact situation. The standards are higher than commercial requirements, and so, you have to modify the COTS device to pass.

MR. COUTTS:

And regardless of whether you've modified it or not, you do have to pay for it to be certified, which is not...

MR. SMITH:

And tested.

MR. COUTTS:

...an inexpensive proposition.

MR. SMITH:

Tested and certified.

MR. COUTTS:

Yes, tested and certified.

MR. STENBJORN:

The question posed to the local election officials were did -- were we able to leverage any cost benefits from COTS products. And the short answer is "no."

MR. TORRES:

No.

MR. STENBJORN:

And while there are obvious benefits to using COTS when it comes to the voting systems specifically. Not true when it comes to the

software and the other peripheral items that we -- we can't leverage COTS as a benefit because of the configuration of systems. And there are reasons why. I understand the reasons why. But the short answer is "no."

DR. KING:

Very good. From the vendors, anything to add to that, the cost savings that can be realized?

MR. SMITH:

I think McDermott said it very well, earlier. The only thing I would add is, you can probably save some money in development, but that's about it. It all has to be tested the same. And whether it's a Bell and Howell or a Kodak or a scanner, it's going through accuracy. It's going through volume and reliability. It's going through the different singular unit tests that are required of a central count device, whether I build it or I buy it.

MR. COUTTS:

You get to the significant savings up front as far as development time and expertise in-house. I wouldn't want to build a scanner from scratch. But...

MR. SMITH:

Expertise is a good example.

MR. COUTTS:

I don't want to build printers. There are plenty of people out there who build really, really good printers. There's no reason for me to go out and hire somebody to build me another printer. So that is, no, not reinventing the wheel it's probably one of the best advantages of using COTS, because there is very good, very solid

products out there that we can leverage and get our products to market faster, and hopefully better. But, as Ed pointed out, you still have to test it exactly the same. The context doesn't change and we have to test it within that context.

DR. KING:

Okay, any other comments on the cost savings for manufacturers or end users?

Let's talk about the hidden costs or explicit costs associated with the use of COTS products. Glenn, when you're advising jurisdictions regarding certification, does that come up? Obviously, I think we heard from Paul earlier about how jurisdictions are extremely concerned about the costs, not only of purchase, but the ongoing operational costs. And often, those costs are not evident in the hurry to purchase a system, but come out in the utilization.

Do you see any hidden costs associated with COTS?

MR. NEWKIRK:

Well I -- I do. And I believe that now, more and more people are seeing them as we get longer in the lifecycle. I think, you know, frankly, most people would agree that from 2003 through 2006, this was the farthest thing from anybody's mind. I mean, they had demands to meet, money to spend and a mandate to get it done. So, the lifecycle was roughly defined by November of 2006. I mean, that was the push. I think since that time we have seen more and more interest in people looking at COTS and the pros and the cons. And I think now we're starting to see what some of those hidden costs were. I think, actually, McDermott and Ed have already mentioned some of the hidden costs, you know. We've got

lots of examples, now, as you get further into the lifecycle as you start to see, "Oh," you know, "I wish I had a V8." I mean, it was the kind of thing, "If only I had known then," where you didn't have time to know it then, frankly. It was the rush to get it out and get it done to meet the mandate and to get the money spent. And -- but now, I think it's very clear that some of these hidden costs are starting to pop up both -- well, at all phases. The development part of the product lifecycle, the testing and certification part, and now, and I know we're going to talk about this literally on the next one, maintainability and sustainability of it we're finding that the costs are a little bit higher. Everybody is finding that the costs are a little bit higher than they thought they were going to be.

I think somebody made the statement, I think it might even have been before we were going -- before we got started, perhaps at lunch, somebody made the statement that the cost factor of COTS, initially, is always viewed in the short term. I mean, that's what most people take a look at. You save money on development. You save money on implementation, and so, COTS looks really, really good. And it is. Don't get me wrong. This is not harping anything negative at all on COTS. It's just that afterwards you then start to take a look at what some of those longer term ramifications are. And I think that's part of the lifecycle we're in now.

DR. KING:

I would agree. For Bill and Pete, on the issue of the hidden costs of COTS, within the industries that you've observed, or have experience with, are there comparable issues that arise from the

manufacturer's perspective? And here, I'm going to kind of broaden it a little bit, because what I've seen is it's really a supply chain issue, in that, when the vendor controls the supply chain, the likelihood that those key components will be provided increases where there has been extensive sub-analytive components, less control. And I've seen it with batteries, memory cards, things that were subbed out are now no longer available for certain components. But for Pete and Bill, in your respective spheres, have you seen comparable instances where, as Glenn said, there may be a short-term advantage to COTS, but then, long run there are issues associated with them?

MR. MARTI:

I think the big thing is obsolescence. The longer a product -- every product is designed for a certain lifecycle. Like a lawn mower is built to last two years, or a Weed Eater, I was told -- I went to get one fixed after a year, and it was to the day. He said, "No, it was only designed to run a year." I said, "How did you design this to happen within that day?" So, I ended up buying a four cycle this time, instead of a two cycle. However, I think it is all geared to what is expected -- supposed to be designed, to what is expected in the market, what the end user is expecting. That's not always the case.

I think the obsolescence of small components -- I think technology is what's against us, because of the complexity and how fast things are moving, because every manufacturer is going to be the build cycle and they're ready for the next one. And all at once, "Oh, by the way, new technology," so they change whatever they

have to. And that's now old technology. Technology is really driving a lot. The component level, there are small things like batteries or whatever, yes they've got -- I think they've got a longer lifecycle in being useful in, you know, handling their components. The lesser the complexity, the longer the lifespan is, or you could find or adapt something to take its place. But I think that's what I've seen with COTS. Technology is going so fast and what's being required is really going to drive how long something -- a good example, a voting machine. You've got technology running alongside of it and we're all trying to keep up with it. That's what -- I think that's the biggest challenge is when you say, "We're off to the new model." Well I think it's -- a lot of it's communication, everybody keeping informed, making intelligent decisions. When do we recommend, "Oh, we're off to the next design."

MR. COUTTS:

The 3D holographic voting machine.

[Laughter]

DR. KING:

Bill, any insights?

MR. HURST:

Yeah, in the telecom industry, like Pete has mentioned, it's moving so quickly that it's a matter of keeping up. But there are products out there that have been there for a long time and continue to be out there and continue to meet the challenges of how do you continue to keep it maintained. And I would say, as those manufacturers face the need to get the changes to that equipment to be able to continue to manufacture it, perhaps one of the costs is

to continue to keep it approved and go back through the approval process. We talked about the certification and testing is an expensive cost, and you may not think about that as you buy that COTS product at the beginning of your development cycle, but down the road you may find you can't replace it, and now you've got an added cost to go back through an approval process again, which you didn't expect to have to do.

DR. KING:

Okay. What about from the jurisdiction point of view, hidden costs? Luis?

MR. TORRES:

I'll tell you, you know, when we're talking about this, it brings back some memories, you know.

[Laughter]

MR. TORRES:

One of the first things we tried to do is, we went out and we wanted to make all of the systems within our office the same model, same make and model. We have one image. We can restore that computer with this one image. Well, that didn't happen. I'll tell you, within a two-month period, we ordered a model called GX270.

Within that two-month period, by the time I ordered my next shipment that motherboard configuration had changed. So, no, there is -- I can't see cost savings involved in this, because of how fast it changes. And, you know, one of those things that I tell my employees all the time, I was like, you know, we could be at 270 today and 620 tomorrow. What we have to do is make sure that our testing procedures are in place to test the functionality of a

system. Whatever it is, whatever changes are made, we got to be able to test it to our standards.

MR. STENBJORN:

The specific extra hidden costs in vendors using COTS, versus their own in-house developed hardware or software, I go back to the example of the external printer that we use on our DRE machines. There are substantial hidden -- there is a hidden cost. There's a deferred expense, because that technology has not kept pace with the other technologies used in the system. So, it actually costs more now to maintain than it did when it was new. So there is the obsolescence factor there. That's something obviously to consider in future designs, but that's a deferred cost of having used a COTS product and it's fairly recurring.

DR. KING:

Okay, any other observations about the costs of COTS? Glenn?

MR. NEWKIRK:

Are we going to talk -- are we going to 4(d)?

MR. KING:

We are. We're going to go onto (c) and (d).

MR. NEWKIRK:

(c) and (d)? Okay, that's fine.

DR. KING:

Okay.

MR. NEWKIRK:

I've got some other comments.

DR. KING:

Okay, well, let's go onto (c) then, which I think is very germane given the maturity of our voting systems, which is the impact of costs on sustainability of systems. And I'll preface your responses with my own experience, which is, it's not what I thought it would be.

[Laughter]

DR. KING:

If you had asked me nine years ago, when we purchased our system, would the presence and the inclusion of COTS extend the life of the system, I would have said, "Yes, it would", because that's been my experience with prior technologies. That has not proven to be true. And one of the hidden costs of COTS is how much time and effort is spent in finding alternate components, and then testing alternate components, and then, as you pointed out, evaluating the impact on existing warranties, if any exist. So, from my experience, the inclusion of COTS might have been a persuasive argument at the purchase, but on the sustainability of the system, not so much.

So, what other observations, from your perspective, are there about how COTS has impacted the maintainability and sustainability of systems?

MR. NEWKIRK:

Well, if I could build on what Luis was saying, one of the hidden costs is on personnel on maintainability and sustainability. It's something that's very easy to overlook, at the local jurisdiction and at the State level. But it's there. It's a, you know, as we always like to say, the things that get cut first in short budget times are those minor things like training documentation and testing. Those are --

that frequently gets thrown out the window first, and when it does, you don't have any of the institutional knowledge and documentation that's sitting there, that you have to rest maintainability and sustainability on. You rest it either internally or you rest it on the vendors. It's your call. It will be there and there will be a cost associated with it either way. And I don't think a lot of people really realize that; that when you go back and make some of those gut-wrenching decisions, that you have to make, usually after the legislature has changed the law on you, and you have to get ready for November and you found out about the change in July, you have to be ready and able to go back and make a determination of what it was you did, why you did it in order to make the decision about why you're going forward. And you have to have a different kind of person there or people there to maintain those records, to know what you're doing, to know who to pick up the phone and call, if you're looking for a different component. And those are kinds of things back whenever we had voting systems that were 15 and 20 years old, and they were far simpler and they didn't have a lot of COTS. I mean, you know, whether it was a lever machine or a punch card or whatever it was, it was a pretty straightforward piece of device and -- piece of equipment. And now, you're in a situation where it is much more complicated, it is an integrated system one way or another, and there needs to be somebody somewhere either at the vendors or in the jurisdictions, or both, who has that information that will allow that maintainability and sustainability to be carried out within reasonable cost parameters. Otherwise it will skyrocket.

MR. COUTTS:

Part of the problem, though, is that we are not as a whole these days into repairing things.

MR. NEWKIRK:

That's right.

MR. COUTTS:

When was the last time you got your DVD player repaired? You took it into somebody who supposedly should know such things and they'll say, "It will cost me more to repair it than it will be for you to go buy a new one." So what do you do? You go buy a new one, and that one is better. It does Blue Ray and streaming video instead. So, you know, unfortunately, I think we're hurting ourselves, in that respect, because we're not repairing things and we're not getting ourselves set up to be able to repair these things. They're meant to last your year or your two years for your Weedwacker and then be done. So, you know, how do we change that? I mean, some of it is, we do it through the vendors that we choose that do do refurbishments, but some things we just don't have that option. So it's -- it's a hard call.

DR. KING:

Paul.

MR. STENBJORN:

Specifically, how the use of COTS impacted the maintainability and sustainability of systems that were deployed, the HAVA funded systems that were deployed in Virginia, is, there is now the largest jurisdiction in the Commonwealth of Virginia that uses touch screen voting equipment that is not maintainable or supportable by

anybody. And it's because they used a COTS chip vendor that went out of business shortly after the manufacturer installed it in the system. Fully certified systems, love to throw them out and buy new ones, but they can't. They can't, not just because they're not manufactured anymore, but because there's a law change in Virginia. And the code change in Virginia says that no new DRE only voting equipment can be purchased. So they can't even go out -- even if there were refurbished ones on the market, they couldn't go out and buy them because the law has changed.

And so, they've -- and so, between the certification schemes and the legislative schemes, there are these unfortunate dead ends that have occurred. And part of the reason for the dead ends is that there isn't a vendor somewhere who's currently manufacturing this item, in this -- in its current iteration. And that's because we -- it's the nature of the beast. But it's something that needs to be stated that, you know, using COTS items in these voting systems that are designed to last ten to 12 years has inherent shortcomings. And one of the inherent shortcomings has to do with the maintainability of the equipment beyond, you know, a year's lifespan, which is really the technical lifespan of most technical hardware. So, I wanted to give it a little bit of currency.

DR. KING:

Okay. Luis, and then I'd like to come back and comment on Paul.

MR. TORRES:

You know I'm going to go back to the BOD analogy, you know. We purchased our BOD through one of our vendors, our voting system vendor, and when we purchased the BOD, our warranty was

through the manufacturer, Okidata, okay? Once -- it was a one-year warranty. Now, if I looked at the cost, if I looked at the cost of the extended warranty on that particular product, I have to weigh, is it going to cost me -- I have 22 of those printers, okay? If one of those printers goes down, the cost for the extended warranty is going to cost me more. I can purchase three to four of those printers in a year's time to cover one of my machines that goes down. So, I have to weigh -- I have to weigh that.

So, in Orange County, we do repairs. We do board repairs, we do soldering and all of that. We support our own equipment. And that being said, those are some hidden costs that we're incurring, because of the type of person that I'm hiring to make those costs -- I mean, to make those repairs as a temporary technician, or whatever the case may be. I have to hire somebody that's more knowledgeable in printers, and that I know has a good printing background because he can do these steps and he can change out fuses, he can change our consumables, he could repair boards, he can change our memory modules, you know. So those are some of the hidden costs that we get faced with in the local jurisdiction area.

DR. KING:

Okay. Paul brought up a good point about the incongruity of the lifecycles of the components within the voting system. And I know, as probably in all jurisdictions now, the voting system is not "a" thing, it's a collection of things. And this collection of things is of all different ages from, you know, some of the initial HAVA purchases and, in fact, pre-HAVA purchases through very new products. And

in the purchase decision, I rarely hear sustainability criteria discussed, beyond the warranty. And often, I think warranties are committed to without much research about whether or not, in fact, they're sustainable. And I'm aware of cases where warranties have been issued and when it came time to make good on the warranties the vendors would say, "Could we substitute another product instead," as a way of honoring the warranty but, in fact, from a State certification point of view, it may be untenable.

So, one of the tangential issues it seems to me on the integration of COTS into it is this integration of lifecycles and accurate estimates of those lifecycles and the implications of managing all of these concurrent lifecycles, both independently and as a collective. So, to that end, I'd like to ask the manufacturers, in your discussions with clients, and I know you guys are in the certification piece more than the selling piece, but when the question of sustainability comes up regarding the system, how do you integrate the presence of your COTS components and perhaps the limited control you have over those vendors into that discussion and ultimately into what's proffered to the jurisdiction in your system? I think it might be helpful for us to see from your perspective the challenges that exist with these disparate lifecycles that are imbedded into the systems because of the COTS components.

Take your time.

MR. COUTTS:

I honestly cannot speak to this. It is very much out of my realm.

DR KING:

Okay.

MR. SMITH:

And a portion of it's out of mine, too, as you've stated Merle. But I'll try, because it's a very big question actually, you know. You have sales involvement, customer involvement, representations, warranties, engineering and how -- how they view the world and what they see in the vendor base and what they designed in and what they chose to design out, you know. All of those things come together. Plus Help America Vote Act II could pass and require holographic-projection-in-your living-room-voting, which, obviously, none of the systems today would meet. So, you can have situations where, you know, those little Sequoia Advantage DREs that were fairly ubiquitous around the country, out in the '80s, the Help America Vote Act came by and caused a fairly significant design effort to bring about [inaudible] and such to those units because the original configuration of the unit would not have enough ram and program memory and such to accept that.

So typically, what we're doing, in fact, in almost every case, is, we say it complies on the date that we sell it to you and we'll give you some equipment warranties which you can up, you know, you can re-up as time goes on. Because, just like I was having a conversation with somebody here today about predicting the weather, you know, I can tell you today exactly what the weather -- I can tell you -- I can go outside and tell you, "It's great," tomorrow less so and a week from now I'll probably have no idea. And, thereby, you know, it's a two-year warranty and when the contract comes up two years from now, I'll tell you, "Yeah, we'll extend you

for another two years. We'll give you a preventative maintenance package that looks like this, and we'll change out these wear components, your belts and what not, and we'll make sure everything is adjusted and in tune for your next few elections." But, it's hard for me to make that -- to make warranty claims and such and avoid, I think what you might have just said Glenn, about that it's not well researched, I agree, but part of the ways to avoid that is to kill the uncertainty by giving you, you know, extra warranty as time goes by when we have a better horizon for that visibility and to form a basis through research and through market surveillance of what that's going to look like two years from now.

DR. KING:

Okay. Glenn, do you have a comment?

MR. NEWKIRK:

Yeah, in my many respects Merle, I think this is a -- this is a procurement question. The burden and the responsibility, here, in many respects, on enforcement of this, falls on the local and State jurisdictions. By that I mean, if you put in your procurement documents, your RFP, a requirement that for all COTS equipment which, again absolutely, right it has to be identified in advance what that is, for all those manufacturers they have to provide you certain types of certifications of their quality standards and their quality operations. What that might have the effect of doing, and this actually gets into the point I wanted to make under (d), of providing no guarantees, but perhaps reducing the risk, that they will be around longer to provide that kind of warranty service and replacement products; that if they are, in fact, reputable, certified

ISO 9000s, whatever it happens to be, that's sitting out there, that there is at least some possibility that increases like the likelihood that that supplier in the supply chain, which can be two and three steps removed, will be around. So, that's what I'm referring to. I think that was the point you were trying to get at too, Merle, is that in the lifecycle, you have to start thinking about maintainability and sustainability at the pre-procurement and procurement level, not, "Oh I got this thing in my hands. How do I maintain it and sustain it over time"?

DR. KING:

Right, I agree. Let's look at the part (d), which is the security part. In some of the earlier discussions of the VVSG, going back and prior to 2005, there was a discussion about whether or not the inclusion of COTS could improve security of voting systems, since it's presumed that the COTS components had already been assessed for security, and a counter argument that, maybe perhaps, the inclusion of COTS introduced security risks into the system. And so, this question seeks to get at, has anything changed? Is it still a "yes" and "no" response? Or do we have a better feel for how the inclusion of COTS impacts security of systems?

And I'd like to start with the voting system manufacturers on this, if I could, so McDermott?

MR. COUTTS:

Well, I was talking with Pete earlier -- or actually, I think it was Bill I was talking with earlier about this. Security, it's an interesting architectural challenge, because you're talking about a very static

voting system with a fluid security architecture on top of it, because it has to be fluid. It has to be able to react to all the new stuff that is happening. You know the common joke is, “Hey what’s the most secure computer system in the world? It’s the one without a power supply, unplugged in the middle of a locked room, buried under concrete.” Yeah, it’s secure. Nothing’s going to happen to it. So, from that perspective, the security needs to be able to change much more fluidly, than function, in a voting system. And does this --- and does COTS have an impact on this? Well, it comes back to your original answer, “Well, yes and no. Sometimes it does, sometimes it doesn’t.” In the case of an open source software, it can enhance your security, as long as you can maintain it in a proper manner. If you can apply updates, then you can increase your security. But -- and also, with open source, you have a much broader community looking at it, trying to see -- trying to break it, basically. But again, you have to be able to respond to it. And that’s one of the -- that becomes one of the real challenges with certification, is that, the security is moving much faster than certification. I could be in and out of certification in a month and I’m already out of date with security. So, that’s been probably one of my biggest challenges, moving forward, is, how do we integrate that sort of flexible security structure? And some of the COTS helps, some of it hurts, some of it provides an opening, some of it doesn’t.

Linux is probably one of the best examples of something that absolutely helps beyond belief, because in -- when you remove a service from Linux, it’s gone. It’s not coming back. It’s not --

nobody is going in there and flipping a switch and turning back on FTP or whatever it is that you have decided to turn off. It's not there. That's one of the things we do in our system. We don't have compilers on the system. You couldn't put new software on there if you wanted to.

But, on the other -- but on the other side of that coin, you need to keep moving with it. You have to keep moving with the security. You have to keep watching it. And the question is, when is enough enough? I will freely admit that I have had customers come to me and say, "Oh, your system is all on Linux. Isn't that going to be a lot -- isn't that going to be hard to use?" Well, no not really, but you just have to get used to it. So, there's a challenge there, there's no doubt about it. But -- so unfortunately, the long and short of my answer is, "Well, yes, both still." And I don't think that's a changeable opportunity at this point.

DR. KING:

Okay. Ed.

MR. SMITH:

Indeed it is a "yes" and "no" answer, as you stated Merle. And the only thing I would add to what McDermott said was that it's very deployment dependent as well. Some of the security vulnerabilities that come along for the ride when they're testing a voting system are ones very much deployment dependent. If you never connect to the Internet, if you isolate, at least, from that manner while you're under or over the concrete bunker, you kill off all of those issues that are dependent upon a connection to the Internet. So it is very much deployment dependent. And deployments are all over the

map in this country. There's over 3,000 of them and, "By golly, my way is better than anybody else's way." So that shades and flavors your answer, but the basic answer is "yes" and "no."

DR. KING:

Okay. Glenn, any...

MR. NEWKIRK:

Yeah, just a couple of things, the old adage about security of, you know, it involves CIA; the confidentiality, the integrity and the availability. We very frequently overlook the availability component. Paul has already hit on, you know, literally, a vendor whose availability of their systems basically went away, because back there in the supply chain one of their suppliers went away. That's it. That and availability, it's all over. It's kind of the classic thing.

I don't know if you remember or if anybody remembers the West Coast port strike, the dock strike that occurred several years back. Two wonderful stories coming out of that, one was the Los Angeles Ballet had to cancel a portion of its season because all of its costumes were sitting out on the ships outside Long Beach and they couldn't get them to shore. That was sad and tragic. But there was also a vendor had a whole bunch of pieces of equipment that had been manufactured offshore sitting out on those ships that could not get to port and they ended up having to have rapid manufacturing and having the devices flown to the United States. And the cost went right through the roof for that. So, does the use of COTS in systems pose a security benefit or a risk? If you're not awake, it's a risk. It's just that simple, particularly on the availability component which tends to be overlooked.

Let me just add one other component to that, and that is configuration management. Configuration management is an absolute cornerstone of good security. And back when I was talking earlier about slipstreaming and things of that nature, you absolutely have to know what is in the local election jurisdictions, what is sitting there, what is being ready to use, who touched it last, what did they put it in, where did it come from, everything. And that responsibility is something that simply cannot be shifted to anybody else. You can put in the contracts that it's required that the vendors notify you of all these things. But again, there still has to be that kind of verification in there. So configuration management, I would argue, on any kind of discussion of security you've got risk and you've got configuration management is the two cornerstones that you have to deal with.

DR. KING:

I think that's an excellent point on the inclusion of COTS components at the jurisdiction level. But, at the VSTL level when we're looking at the pristine model of the voting system, does the utilization of COTS introduce any additional or noteworthy security risk? And the reason I think that merits discussion is that the COTS components are somewhat excluded from the software review. So, what is this group's take on that?

MR. SMITH:

Well, you accept -- there's a few things that I can think of. You accept that risk. I have accepted it for years and you try and mitigate that risk through your functional testing. But also, in many cases, we don't have the rights to obtain the source code, much

less look at it. And so, that poses an issue, you know. I don't even know that you could if you wanted to. So, you try and test out the risk as best you can.

MR. STENBJORN:

And I would like to actually -- I completely agree with what Ed said. I mean, there are baseline risks in every system that's deployed. It's the Windows operating system baseline risk in Windows based system that there's going to be a baseline risk. And I don't think you could test to that. It's -- you can't certify that, anyway, because it's something that's a background. It's the background risk level with any computer system. And so, what really -- what's being tested and what's being certified is that the voting system components have passed muster, and not that the underlying systems have been improved to the point, well, they'll now assist the voting system to pass muster. So, if it's almost as if it's severable from what is being tested.

I mean, this is an argument we got into in the District of Columbia last year. You might -- some of you may have followed some of the stories about our -- the respective risks that we have introduced into voting systems, and the whole discussion that we wanted to have were the inherent risks. What risks did we inherit by just transmitting ballots to voters and receiving them back from voters? And that's kind of the base -- that's the baseline background level of risk in any system. And so, there again in electronic voting systems, regardless of whether it's paper based or touch screen based, Windows based or Linux based, there is a

baseline risk level and security level. And so, I don't know that you can test to it.

DR. KING:

Okay, well, we're right at our 3:00 break, and great discussion. When we come back in 15 minutes, we'll take up with question number five. And I'll see you, then. Thank you.

[The roundtable panel recessed at 2:57 p.m. and reconvened at 3:16 p.m.]

DR. KING:

All right, we're in the homestretch. The leadership has informed me that 4:30 is a more appropriate finishing time than 5 p.m.

MR. HANCOCK:

Especially, since we have a full day tomorrow.

DR. KING:

I concur with that. So we will -- we're going to push until 4:30.

I want to go a little bit off of the program for just, maybe a few minutes to take a chance on summarizing some of the perspectives, so far. We've covered a lot of ground in the first six hours today. And we invited Bill and Pete, here, to really bring us a perspective of other industries to what we do. If you work in elections, you have a tendency to see the same people quite frequently. And I'm always glad to see them, but it is -- it is a small community and cannot overstate the value of getting outside perspectives on what we do.

So, to both Bill and Pete, I'd like to pause here in our program and ask you the question on what you've heard so far this

morning, you've heard election officials, vendors, testing people talk about the struggle of identifying an appropriate role within our testing and deployment strategies for COTS, some of the issues that we're struggling with, and would like to give you a chance to kind of give us your perspective. You're in industries that have invented the similar kind of wheel already and advice that you might be able to give this group about pitfalls, are we doing anything right? Are there things that we can do better? Are there things that we should pay careful attention to? And that's how I'd like to start coming back from our break today.

And so, if you could favor us with your observations, we would welcome them.

MR. HURST:

Yes, and I would be happy to. I would say we all tend to come from small groups of industries, so it's probably not that much different. As I go within my circles within telecom and EMC, the standards group tends to be the same people. So, it's good to get that cross mixture and it's a very good learning experience for me to see what is happening here within your community, as well.

A lot of challenges. There are different ways to kind of find the solutions to these various -- various issues and concerns. In the telecom world, right now, there's a lot of concerns and issues with how things interoperate, how well they work together, and there's some good examples out there of industry getting involved. For example, I was involved in the area of Bluetooth. So as Bluetooth was developed, there was a particular model came out to develop that which was really driven by industry, industry

consortium, and they worked out a lot of difficulties through many painful years of developing a certification program themselves, having different interoperability forms, where they would come together and make sure that the products all worked together. So, I think there's a lot of different models that you can use and look at and not -- hopefully not get trapped on the way you've always been doing things, but continue to look for new ways and new approaches to solving it and continue to evolve. I know that as we've looked at the telecom approvals, we've tried to adapt and learn. As we identify the problems, make changes in our approach in how we do things. Constant communication has been critical as we work with our industry, both the manufacturers, the test laboratories. We have relied heavily on accreditation as a means of making certain that those that are doing the testing and certification are competent to do that. I find that we have to have a constant dialogue with those accreditation bodies to make sure that they're really meeting what our needs are.

And so, it's not easy, it's a constant work to do it. But make certain -- I would say a pitfall to avoid is to -- I don't think any one person has all the answers, but to continue to look outside and look for new ideas and new approaches to solve the problems.

DR. KING:

Okay, thank you, Bill. Pete.

MR. MARTI:

Of everything that we've talked about today, I thought long and hard of the market that you are in. You have a lot of challenges. I think you've come a long way. In fact, my hat's off to you in

surviving and becoming and doing the job that you are doing, because there are a lot of challenges. I think the biggest thing is communication, being aware of what's going on around us. And from that we can make our decisions.

And looking at a couple things that I -- that really stick in my mind, I come from very large manufacturers that I've seen very successful and they're doing a lot of quantity. I think that one of timing you have a problem with, deciding what to do. But I think communication and being on the same page and figuring out what you can do collectively, in going forward. I think you've done a super job. I don't know how you've done it, but you've succeeded and the fact that we're meeting -- that you're meeting now, is that you're looking down the road and keeping an eye out, "What is going to be -- what are we going to have to do in five years? Where is technology taking us?" Listening -- looking at the different models that are around that can be looked at.

You've got several challenges, and there's only a few things that I would really look out for. One is quality, and keeping in touch and understanding who's supplying who and how -- having trust in the people that are building them for you. Going on those alliances and keeping the communications up with whoever is supplying it. And the firm understanding, "What do you want me to build"? The problem of systems, the turnover, as fast as technology is going, that definitely is going to take a lot of planning, a lot of planning and a lot of communications on what's going on and who's -- what cycles, you know. And the other one is, what's the hardware going to look like in five years? What do we think it's going to look like in

ten years? Just brainstorming, talking about it, talk it to engineers, talking about, people in the industry, testing, and what is it going to take to get five years down the road.

That's -- that's what I think -- I think QC is a real big thing. I understand, now, a lot more about your industry and trying to keep up with, not only the technology, but also with -- you're trying to provide a service, and to keep up with it, it's going to be a challenge.

But I think the biggest thing is communications. I think you can't drop off from it. Everybody has got to keep talking and keep their heads up and look out there and say, "Well, what is really going on out here? What is the best plan of attack at a very high level? Let's get to the level where, at this level, here's the functionality that you should -- that we're trying to provide our end customers. And the components, move away from doing components as much as you can, leaving it up to the integrator or the parts supplier to, basically, control that. And if they need a second, third, fourth source, at this level, you don't even see it. You are getting delivered the product of functionality. In the meantime, between failure and supportability, I think that's the biggest thing. When I heard that everything stopped because of a single disc drive, how it got there, wish it would have never happened. But I think at the component level it's got to be resolved at the lower level, and a bigger picture on providing the service.

That's what I think my observation is.

DR. KING:

Okay, good. Well, thank you. Well, that's useful. I always find it both pleasing when we talk to outsiders to our industry they're always kind of surprised at the detail. But, it's also, I think, reassuring to those of us involved in testing that there are other groups that have gone through the growing pains that we're going through and that they have persevered. And I've heard a couple of things from both of you that are consistent. One is communication, collaboration, patience, focus on quality, set the ratchet so that you don't back up on the quality issue. So, I think that is instructive to us.

I want to shift the question to, now, the vendors and, Glenn, the folks who test, about changing the protocol for handling COTS at the certification level. And I want to give the vendors a little bit more time to think about the question, because it's -- it is a complex question. But essentially, if you had a short list of changes to make to the certification process -- restrict it to scope of COTS please, not -- don't let scope creep overtake us -- but if you were to come up with a short list of two or three items that you would like to see changed, as it impacts certification of voting systems and COTS, what would those things be?

So, I'm going to give you guys a chance to think that over and I'm going to go to Glenn. From your perspective as somebody who is the recipient of technical data packages, who works with the downstream products of VSTL testing, works at the interface between the jurisdictions, sometimes, and the vendor in an indirect way, what do you see could be changed in the COTS aspect of

certification that would be of value to you and subsequently to your client, the jurisdiction?

MR. NEWKIRK:

My answer might run at cross purposes with what the vendor representatives might say on this one, Merle, because the more information we can have coming from the VSTLs and from the Federal certification process, the greater inclusion of COTS and COTS alternatives upfront, the better it will be, I believe, for my clients in the State and local areas, because we will be getting fewer of those phone calls. There will be fewer situations in which a vendor goes out of business or can't meet some particular set of State requirements. If those kinds of questions are answered in advance, which gets to a lot of what Pete was referring to, of forecasting and thinking upfront, and communicating a lot with the vendors, and getting a lot of that kind of documentation in collaboration coming from the -- and face it, they are, they are a supply chain that's sitting out there. And so, from that perspective, the more of that that can be handled upfront in the testing and certification process, even of some of what you would consider to be -- what now would be considered COTS products that don't fall within that, just realizing that at the testing level and at the State level, we might not necessarily agree that that's something that we can simply live with. I mean, I'm sure you've heard this Merle, I've heard it, that people say, "That's a COTS product. It doesn't fall within the testing and certification, so we don't need to worry about it." And yet, again, as I said very early on, "But wait a minute. You're asking me to sign a report to my client saying that it works."

And the only way I can say that is if I test it, and all that's going to do is add cost and misery and delay as far as everybody is concerned. I mean, we have had, with one of my large clients, two specific examples where we were told, "You don't need to test that because it's just -- it's a COTS reader." Well, it failed. I mean, it just simply failed. Accuracy, those are really unnerving, from our perspective, you know. Those are really unnerving when we're told that something is COTS, we don't have to submit it because it is COTS, et cetera, et cetera, and it fails. So again, I'm all in favor of putting myself out of business, of not having to spend all of that time going through those kinds of things looking for the little things that wouldn't have been missed.

Shouldn't have been missed early on, simply because it was classified as COTS. So, from that perspective, a clearer definition of what's in the circle, what's outside the circle. I like the idea of this spectrum, and the class one through three, so that people would have clarity of those definitions would be tremendously helpful, as far as we're concerned.

DR. KING:

I would like to kind of reflect on what you said Glenn, that as a subsequent tester often, if not replicating VSTL tests, at least, affirming those tests, we often look for overlap and redundancy, because it gives us greater assurance in our own findings. It's another data point.

But often, from the jurisdiction's perspective, and because I think you and I often find ourselves in, not only a testing role, but sometimes an advocacy and a consulting role with a jurisdiction, on

operational issues, that the tension between that making sure that the system is fully functional, conformant, et cetera, and the operational reality of the jurisdiction does create a tension there. And that tension is the result of budgets, the result of skill sets, et cetera. And I think once we've heard from the vendors, I'd like to come down to the jurisdictions and get your viewpoint on kind of the same question about the size of the envelope of the testing.

MR. NEWKIRK:

Yeah, Merle, I just want to follow-up what you just said because it's very important.

We all live in a world of finite resources, and to the degree that I have to spend my time looking at something that, again, from my perspective, could have and should have been caught or tested upstream, that will take away the time I have to look for my client's functional and operational interests and requirements. I don't want to get so busy worrying over here about a, you know, operation of a \$250 HP printer, and whether or not it flushes its buffer appropriately and doesn't retain images of print documents and thereby violates some security capabilities and this, that and the other, that I've missed something over here, that deals specifically with a State or local legal requirement. And that can happen. So, I really would like to be able to focus on the things that will have the greatest value added to the State and local election authorities.

DR. KING:

Okay, good. Ed, got your wish list?

MR. SMITH:

You know Merle, I'd like a new toy train set, a bicycle.

[Laughter]

MR. COUTTS:

World peace, Ed.

MR. SMITH:

World peace is always good. Thankfully, it's not a beauty contest.

So, yes, some like to have changes. I would like to see a more -- or a dynamic backend post-certification, meaning that through a process that is abbreviated, compared to the existing process, I can certify whether it be through self, the VSTL or some combination of both, different configurations and different COTS devices that vary from a baseline that received an EAC number but can move fairly quickly to receive some sort of an addendum certification or some sort of additional -- and put the onus on me to make sure that it's going to conform to the program requirements. I'm okay with that.

And along those lines, maybe that program accounts for the goodness of my design and development processes, be they ISO related, be they CMMI related, that says, like I've heard today, that people have an established track record, or they don't, and how that plays into -- so then, the judgment call is made by these agencies, and then, by folks like Glenn, who are doing State work for certification, that maybe you can. If the documentation is better, the underlying design development processes are better, somehow that plays into how much effort is then required to say that, "Yes, this configuration with newer COTS is somehow okay."

DR. KING:

Okay, I have two questions if I can follow-up. And I don't know if that was your whole list or not, but...

MR. SMITH:

That was, thank you.

DR. KING:

Okay. The first is -- and I'm thinking about Bill, in your industry, what "quickly" means. And just as a casual observer of the velocity of change in that technology, I've got a feeling that "quickly" is different for you than it is for voting systems. And so, when you say "a dynamic post-certification process that moves quickly," what might be a timeframe that you would consider to be desirable for that?

MR. SMITH:

I'll throw out a calendar quarter. To some degree, Merle, it depends on the nature of the change and how extensive it is.

DR. KING:

Okay. Brian?

MR. HANCOCK:

I think I have to agree with Ed on that respect, you know. Our goal is not to have extended certifications, you know. We have had, you know -- I think -- McDermott's here. With the few problems that we had, I think your system took eight or nine months to get out of certification, at what probably didn't seem like a reasonable cost to you, but a fairly moderate cost.

[Laughter]

MR. HANCOCK:

I mean, I think that's our goal. For a full system certification, our goal is to have that done in six to eight months. Our goal for modifications, depending on how complex it is, should be two to three months. That's my goal. So, every time we go in, that is going to be what we're looking to get, you know, out of it. It hasn't happened so far, but that's still our goal. So with that, I agree with you a hundred percent.

The other question I had was -- and I really agree with everything you actually said in sort of the perfect world as far as the wishes for the backend on post-certification items. I guess, from a certifying organization's perspective, let me ask a question though. Say we're relying on the manufacturer to tell us that, "Yes these systems conform." What is our recourse if we find that they do not? Okay, so currently our recourse would be to decertify that product, potentially. Investigate, decertify down the road. And other organizations do those types of things. The problem that we run into in this industry is we can do that, but we're putting the end user at risk. And the end user is election officials who have to run that election every year in November and a lot in between those November elections as well, regardless of our process here. So, you know, we can do that but we also have to remember who we're putting at risk down the road. And I'm sure you've thought of that, but that's just sort of my perspective.

MR. SMITH:

Absolutely. Well, one of the balancing factors to that is, now you have additional systems in your quality monitoring program that currently are not, because they're only State-level certified and

don't match your baseline certification -- or a certified system. So there is a benefit to you because now you have the goodness that derives from the quality monitoring program which you have said, and I agree with this, probably is the most valuable, if not one of the most valuable certainly, portions of the EAC total program around voting systems.

DR. KING:

Okay. And I had one more follow-on question, Ed. A lot of the testing that's done on voting systems is pass/fail and quantitative based metrics. And those of us involved in testing like that because we can subsequently back-up recommendations that we've made. But I think I heard you say that looking for an opportunity for, not only, that quantitative evaluation, but a qualitative evaluation of the vendor and their experience in the subsequent change in the context. And I want to make sure that I recorded that in my notes.

MR. SMITH:

That's sort of right. But using -- there is very -- in my opinion when we develop a spectrum, there is very likely to be some subjectivity. I heard that there was a small degree of subjectivity in the FCC's program. That you're, you know, sometimes -- the examples you give in your manual are what not -- can't fit everything, and so, you're having to evolve and then feel things out a little bit as you go because technology is changing and things don't need to be -- fit the boxes that you would like to place them into. And so, when that occurs, can another measure be utilized to say, "Okay, well, these people have a sound development methodology. These people

have a poor design methodology. So we're going to make the folks with the poor design methodology rely upon the VSTL more than, for instance, someone who has a better design development track record and current status because they have an ISO certificate that's current or they have CMMI level two or three, or something." So that's what I was looking at, in terms of qualitative. So now, you're making some judgments to fill in gaps where something in the eventual COTS spectrum, if we come out with that, may lead to some subjective decisions needing to be made.

DR. KING:

Okay. Well, I think that's, in many ways, realistic, because I think all of us who do testing would acknowledge that there's subjective components to it. I think what I hear you say is let's acknowledge that and then let's create a better way to manage that subjectivity, particularly in the context of these post-certification, rapid deployment situations.

MR. SMITH:

Right.

DR. KING:

Good. McDermott, your wish list?

MR. COUTTS:

Mine got a little bit longer, but I do agree with Ed that a more dynamic backend certification of systems. I mean, in particular I'm looking at the backend ballot generation central accumulation systems that are indeed COTS. We call Dell up and say, "Please give me X," and they send us "X." And getting those through a certification process quicker, and I'll see your calendar quarter and

raise you a month. It just adds to deployment time. It adds to cost. It adds to a whole lot of things if we have to go through the same process of recertifying all of our software to run on just another -- on another computer, when these are things that should be when it's just a software, no peripherals, a fairly plug and play sort of environment. And I'm not saying that there should not be testing. I'm saying it needs to be a little bit quicker. And again, please put the onus on us. Give -- we will put together a test plan. Put it in our certification and say, "When we change this, we will do this." And then, that's part of our plan. And then, we notify you when we do it.

Another one is one that I know is currently being worked on, but I wanted to stress its importance, is a common data format for elections. This is -- basically, let's make sure that we can test apples to apples. I'd like to -- it would speed up testing a whole lot if we have the same common data format for elections, we walk into a test event and say, "We have this election, we're going to run it through the system and we're going to get this on the backend." There it is. I think that the common data format project is probably one of the key things to getting us through a lot of our problems.

As I mentioned earlier, multiple alternatives to common and volatile hardware components without extensive retesting. And I agree, we should be doing testing there, but let's not go nuts.

And then, lastly, the -- a matrix of testable events. What is a testable event? I think we've talked about this a number of times through the course of the day, is did they change the color of the plastic? That's not a testable event. They changed something that

is not mission critical. They changed a video driver for a monitor. Maybe not mission critical, but we can define that. Or they changed something that's mission critical that we need to do a component test, or they changed something mission critical, and let's test the whole darn system, because they changed the scanner, because that's accuracy. And why you would never -- why somebody would say you wouldn't test accuracy every single time, I have no idea. And that's kind of been part of any smoke test. Any sort of retest should say, "Have an accuracy component."

DR. KING:

Okay.

MR. COUTTS:

So, I think that's my list.

DR. KING:

Okay, good.

MR. COUTTS:

I might come back with more tomorrow.

DR. KING:

Well, you know, that's a thought. Ed?

MR. SMITH:

Let me respond. After hearing McDermott speak a little bit, let me respond to your comment, Brian.

Your right, it's the end users, the jurisdictions, and hopefully, the voters that get the brunt of the risk. But, I would submit that regardless of what we do, don't certify, the risk is already there in many -- the situations that I've had to deal with personally.

For example, your Dell server that's four years old died and it's...

MR. STENBJORN:

Yes, it did.

MR. SMITH:

And it's -- don't let that happen again.

MR. STENBJORN:

We didn't have a choice.

MR. SMITH:

Say, it's a Dell 3100 Power server deluxe, whatever, and Dell doesn't make those anymore. Now, it's a 310T. So, there are issues. Some States would take issue with that. I would submit that the EAC certification would take issue with that. But that jurisdiction's server is still dead. So, whether we do nothing about it, their server is dead and they can't hold an election, or whether we do something about it and we, the manufacturer along with perhaps the jurisdiction, the jurisdiction on their own or somebody, they hire Glenn. Somebody tests this thing and makes it work again. The risk equation really didn't change. And once again, if it's part of the EAC process you get the benefits of having that configuration in your quality monitoring program.

So I mean the problem is extant regardless of what we do with it. And on the other hand, what you end up doing is something that none of us want, and that is a proliferation of State certifications. Now, the State is having to certify that because either the manufacturer can't or won't do it with you or -- and this is not true but, for instance, you could say you can't or don't or won't

have a certification program. Of course, you do. But, you end up proliferating State certifications, which is not good for the community.

DR. KING:

Brian.

MR. HANCOCK:

Yeah, I agree. The one thing that I've said for a long time, for years really since our program opened, and I'm not sure States have taken this to heart, is that they need to have an emergency procedure, right, because events -- we all know that events happen very close to the election and changes have to be made. Those elections have to be run regardless of the Federal certification, regardless of the State certification, in most instances. So, States have to have that backup, you know. And I think as long as that's there, legislatively or procedurally, I think States will be okay. But I think we need more States to really realize that that's an issue and they need to take that to heart.

DR. KING:

Okay. Yeah, I would like to ask the two jurisdiction representatives about their perception of any needed changes to the testing protocol, as it exists now, vis-à-vis, COTS. And, in prefacing that question, one of the assumptions that's often made, although Brian did just address the exception to that, is that if you're running an EAC certified system in your jurisdiction and you have a server failure and a new model of server needs to be configured and you inform the vendor of that, then the vendor will shoulder-up and get the certification done. But, in many instances, there may not be a

contractual requirement to do that. There may not be financial justification for the vendor to do that. And so, the jurisdiction is then faced with the specter of having to mount their own ECO and certification question. So, one of the things that I reflected on, McDermott with your comments, by streamlining and simplifying and shortening any post-certification process to address COTS issues, making sure that that system is accessible to jurisdictions without the participation of the vendor may also be a good idea, if the vendor chooses not to participate in it.

So, coming back then to the question about how this looks from the jurisdiction's perspective, what changes would you like to see, or at least, have considered, in the certification process that would create a positive impact at the jurisdiction level regarding COTS?

Paul, I'll start with you.

MR. STENBJORN:

Sure. When we look at the array of systems that are out there to be purchased, COTS are so -- they're deeply imbedded in the entire process, so it's really almost -- it's hard for me to envision how from a jurisdiction standpoint really the certification model is influenced separately from -- by COTS, versus the entirety of the certification model.

One of those -- one of the struggles, the frustrations on election officials, in a limited resource environment, is, still, lack of component level certification, even within a vendor's offering. And so, perhaps that is what Ed was referring to, that there is this matrix of relative -- of systems that interoperate where you could have a

whole menu of options to choose from. That would be something that would be helpful for jurisdictions, so we have more flexibility in our purchase. And how that might be influenced by COTS, specifically, is that could be one of the drivers to -- it could be one of the elements that would drive cost -- total cost of ownership down.

You know, certainly, in looking at the most currently available servers, because we did actually, literally, have a server crash on a four-year old Dell server in -- actually, it was a 2960 to be precise -- that is not currently supported by the vendor, is that we had to actually go out and purchase a used one to replace our system, so that we didn't have to bother with going through the recertification, because that's one of the effects of it. So is there was some method of our looking at individual vendor packages, making them component driven, it would be very helpful for the States. I think it would enable us at the jurisdiction level, at the D.C. level, is to be more flexible in our purchase options. I mentioned earlier that we had an opportunity to purchase a software library package that would dramatically simplify our election results processing. It would require an upgrade of one of the components of our EAC certified system, but then, it would bring it out of compliance with the entire package. Although, according to the vendor, they all interoperate. And I imagine the vendor would go through the process of this matrix level certification if it were relatively simple. But given the current status, they probably wouldn't.

On a slightly different topic, but just to close out my comments, one -- something I mentioned in a sidebar discussion, today, I really want us to have in the back of our minds as we discuss this. States and localities do not perceive voting equipment as computer equipment. It's perceived as machinery. And this is partly a legacy of the many, many years of having punch cards and lever machines. But the infrastructure that manage voting systems in the country, by and large, still views it as machinery. And that's one of the reasons why it has such a long lifespan. And this could be -- this is reflected, if you look at any jurisdiction, and Luis, you can prove me wrong, you have the paucity of technical expertise within jurisdictions and the State and you have largely a top-heavy administrative component to election management. Given that current reality, and in fact, that reality is probably going to -- it still has a generation to live out, we have to remember that technology is going to move substantially more quickly than the mechanics of State and local election officials to respond to it. We're going to continue to view things as, I guess, the analogy that was used earlier, that these aren't laptops; these are freightliners. I mean, these are things that we need to maintain and we're going to continue to maintain until they cannot run anymore.

So, while there are certainly new technologies that we'd like to leverage, the best response for local election officials is to continue to still view them as machinery. I don't have the technology budget. I don't have the technology staff to be refreshing our technology every five years for election systems, so -

- much less every three years. So, that's something just that I wanted to throw out there as part of the discussion.

DR. KING:

Okay, thank you. Luis.

MR. TORRES:

I just want to echo what Paul said. I mean, it's -- you know when you have a situation like a Dell server when that goes down and you've had this server, you're using it for four years, you know you're not going to get an equivalent server. It's going to be an upgraded model. Does that mean that the software that was certified on that server would have worked? It should work. We know it's going to work. But, a lot of these problems happen during the testing process. And when is that testing process done? Prior to any election and probably close to an election cycle. So, at the local level, you're going to do whatever it takes to make it up -- to get the system up and running. So, to have, like a State -- like the Division of Elections in the State of Florida say, you know, "You know, we understand your situation. We understand that there's a new model of server out there. We are going to give you some type of clearance to use this new model, so you can go forth with your election instead of bringing the whole system through another cycle of testing." It's got to be fairly quick. And like Brian, you have to have some emergency procedures, because the election -- the date's not changing just because your server went down. The date's going to be that date that you have to conduct the election. Regardless, if a server's down or if a PC's down, you have to conduct the election.

DR. KING:

I wanted to reflect on something that Paul said about viewing your equipment as machinery as opposed to what it really is, which is IT. I'm frequently asked the question, which is, how long will the voting system last. And my stock response is "forever." And the reason that I say that is, much like in your home, the day you decide to sell your home is when you start cutting back on the maintenance of it. You start making decisions about what you're going to invest in it and what you're not. And conversely, if you look at the gear as lasting forever, you will always make good decisions about finding alternative sources, investing in developing your own maintenance, repair capabilities, et cetera. And so, to that end, I do think it is really a different mindset for managing IT. In my facility, on any given day, I might have 60 servers warehoused and archived and every IT person that comes in asks me, "Why in the world would you be stockpiling servers?" In IT Management 101 that is bad, bad inventory management. But the reality is I've got to be able to deploy those same models in the field, over the duration of time that we use that system. So, there are some things that are unique.

But I think what I heard both jurisdiction folks say is that we need flexibility in the testing system to respond to the realities of our budget, the realities of our personnel in that the removal of impediments to participation -- there is an advantage to having this information shared. So, for example, if your jurisdiction and mine are running a comparable server and you identify a replacement server, and you run it through a backend recertification process,

then I can piggyback on top of that. So I think there is clearly some synergies that can be gained from larger participation, and then, ultimately minimizing the amount of State testing that goes on, which drives down that cost of ownership in the system.

So, I think we're going to come back and revisit this question one more time in our closing summary tomorrow, where we're going to reflect on this list. Ed, you only used up one of your allotted three items on the wish list, so you can come back with two more tomorrow. But I think, for our colleagues at the EAC, they need that kind of detailed input and feedback for their policymaking and I want to encourage us to continue to think along the lines of that very specific, "This change is beneficial, here's how it's beneficial, and here's why it rises at the tide on all ships." So, thank you for that. That's a little off topic, but I think it was very constructive.

I'd like to move on, then, to question number five, and we'll get as far as we can with that today. And then, I think we may have a little bit of a homework assignment for everybody to work on overnight to come back with tomorrow. This is kind of a good segue, because we've touched on product lifecycles and its impact on testing, how perhaps the reality of the lifecycle of these products is different than what we at the jurisdiction level would like it to be. And certainly, sometimes is all that the certification process can do to keep up with the velocity of change with the products in that lifecycle.

So, in considering COTS and the product lifecycle, the question for the COTS assemblers, an example Hewlett Packard,

Dell, organizations that integrate large numbers of COTS components, what is our level of knowledge about state-of-the-art practices within integrators, either within our industry or outside of our industry, in dealing with that component change of COTS components within the products they integrate?

And I will start by sharing an experience that we had with Dell regarding power supplies on servers and very, very impressed, in that, given the tag number of any Dell product, they could tell me the components that were in it, and the source of those components, and the relative age of the component when it was installed. So, my take away from that was that Dell had invested a substantial amount of time and effort into a component management system, that probably, for most clients would be irrelevant, but in a particular case of a jurisdiction using a certified configuration, it became very important of trying to find comparable power supplies to go back into the server. So, there is an example of a practice that we found to be beneficial, but also impressed me with the cost of developing such a practice and maintaining that practice.

What other examples are we aware of that might be instructive to us to look at regarding component management? Ed.

MR. SMITH:

I too, have some experience with Dell. I was a supplier to them for a number of years when I was in manufacturing, manufacturing voting machines for Hart, alongside of motherboards for compact computers in North Houston and motherboard -- portions of motherboards for Dell. And so, we got to tour their labs and talk to

their engineers and understand a little bit about what they're doing. And this, in fact, was one of the discussions. And what they do, not only to aid the established procurement procedures, which we've talked a little bit, you know, that today I can get this LCD for \$5 less than I did yesterday and -- from their competitors, the engineers designed, for instance, adaptor rings to go around their LCDs in the laptops. In other words, they can fit any brand of laptop that they want with just a change of a simple sheet metal piece. Otherwise, you know, they'd be stuck with being able to fit maybe one or two. But now, they can fit a myriad of those components the same way as somebody -- I think it might have been you Paul, you know, if they can shave, you know, a nickel off of chips, that's what's going to happen. If a Samsung RAM is cheaper than a Hynix RAM, that's what's going in today.

So that's one of the ways that they deal with it, but not -- the procurements and the costs is the star of that show, but it also has ramifications for component obsolescence and changes, in that, if somebody goes out of the RAM business, "Well, that's okay, because we've got five other ones qualified." And they're doing their own, you know, radio EMC testing, they're doing their own performance testing, their traceability is outstanding. And they'll bring back units that are problematic, units that have been through their RMA process a few times or have had service calls on them and try and find out why and get underneath these weird, intermittent, latent sort of issues that you have with electronics, sometimes, where things are just not quite meshing internally and the unit does things, like we've heard about today, that it hangs up

at weird times for no apparent reason and such. So I've always been very impressed.

But through -- as an offshoot of that procurement policy that became an engineering design policy, they get the benefits of dealing with components issues, too. And they're always updating, you know. It's a new model every time, and they're working very closely with the memory guys and the motherboard guys and the processor folks at Intel, and what not, to understand what they've got coming and what their roadmaps look like, so that they're always just right there. So, the way that they deal with it is that their markets allows, and even encourages them to deal with it. They just develop something new that happens to fit what's available today.

Certification, they don't have it, very minimal.

DR. KING:

And skill ability of that kind of system to smaller markets like voting system markets, would that be problematic? I mean, a part of the reason that Dell can do what Dell does is they're scale.

MR. SMITH:

The same thing with the cell phone manufacturers, the folks making calculations and fax machines and other ubiquitous consumer and sordid consumer products. Sure they can. Some of that you can back port to a smaller industry and some of it you can't. And some of it you can ride the coat tails of a Dell and the other large players, but a lot of it you can't. You end up, like I talked about earlier, you've picked the right supply base to fit your volume and your product mix. Because, when I go to manufacturers, I don't go to

look at the top two or three contract manufacturers across the world, because they only want to do printers, fax machines, phones and what not. I go to the mid-market folks that want to do and can tolerate and have set up their customer base and mix to tolerate, okay, "I've got a lot of voting machines to do today, but might not in six months, but maybe by then I'll have some automotive work come in, or I'll have some medical device come in." So they have a multi-cylinder engine, such that any few cylinders are hitting at one time and their business steadies out as a result.

DR. KING:

Okay, good. Other observations about best practices on component management?

Pete, or Bill, in your industries, do you see models that stand out as, perhaps, needing to be emulated?

MR. HURST:

It -- I mean, it's been noted, based on the size of the company that's doing the manufacturing, it can make a big difference. And there have been cases of great excellence, as we look historically through the telecom industry, and those companies do have multiple suppliers. They have their back-up plans, and they do a lot of their own in-house testing to make certain that the products are qualified and have a great quality system. And that's probably one of the keys, as I mentioned before, ISO 9000, but different quality systems are probably key to make certain that the manufacturer can develop and deliver that product and be prepared to do it. So, you know, as you have various size and capabilities of

manufacturers, it becomes a challenge. But, perhaps the quality system management is something to take a closer look at.

DR. KING:

Okay. Pete, any comments regarding that?

MR. MARTI:

No, not really.

DR. KING:

All right.

MR. MARTI:

Contract manufacturer level, I've dealt with it, but I don't really have anything to add more than they have.

DR. KING:

Okay, all right. How does the use of COTS impact the development cycle of products in voting systems? Accelerate, adds complexity?

MR. COUTTS:

I think we've already kind of touched upon this. I mean, again, it's - - the upfront of benefits are huge. And the fact that we don't have to reinvent the wheel is also a massive benefit. We can take advantage of what other people have done before us. But then, again, with the way the process is set up that we have to recertify, retest -- I mean, we would retest anyway, but recertify again after that, that's where things start -- you know it takes time and money to produce the quality. And quality is job one in this particular...

MR. STENBJORN:

I heard that before.

DR. KING:

Um-hum. Did you make that up?

[Laughter]

MR. COUTTS:

I wish I had. So, you know, you've got those three points of the triangle. You can have two of the three.

DR. KING:

Um-hum, okay.

MR. SMITH:

I would add, it works really well when it works really well.

[Laughter]

MR. SMITH:

And when you have disruption to that COTS in the middle of your development cycle, it disappears, or is replaced, or that vendor goes under or something, then it works real poorly. And there can be a mad scramble, which could be very little effort or it could be quite a bit of effort to restart and move forward again with something new. So, it works well when it works well, but occasionally it doesn't work so well.

MR. COUTTS:

It's really that.

MR. SMITH:

It creates a lot of grief.

MR. STENBJORN:

Does the inclusion of more COTS, though, decrease the -- increase the frequency of the release frequency? Does that affect the duration of the lifecycle of any one specific product? Is there some sort of measurement that says, "If we have this, add this?" I'm just

thinking about, specifically, like with chips and the like, not so much add software.

MR. SMITH:

No, there's always some basic level you're stuck with. Your board parts, whether it's a custom board or whether it's an off-the-shelf motherboard, you're stuck. Your parts are all COTS. There's a baseline that you will always have in your system. So it really -- once you get up to the things that we're talking about that are kind of optional, do I have one USB card reader or a couple that I qualify? Yeah, it gets to the point where it's helpful to have two, but in the grand scheme of things it doesn't make that much of an effect.

DR. KING:

All right. And then, kind of rounding the discussion out on COTS and the lifecycle, how does it impact the end users, the jurisdictions?

MR. TORRES:

I think they're always going to be there. They're always going to be there. How does it impact? We just got to go with the, so to speak, go with the flow of COTS products introduced. We have to tweak our testing criteria to match that of the COTS product. We just got to be prepared, just like the vendors are, have to be prepared of the change. And then, of course, it's the ultimate decision of the Division of Elections to certify the equipment. So, we can't make that change at the local level, we have to wait until the State level. But what we do, is, we help in the testing of the certification process

at the local level. So, it's always -- we always -- we're always on the go.

DR. KING:

Paul.

MR. STENBJORN:

The changes in COTS systems, the speed at which they change will always outstrip the demand from the localities for the change.

[Laughter]

MR. STENBJORN:

And that's actually -- when it comes to the COTS systems used by the vendors, it's very different than the ones that are used peripherally by the election officials that, you know, some we have to live with. Some we'll defer. And I think the latter category is what most of the lifecycle will fall into is. And I learned this in Virginia, being at the State certification level is that really what we heard from the counties was the need to defer. And so, our -- in fact what we spent a lot of time doing was writing grandfathered-in clauses into legislation, so things didn't need to comply with current certification standards.

DR. KING:

From my perspective in the jurisdiction, I think the inclusion of COTS is, on the surface, it's a desirable thing, because the hope is that it will give you more alternative supplies that you'll be able to get more competitive pricing, that you will not be tied to a single source. And all of those are good things. But, it's quickly replaced by the testing, and that confidence that once you've integrated a COTS component, whether it's something as trivial as a different

manufacturer of a ribbon for a device that prints, that the uncertainty of that hardly seems worth the savings to it. So, I think it's interesting how the COTS phenomena trickles down through and creates different challenges at each level. But I think, and this is something that Glenn you had hinted at earlier, said that many of these perspectives are a function of where you are in the lifecycle of that system, in that, for all of us that are sitting now with legacy systems the variety that we thought would be a good thing, initially, it looks different to us now.

All right, I'm going to suggest then that we pause at this point. We're getting close to our 4:30 ending mark. And Brian has made a suggestion. In fact I'm going to read his note. He says he has homework for this group. And our hope is, first, that your dog will not eat it before you bring it back.

MR. HANCOCK:

I'm going to send it electronically, so unless you have a virtual dog he shouldn't be eating your homework.

[Laughter]

MR. NEWKIRK:

I could build one.

MR. HANCOCK:

I'm sure you can.

DR. KING:

But we want to make sure that given your generous contribution of time to this project that we optimize those contributions tomorrow. And we think a way to do that is to kind of focus in on what we hope

to get out of our discussions tomorrow. And to that end, I'll turn it over to Brian.

MR. HANCOCK:

Thank you, Merle. I have really four things I'd like you to think about over the course of the evening. And you can certainly write these down but, like I said, we'll e-mail them to you, so you have them as well.

If you could, and we've talked about this somewhat, but if you could come tomorrow with at least one concrete suggestion as to alternatives to how we deal with COTS, and I'm going to give you some of the ones that I've thought of already, and so no fair using those. All right, for example, when we're talking about, as Merle said, servers or laptops, things like that, you know, one alternative would be to allow upgrades within series, right, without doing anything. Say you have a Dell OptiPlex, whatever, 3000. As long as it's in that 3000 series, we could say, "Fine, you know, you only have to have it looked at once it moves -- once Dell moves beyond that series." That's one alternative.

Certainly, something I think we need to do in our program is to add software to the concept of de minimis changes. As the manufacturers out there know, right now hardware is what we have limited to de minimis changes. And for the FCC, that's sort of like your class one. But it's limited to hardware, and I think adding software to that would add some benefit. But let's see what you all think.

Also we could potentially do things like -- the EAC, that is, could qualify lists of COTS suppliers of specific components. I

mean that's a little out of the box, but that's certainly an alternative thing that we could do. So those are the types of ideas that I'd be looking at you to come back with. And, you know, you only need one of those. But if, of course, you have more great ideas we're I think willing to accept those as well.

The second item I'd like you to think about is, at what depth do you think that the EAC should certify COTS products to? So, for example, should removable media be certified? And, you know, what we're looking here is to try to establish some granularity to this issue.

Item three. Do you think increased scrutiny on the manufacturing process by the EAC would allow looser constraints on COTS integration? What do you think about that idea?

And finally, who should be eligible to certify to the EAC that a COTS components is, in fact, COTS? And perhaps you can think of some criteria that we might be able to use, you know, whether it's the voting system manufacturer, or the COTS manufacturer or the integrator, who, and what criteria could we use to make such a determination.

So that's it. Hopefully -- I know some of these issues we've touched on either fairly directly or at least peripherally today. So hopefully you may have some ideas already floating around up there as to answers as to these questions. But I think these questions will give us a framework to start our discussion tomorrow and move forward in a, again, a more granular fashion to get to the bottom of this issue.

DR. KING:

Okay, I like that. I may have some homework for the EAC, too. I looked at the first one, one concrete suggestion on how the EAC deals with COTS. I'm wondering if it might not be beneficial for the first thing in the morning for the EAC to give us an overview, particularly I think for Pete and Bill's benefit, but maybe to refresh all of our memories about how you're currently dealing with COTS. That way as we take the suggestions from the panel we can look for where the fit and where the chafing may be on that policy.

MR. HANCOCK:

Um-hum.

DR. KING:

So that's your homework.

MR. HANCOCK:

Got it.

DR. KING:

That will give you guys time to get your answers actually down as we go through it.

Well, I want to thank everybody for a great start to this.

Again, your time is so valuable and your perspectives are so appreciated on this topic that we really do appreciate it. And I'll look forward to seeing everybody here in the morning at...

MR. HANCOCK:

9:00.

DR. KING:

...9 a.m., same place. And if there are no other observations, then we'll adjourn for today, and I'll see you in the morning at nine.

Thank you all.

MR. HANCOCK:

Thank you

[The roundtable panel recessed at 4:24 p.m.]