Meeting Minutes (Official)
Technical Guidelines Development Committee (TGDC) Meeting
March 29, 2006
National Institute of Standards and Technology (NIST)
Gaithersburg, MD 20899

Members in Attendance:

Dr. Hratch Semerjian – Acting Chair
H. Stephen Berger
Paul Craft
James Elekes
Hon. John Gale
Patrick Gannon
J.R. Harding
David Karmol
Alice Miller
Helen Purcell
Whitney Quesenbery
Ronald Rivest
Daniel Schutzer
Sharon Turner-Buie (Conference Call)
Britt Williams

Committee Support Staff:

Phil Greene, General Counsel Office, Department of Commerce
Mark Skall, Chief, Software Diagnostics and Conformance Testing, ITL, NIST
Barbara Guttman, Software Diagnostics and Conformance Testing, ITL, NIST
John Wack, Software Diagnostics and Conformance Testing (ITL), NIST
Alan Goldfine, Software Diagnostics and Conformance Testing (ITL), NIST
David Flater, Software Diagnostics and Conformance Testing (ITL), NIST
Wendy Havens, Software Diagnostics and Conformance Testing (ITL), NIST
Lucy Salah, Software Diagnostics and Conformance Testing, ITL, NIST
Allan Eustis, Information Technology Laboratory (ITL), NIST
Sharon Laskowski, Information Technology Laboratory (ITL), NIST
John Cugini, Information Technology Laboratory (ITL), NIST
Nelson Hastings, Information Technology Laboratory (ITL), NIST

March 29, 2006: Morning Session # 1

Dr. Hratch Semerjian, Acting TGDC Chair, called the sixth plenary session of the Technical Guidelines Development Committee to order at 9:00 a.m. He introduced himself as the Deputy Director of the National Institute of Standards and Technology and Acting Chair of the Technical Guidelines Development Committee.

After the pledge of allegiance, the Chair recognized Mr. Phil Greene as the TGDC Parliamentarian and requested that he determine if a quorum of the Committee was present. Mr. Greene then called the roll (see Table 1). Fourteen TGDC members

answered "present." Mr. Greene notified the Chair that a quorum (simple majority) of the Committee was present either in person or via conference call connection. (Note: Ms. Turner-Buie was present on the teleconference line at the beginning of the meeting. However, due to a communications failure, the Committee could not initially hear her responses. The one-way communication malfunction was remedied by midmorning.)

Mr. Craft asked the Chair how many votes were required to carry an issue. The Chair deferred to the Parliamentarian. Mr. Greene responded that with fourteen Committee members present, eight votes were required to pass a motion.

Dr. Semerjian thanked the Parliamentarian. In an explanation for Dr. Jeffrey's absence, the Chair related to the TGDC that a Senate Committee had requested the NIST Director to testify on short notice at a hearing scheduled for this morning. Dr. Semerjian expressed his gratitude for the opportunity to substitute for the NIST Director on this occasion and expressed Dr. Jeffrey's regrets to the Committee for his unexpected absence. "This morning, I look forward to working with my former colleagues on the Committee. We are especially pleased that Mr. Jim Elekes representing the U.S. Access Board is able to participate in person today. He has been a most valuable contributor to the voting standards development work of the TGDC's Subcommittee on Human Factors and Privacy. I also welcome Ms. Sharon Turner Buie who is participating via teleconference due to her work load as Director of Elections in Kansas City."

The Chair thanked all the members of the Committee for reserving time on their busy schedules to participate in these proceedings. He noted that the initial recommendations for voluntary voting systems standards delivered by this Committee to the Election Assistance Commission in May 2005 as mandated by the Help America Vote Act are a foundation for increasing the nation's trust and confidence in our voting system. "In addition, the NIST voting team has benefited from your willingness to volunteer significant time in assisting them to complete drafts of preliminary reports for future updates to the Voluntary Voting Systems Guidelines (VVSG) that we will review today."

The Chair gratefully acknowledged the attendance at this plenary session of Commissioners Gracia Hillman, Donetta Davidson, and Ray Martinez from the U.S. Election Assistance Commission (EAC) as well as EAC Executive Director Tom Wilkey. He looked forward to their comments on the work of the TGDC shortly.

Dr. Semerjian entertained a motion to accept the agenda for the March 29, 2006, meeting of the Technical Guidelines Development Committee. The motion was so moved. Dr. Harding seconded the motion.

Mr. Berger requested a modification to the current agenda. "I think there are several of us that would like to discuss the general structure of our work, given where we are, to assure that our efforts are being focused on where they're most needed to improve the voting system. And I think that might be most helpfully done early in the meeting, and then revisited at the end of the meeting."

The Chair recognized Mr. Craft who asked for a clarification on Committee members' opportunities to introduce motions at different point in the agenda. Dr. Semerjian

explained that resolutions would be considered where appropriate. Mr. Craft offered an additional motion. "Then I would move that the 4:15 p.m. agenda item be amended to include introduction and discussion of any resolutions not discussed earlier in the day." Dr. Semerjian accepted this motion and noted, "If there are indeed resolutions that need to be taken up earlier on, we will do so." Mr. Craft agreed to this implementation of the agenda.

With regard to Mr. Berger's motion, the Chair recommended that the Committee first hear from Mr. Skall and Mr. Wack regarding NIST's current plans. Then the Committee could more effectively discuss the relevant issues. Mr. Berger agreed to this procedure.

Dr. Semerjian asked for a motion to accept the agenda as amended. The motion was moved, seconded, and unanimously approved (see Table 1).

The Chair then entertained a motion to accept the minutes of the September 29, 2005, TGDC meeting. Mr. Craft noted a correction had been sent to the Committee in advance by Mr. Eustis and asked if the correction had been included in the final copy of the minutes up for adoption. Mr. Eustis indicated that the correction was incorporated in the final minutes inserted in the Committee members' meeting binders. The motion was moved to adopt the minutes of the September 29, 2005, meeting. There was a second and the motion passed unanimously (see Table 1).

Dr. Semerjian noted for the Committee that recently adopted resolutions were also included in their meeting binders. As a brief review for the public in attendance and viewing the web cast, the Chair explained that Public Law 107-252, the Help America Vote Act (HAVA), establishes the Technical Guidelines Development Committee. HAVA charters the members of this Committee to assist the Election Assistance Commission with the development of voluntary voting system guidelines. Dr. Semerjian indicated that the final Voluntary Voting Systems Guidelines (VVSG 2005) were publicly announced on December 13, 2005, by the EAC. Copies of the VVSG 2005 were sent to Committee members in their advance reading material. The guidelines are also posted on the EAC web site http://www.eac.gov.

In addition, the Chair stated that EAC Resolution 2005-01 authorizes the TGDC to continue its work beyond the development of initial voting system standards guidelines. Dr. Semerjian then reviewed recent NIST HAVA-related activities. "Since the last meeting of the TGDC in September 2005, NIST staff, in coordination with the three working subcommittees of the TGDC, has continued drafting and editing preliminary reports on issues pertinent to future voluntary standards development in the areas of human factors and privacy, security and transparency, and core requirements and testing of voting systems. We will discuss these reports at today's plenary session."

Dr. Semerjian elaborated that the TGDC will review, approve, and where appropriate, provide supplemental direction to NIST scientists. He noted that this guidance is critical to the development of future recommendations for future voluntary voting system guidelines. "The time required to accomplish the Agenda items means that the committee cannot take public comment at this meeting. However, there will continue to be opportunities for the public to comment on relevant issues. Additional comments and

position statements regarding the work of this Committee should be sent to voting@nist.gov where they will be posted on the NIST voting web site: http://vote.nist.gov. The comments we have received to date have been posted and reviewed by NIST staff and TGDC Committee members."

At this time, the Chair noted that the latest, revised version of Robert's Rules of Order was adopted on July 9, 2004, to govern Technical Guidelines Development Committee and subcommittee proceedings.

The Chair recognized Dr. Harding who initiated a discussion of past resolutions and their integration into NIST's work process. "In the past, we have referenced the resolutions as a kind of an overview or intent of this group to guide the development of our guidelines. Has there been any effort made by staff to quantify the integration of these philosophical statements into those draft guidelines as a check of the spirit of our work in fact being integrated into the VVSG? And if not, I'd like to ask that we do that."

Mr. Craft expressed his concern that this integration of work product and TGDC resolution intent was not taking place. "And I have been unable to find a document that has that kind of analysis. So I would make a motion that NIST take it upon itself to do an audit or review, then determine and publish a paper as to the extent of those prior (TGDC) motions flowing through to the standards."

Dr. Harding seconded the motion.

The Chair recognized Mr. Skall of NIST. He noted that, in the next few weeks, staff would post a breakdown of all the adopted resolutions and where NIST is with respect to accomplishing each resolution.

The Chair asked for a clarification of the resolution and then recognized Ms. Quesenbery, who wondered whether the resolution should be framed more broadly. "I know that on the Human Factors subcommittee, some of our resolutions are for ongoing work which is a slightly broader question. We are working on some things that you will hear about this afternoon that are not in the current version of the guidelines, but are being planned for future versions."

After further discussion on the motion, Mr. Craft agreed to temporarily withdraw his resolution until after the morning break in order not to delay the remarks by Commissioner Davidson. During the break, Committee members will draft final language for the motion.

The Chair thanked Mr. Craft, apologized for the delay, and recognized Commissioner Davidson.

Commissioner Davidson thanked Dr. Semerjian. She briefly described the numerous events of 2005 related to the adoption of VVSG 2005. The Commissioner thanked NIST for their technical assistance in reviewing six thousand public comments submitted on the draft of the voluntary voting system guidelines. She noted that the testing laboratory certification program would be a top priority for the EAC in 2006. "We have come a long

ways in a short time. And as a former TDGC member, I understand how hard you work. I want to thank each and every one of you for your loyalty, for being here for meetings as often as you can, and also for participating by teleconference when you cannot be here in person. We at the EAC do thank you. In addition, thanks to Dr. Semerjian for your leadership in the past, and we look forward to working with Dr. Jeffrey in the future."

Commissioner Davidson briefly summarized the important work ahead for both the TGDC and the EAC including the continuing work on the future iterations of the VVSG, and the laboratory certification program- a priority for the EAC in 2006. "We must address the issues of security, including, as we move forward, the security of the software. We also have to keep in mind wireless security issues and, as well, address the voter verified paper audit trail (VVPAT) and independent verification issues. The EAC is also really very anxious for the development of test suites by NIST."

The Commissioner noted that NIST and the EAC discussed the concept of individual VVSG module updates during their recent monthly meetings. The EAC decided that the insertion of module updates to the standards would be both confusing for the election community and unwieldy from a public approval process standpoint. However, technical amendments to the standards will be allowed and will be incorporated through a public review process.

Commissioner Davidson thanked the TGDC subcommittee chairs (Schutzer, Rivest, and Quesenbery) for their participation in meetings of the EAC Standards Board and Board of Advisors meetings. The Commissioner noted that the TGDC and the EAC need to address methods for voting that do not yet have standards, such as voting by telephone. She emphasized that Congress, in HAVA, intended that the EAC address better methods for citizens overseas and the military to cast their votes.

Beyond the current VVSG development, the Commissioner noted that critical future issues include poll worker training and election management guidelines. Commissioner Davidson concluded her remarks with a plea for balance in the deliberations by the TGDC. "There is a balance of the cost for security (in new voting systems) and the usability of voting systems for poll workers. Obviously we want every state to adopt our voluntary guidelines. And if we have standards that are too stringent and costly, we will see the states backing off. So there's a balance there that we all have to remember. I know you understand that, and I just wish you all the very best in moving forward."

The Chair thanked Commissioner Davidson and recognized Commissioner Hillman.

Commissioner Hillman thanked both her fellow Commissioner and Dr. Semerjian. She highlighted the major accomplishment of the TGDC-the delivery of the 2005 VVSG. "And it was indeed a pleasure for me to have served as Chair during that time, to have completed one full year of working with the Technical Guidelines Development Committee. Your accomplishment was something that, at the beginning of the Election Assistance Commission, we could not imagine given the great obstacles."

Commissioner Hillman noted the importance of the inclusion of TGDC members with different backgrounds into the deliberative process that resulted in the VVSG

recommendations to the EAC. “It was important to have the scientific and technical input, but it was also important to have the input of election officials to be able to bring that perspective to the complexity of the issues.”

Finally, Commissioner Hillman thanked the TGDC members for their public service and expressed her enthusiasm for the opportunity to continue working with the Committee members.

The Chair thanked Commissioner Hillman. He expressed his gratitude for the support by the EAC for the work of both NIST and the TGDC. “We appreciate your continuing encouragement of the work of the TGDC and of this staff.”

Dr. Semerjian recognized Mr. Mark Skall, chief of the NIST Information Technology Laboratory’s Software Diagnostics and Conformance Testing Division, to review the activities of his team since the last TGDC meeting.

Mr. Skall thanked the Chair and began a review of key events since the September 2005 TGDC meeting. They included:

- October 2005: NIST Threat Analysis for Voting Systems Workshop
- November 2005: VVSG 2007 Timeline approved by EAC
- November/December 2005: Assisted EAC in VVSG Comments Resolution
- December 2005: Final VVSG adopted December 13, 2005
- Jan/Feb/March 2006: Continued VVSG 2007 research and development.

Mr. Skall noted that five nongovernmental laboratories had applied for accreditation to test voting systems under NIST’s National Voluntary Laboratory Accreditation Program (NVLAP). Building on Commissioner Davidson’s presentation, he then summarized the reasoning behind timeline for delivery of the VVSG 2007 in July 2007. “If you look at the plan for the next VVSG, it seemed that the best way to schedule the upcoming TGDC meetings would be to have the first one after this in December 2006. I think we’ve heard from everybody that we need to wait until after the November elections for the next plenary meeting. Clearly we need one in July 2007 when the final product is due and perhaps an interim one in April 2007. So that would be our thoughts on upcoming TGDC meetings to meet this schedule for delivery of the VVSG 2007.”

Mr. Skall then reviewed the current plans for test suite development dependent on FY 2007 funding. “Test suite development, as I think you all know, is a very, very large job. It requires significant resources to do these correctly. So one of the things we will be working on if the funding comes through in 2007 is the development of three different types of test suites: one to ensure that all the requirements are met correctly; another one to look at security testing including open-ended security testing; and a third to do the human factors testing.”

He then reviewed NIST’s HAVA outreach efforts to the election community including:

- Q&As with election community on accuracy and security issues

- Presentations/talks at National Association of Secretaries of State (NASS), The National Association of State Election Directors (NASED), The Election Center, State government agencies, and the International Association of Clerks, Recorders, Election Administrators, and Treasurers
- Coordination with National Science Foundation-funded Voting Research Efforts
- Information Technology Association of America-sponsored vendor teleconferences
- Planning for an upcoming Threat Summary Workshop at George Washington University (GWU).

Mr. Skall concluded with a brief review of the NIST presentations that would follow later in the day.

(Mr. Skall's full presentation is available for review at: http://vote.nist.gov/meeting20060329.htm.)

A TGDC Committee member asked Mr. Skall for the dates of the GWU Threat Summary workshop. Mr. Skall responded that the workshop was scheduled for June 8-9, 2006, in Washington D.C.

The Chair thanked Mr. Skall and recognized EAC Executive Director Tom Wilkey to report to the Committee on the EAC's strategy for updating the voluntary guidelines and on the EAC's research projects.

Mr. Wilkey thanked Dr. Semerjian. He then expressed his deep appreciation to the TGDC for the work they had accomplished. Reinforcing Commissioner Davidson's remarks, the EAC executive director stated that the laboratory certification program would be a top priority for the EAC over the next few months. "Our own certification agenda is being developed as we speak. We have an excellent consultant working with us, and we expect to get a first draft of all of the procedures that we intend to have in place by the first week of April to our Commissioners." Mr. Wilkey noted that there would be a public comment period following the approval of a draft certification plan by the Commissioners.

Mr. Wilkey reviewed the decision-making process between NIST and EAC that led to the abandonment of the modular approach to updating the VVSG. "As we began to peel back the layers of the onion and take a better look at the EAC's statutory and regulatory process for approval, including the public comment period and follow-up, legal research, so on and so forth, we realized the considerable resources and time involved. We also took into account the impact of the process not only to the vendors but to the entire election community." Mr. Wilkey noted that the EAC and NIST staff meets monthly to discuss relevant VVSG issues.

Mr. Wilkey noted that the EAC had requested additional funds through the Office of Management and Budget to allow NIST to address the development of test suites for the VVSG requirements. "We were very pleased that OMB accepted our recommendation and the funding request is now part of the President's FY 2007 budget. So we look forward hopefully to it being viewed favorably in Congress so that that work can begin immediately upon passage."

Mr. Wilkey then reviewed EAC-funded research projects including guidance for statewide voter databases and the first national Election Day survey. “We are in the process right now of a research project that is nearing completion with Rutgers University’s Eagleton Institute, on a study of provisional voting and voter ID issues.”

Mr. Wilkey described ongoing research into effective management guidelines for election officials that would cover areas including acceptance testing, pre-election testing, physical security requirements, warehouse requirements, and poll worker training requirements. In cooperation with NASED, Mr. Brit Williams and Ms. Connie Schmidt are the lead authors for the guidelines.

Mr. Wilkey stated that the EAC had contracted with the organization Design for Democracy “to look at ballot design, ballot structure, the flow of information, and the design of voter education materials so that we can do a better job of getting that information out to the voter.”

Mr. Wilkey reviewed the EAC’s research in efforts in the area of poll worker recruitment and training with Cleveland State University. He also noted the contract with Florida State University to begin to develop a legal resource clearinghouse.

Mr. Wilkey concluded with a brief description of the research work into public access portal design for voting information.

(A complete review of the EAC’s research projects is available at: http://www.eac.gov/docs/Research%20Projects%204-26-06.pdf .)

The Chair thanked Mr. Wilkey for the informative updates. He opened the floor to the Committee for questions on Mr. Skall’s and Mr. Wilkey’s presentations.

Dr. Harding focused in on the area of research into cognitive, literacy, and accessibility issues for the disability community. He requested discussion of these issues amongst the TGDC before he introduced a motion on outreach and education for the disability community.

Referring to Mr. Skall’s presentation, Mr. Craft raised his concerns of higher costs to the vendors for testing at the state and federal levels. “My concern is that as the states throughout the country become more conscious of the importance of testing and begin efforts to do their own certification testing, the cost is becoming unacceptably expensive for the voting system vendors. And, through the trickle-down effect, the costs will become unacceptably expensive for the taxpayers.” He recommended that federal test standards reach down into more “state-specific” testing requirements. “We need to create an environment where states can rely heavily on the federal testing that’s done and start limiting state certification to just those states’ specific issues that, for some reason or another, cannot be covered in the federal program.”

Dr. Williams declared his support for Mr. Craft’s recommendations. He noted that in the past, many states did no state level testing, simply accepting the voting systems tested at the federal level by independent testing authorities.

In answer to the Chair, Mr. Craft noted that his recommendations were for the record understanding that NIST is undergoing a needs assessment for testing standards.

Mr. Berger stated his support of the previous recommendations and his concern for dealing with the unintended consequences in the implementation of these standards. "Are we discouraging poll workers and creating additional complexity? Are we confusing state officials in their roles? At least we need to look at those issues."

Dr. Schutzer also rose in support of Mr. Craft's recommendations describing a certification paradigm in the financial community. "The banking industry got together with the big four accounting firms and we worked together to develop detailed testing criteria that could be done once. We actually tested it back with individual banks, and of course, we did have some unique testing requirements. But we have found that 60% to 70% of the testing that we were previously doing could now be accomplished by that one single set of certification testing."

Dr. Williams pointed out the additional "nontrivial" challenge of assuring that a certified voting system in the field is the same voting system that successfully completed testing.

The Chair asked Mr. Skall to comment on the previous discussion.

Mr. Skall clarified the role of NIST to develop test suites that test the requirements in the VVSG. "So the only way we can minimize problems with respect to the states is to make sure that various requirements are included generically in the VVSG that would impact the states precisely. We cannot test above and beyond what is already in the standard. So I just want to make sure we are cognizant as we develop requirements that if there are things that are in there that we feel are necessary because of state interest for testing, they can be done at a state level. But what we're doing is just testing to the VVSG."

Mr. Craft stated his philosophical difference with this approach. "We cannot say that we are going to pass a generic federal standard, then pass it, turning a blind eye to the state requirements because we are not going to meet the needs of the people who are depending on the standards if we do that. The standards have got to be expanded; the scope has to be expanded so that we come up with a standard that serves the public we are trying to serve."

Mr. Berger offered his viewpoint in terms of conformity assessment. "At the end of the day, we very much want to make sure that the system delivers to the end user: to the nation, the accuracy, reliability, accessibility, usability that we desire. We need the boundaries Mark has discussed, and we do not need to be doing each other's job. But those state/federal boundaries need to be designed very carefully with a lot of collaboration and sometimes some overlap so that the system functions properly. It is clear to me at least, and I think to several others, that we need to work that state/federal testing boundary to provide better efficiency and a better end product."

Ms. Quesenbery expressed her concerns with module updates to the VVSG if they are published by individual working subcommittees. "If we are in fact going to have specific subcommittees presenting material that in a sense is then going to have a blanket

approval by the entire committee, then there has to be some form of cross-fertilization between the subcommittees. I would like to hear, for example, not just the NIST experts, but the TGDC members from one subcommittee presenting to the others."

The Chair stated that it was his understanding that the subcommittees were expecting further discussion and not a blanket approval.

Ms. Quesenbery emphasized her frustration with the lack of time for discussion of the material. "We get a four-inch pile of paper before the meeting. We have a day to go through the material. We never really have any chance to discuss it in detail. It is reviewed at an overview level. We just heard Mr. Berger talk about unintended consequences. I know that one of the things that the NIST staff and the Human Factors and Privacy Subcommittee have been concerned about is the interplay between accessibility, usability, and security, where obvious trade-offs have to be made. It would be better if we had a way during the course of the development of these modules to cross-communicate between subcommittees, so the material is not just presented as one giant section. Because I really do not see how we are ever going to go back and seriously revisit the material when it has been published as a working module."

Mr. Skall clarified the intent of NIST to provide the subcommittee material to the election community for review in advance of the TGDC plenary meetings "to allow the public and the vendors to see the direction in which we are proceeding. This happens with standards all the time. Drafts are made publicly available and if vendors choose to implement them, they know there is a risk that they may change before they are agreed upon. But it seems to me it is just in line with sharing information and being as transparent as we can be to put these out there when we think there's a meeting of the minds."

Ms. Quesenbery expressed her agreement with the transparency here. She clarified her previous point. "I am suggesting that the communication materials among the TGDC working groups need to be more transparent between the groups, and there needs to be a better communication on the technical issues from the NIST technical staff to the various members of the TGDC, not a single subcommittee."

Mr. Craft and Dr. Schutzer expressed their agreement with Ms. Quesenbery and the interdependence of the three subcommittees. Dr. Schutzer suggested a conference call among all TGDC members before the plenary sessions in the future to get input from each of the three groups.

Mr. Craft expressed his frustration with the lack of vendor input in this standards development process. "It is my understanding that with all the other industries that NIST works with in setting standards, the industry that makes the devices is a very key part of the standard-setting process. I really feel that it has been way too difficult for us to get the vendors involved in the VVSG process. None of the subcommittee meetings to my knowledge have had a vendor participating in them. There are brilliant minds working in the vendor companies: people who have been working for years on some of the problems that we are discussing here. I really feel that they need to be brought a little further into the circle as we go into our next VVSG iteration where we are going to regulate their industry."

Mr. Berger agreed with Mr. Craft on the importance of inviting election community input. "We very much need to know the vendor input and other stakeholder groups' input before we start getting locked in on a direction for the standards."

Dr. Williams expressed his concern with the makeup of the TGDC and specifically the lack of vendor representation. "The makeup of this committee is specified by law, so there is not much we can do about that. But there is nothing wrong with us forming working subgroups and actively soliciting vendor input, on a generic basis, looking to help us refine the standards. And there is nothing that says that we cannot do that within the current TGDC charter.

The Chair adjourned the meeting for a fifteen-minute break.

March 29, 2006: Morning Session # 2

Dr. Semerjian called the plenary meeting back to order. In light of comments from members during the morning session and the intention to discuss and move a resolution, the Chair recommended that Mr. Wack be allowed to first deliver his report on the developmental status and supplemental guidance for the VVSG 2007. Hearing no objection, Dr. Semerjian opened the floor to Mr. Wack.

Mr. Wack thanked the Chair and focused his presentation on where NIST is in the development of the VVSG 2007 standard. His report detailed:

- An Overview of VVSG volumes
- An Overview of VVSG development
- Next steps
- Inclusion of Supplemental Guidance

He described briefly the major VVSG 2007 Volumes including the:

- Introduction
- Terminology Standard (Glossary)
- Product Standard
- Standard on Data to be Provided
- Testing Standard

Mr. Wack delineated the main elements of the election community to whom the VVSG was aimed. He noted the following target audiences and their requirements:

- Besides testers and vendors, states, election officials, researchers, reviewers
- States and election officials need to know…
    - Does a system meet the VVSG requirements? If so, then
    - Do the requirements assume any procedures?
- Reviewers and researchers need to know…

- How do requirements in combination with procedures satisfy threat models?
- What other assumptions are made by the requirements?
- What are the ramifications of using some voting systems on various requirements?

Mr. Wack summarized the plan to include supplemental guidance in the VVSG 2007 where appropriate since:

- All audiences benefit from knowing the context of certain requirements and any procedural assumptions made, or not made, by those requirements
- Supplemental Guidance provides context for VVSG audiences on
  - what the functional requirements specify
  - what they omit

Mr. Wack provided examples of potential supplemental guidance in VVSG 2007 including:

- More separation of certain voting systems to preserve privacy
- Randomness of audits, announcements of audits
- Clearing jams while opening up ballot box
- Distribution of passwords or security information
- Brighter lights in polling place when small fonts display on paper spools

Mr. Wack concluded his presentation with a summary of NIST's current short-term goals including a focus on building the VVSG introduction, completing an overview of all VVSG volumes, writing supplemental guidance where appropriate, and continuing research and coordination with the election community.

(Mr. Wack's complete presentation is available for review at: http://vote.nist.gov/meeting20060329.htm.)

The Chair opened the floor to comments and questions from the Committee.

Dr. Schutzer emphasized the need for increased interaction among the working subcommittees.

Mr. Craft expressed his desire for NIST to look at the issue of firmware validation as a research project, separate from the standard. "The vendors eventually need to figure out how to have firmware validated after the firmware has been loaded. That is an issue that really should be pared off from a draft standard into a research project. I think NIST has probably some of the best resources in the world on which to work this issue. The analysis should examine the various types of vendor firmware, the real technical issues to validate installed firmware, and validation in such a manner that you do not compromise security. Then if NIST could bring the results of this analysis back to the Committee, showing us what specifically has to be done in each of the currently fielded systems, and the impact, I think this Committee could start making informed decisions. But we cannot go down the road of issuing a requirement like that now, even though it's something those of us who have dealt with the issue would love to see."

Mr. Wack informed the Committee of NIST's recent participation in monthly meetings of the Information Technology Association of America (ITAA) at the request of their members who are voting system manufacturers. The issue of research into firmware validation was discussed at a recent meeting. NIST is also pursuing other venues for vender inputs into the standards research including interaction at public meetings of the election community.

Mr. Berger asked a question concerning the certification of commercial of-the-shelf (COTS) software and hardware by testing laboratories and the limits related to replacement of COTS components and subsequent recertification requirements.

Mr. Flater summarized the issues related to voting system modifications and recertification. "I acknowledge that there needs to be some pragmatism and some flexibility, otherwise we cannot possibly send every voting system back for a complete re-certification regression testing every single time something is modified. But speaking as one with a lot of testing experience, I can tell you that's a very tricky issue to address."

Mr. Berger asked Mr. Wack whether NIST had considered requirements for the usability of the laboratory test report by state and local election officials. Mr. Wack indicated that NIST was acutely aware of the need to make the certification test report understandable and usable.

Mr. Gannon commented on the requirements for interoperability testing. "If the need for interoperability across different components from different vendors is one of the major requirements, then there should be testing that would specifically address the way to provide and verify interoperability, specifically focusing on the kinds of data interchange formats that might be required from exchanging data between dissimilar or different vendor-type systems. It is not sufficient to just test all the components by a single vendor, but, in addition, where appropriate, you need to provide interoperability testing across different vendor pieces as part of a larger system. So this is something that could be added to the requirements to indicate the need for test scripts around interoperability testing."

Mr. Wack thanked Mr. Gannon and noted the need to add to the interoperability testing requirements.

Dr. Harding commented on the need to address the interoperability testing requirements for voting systems from the standpoint of the adaptive needs community and their expectations for the 2008 elections. He also provided background into the resolution that Mr. Craft would shortly introduce for adoption. He stated his view that the TGDC resolutions "offered a means of checks and balances" to track the progress of NIST work products.

The Chair then asked Mr. Craft to introduce his resolution discussed at the early morning session. Mr. Craft read his resolution for the record:

"NIST shall prepare an analysis that tracks the resolutions passed by the TGDC with the progress of standards development and specific work products of NIST. After the initial

publication, reports will be provided to the TGDC prior to each public meeting and will be included as an appendix to all NIST and TGDC work products sent to the Election Assistance Commission."

Dr. Harding seconded the motion. The Chair opened the floor for discussion.

Mr. Karmol suggested that the report be provided in a one or two page matrix format. He offered a friendly amendment that the word "analysis" in the first sentence be replaced with "brief report.".

Mr. Craft stated his concerns. "I would like to see the report be as brief and understandable as possible, but very frankly there are a number of us on this Committee who really do not have a clear concept of how our work product from prior meetings has flowed into the standards. If there are resolutions that are not flowing into the standards for some reason, we need to know about that and the report needs to show that. There is no traceability right now from our resolutions to the published standards. And it is very difficult from my perspective to conceptualize where NIST is in executing some of the prior resolutions we passed."

The friendly amendment was accepted by Mr. Craft.

Resolution # 01-06 as amended then read:

NIST shall prepare a brief report that tracks the resolutions passed by the TGDC with the progress of standards development and specific work products of NIST. After the initial publication, reports will be provided to the TGDC prior to each public meeting and will be included as an appendix to all NIST and TGDC work products sent to the Election Assistance Commission.

The Chair requested a voice vote on resolution #01-06 as amended. The resolution passed unanimously (see table 1).

The Chair recognized Mr. Berger.

Mr. Berger posed questions to the Committee. "As we work very diligently, we all recognize that there's much work left to be done in all the areas in which we are engaged. Are we looking at the things that we may be collectively overlooking that may really come back to hurt the election system? Is it very clear in the voting system test report exactly what system the laboratory tested with enough specificity and detail? Will others be able to say they are working with exactly the same system that was qualified in a state-certification process or in a local acceptance testing? Have we really given guidance on what acceptance testing should be performed and what pre-election testing should be performed to assure that the end product is as solid, accurate, and reliable as possible? I am really asking for a resource and focus discussion."

Dr. Rivest thanked Mr. Berger for these excellent points. He raised the issue of statewide voter registration database requirements. Much discussion ensued on whether this area was in scope or out of scope for the work of the TGDC. Dr. Williams commented that

while statewide voter registration databases are out of scope, the interfaces of the databases into the voting system are in scope.

Ms. Quesenbery initiated a discussion of the usability and availability of voting system testing laboratory reports. She noted that the reports provided only a pass-fail result. Dr. Schutzer noted that in the banking industry, the yes-no test results were unacceptable. The details of the test results were critical. Mr. Berger noted that the availability of the test reports was a critical issue.
Dr. Williams noted that currently the laboratory test reports are not publicly available. "The vendor contracts with the testing laboratory to do the testing, and as it stands right now, the reports in their entirety are proprietary. I think what we need to do is to define a public report and we need for this Committee to specify the content of that public report. Any jurisdiction that is considering buying a particular voting system has no problem whatsoever getting the vendor to release the reports to them. But what I'm talking about is a report that would be released publicly without the vendors having to approve every single release of the report."

Dr. Semerjian noted that keeping the entire report proprietary does not serve the needs of the election community. He asked Mr. Skall for his comments. Mr. Skall indicated his concurrence with the preceding comments but he indicated that the EAC certification requirements would, in the final analysis, provide the motivation for a vendor to make aspects of the testing report public.

Dr. Williams offered his analysis on the preceding discussion and the future direction of the TGDC. "This Committee has got this laundry list of things to address that could have an immediate impact on improving elections. Instead we are using NIST resources to drive forward to write another version of voting system standards, even though the voting system standards we have in place are pretty adequate. So what we may be saying here is that we need to change our focus and do more of an analysis of what will have an immediate, beneficial impact on elections, and maybe back off a little bit on using all of our resources just to continue to refine technical standards."

Mr. Berger agreed with Dr. Williams on the need to prioritize the future work for NIST and the TGDC. "If we want renewed focus on some areas that can bring quick and effective improvement, we need to equally say that we are lowering priorities on other items. We also need to ask the question how we more effectively include wider stakeholder input into the standards development process.

Secretary Gale offered his views on these issues from the standpoint of a state election official. "I am trying to balance the discussion here in terms of the art of certainty versus the art of the possible in what we are trying to accomplish. It seems to me that science, in which NIST is involved, is driven toward perfection and politics is simply the art of the possible. And if we drive this toward perfection, a scientific perfection, that maybe accomplishes absolute certainty, it may result in voting equipment that cannot be practically produced or afforded by the states. I think probably about two-thirds of the states rely pretty heavily upon the standards whether they were the 2002 standards or the new 2005 Voluntary Voting System Guidelines. Remember, these are not federally mandated guidelines. And if we make compliance so difficult and so unwieldy in terms of cost, every state will have its own certification process which will be more practical

for them in terms of the affordability of equipment supplied by the vendors. So a drive to absolute certainty on every issue I think fails the vendors by making it impossible to produce a product that will allow them a profit and a market. And it may be that the smaller states cannot afford the equipment because the standards are way too high for what is practically affordable for their use."

Ms. Quesenbery asked Secretary Gale to clarify whether his affordability concerns were dependent on the content of the standards, the cost of testing, or both. Secretary Gale responded that the federal standards needed to provide some flexibility for states and jurisdictions of different sizes and financial means as to the quality of the voting system product available.

The Chair recommended that further discussion and motions be deferred to the afternoon. The Chair then called on Dr. Goldfine to present the NIST Preliminary Core Requirements and Testing Status Report.

Dr. Goldfine thanked the Chair. He outlined his presentation that included updates on:

- Electrical/RF Requirements
- Performance Requirements and Workmanship Requirements
- Quality Assurance and Configuration Management Testable Requirements

He also summarized the future NIST work in the area of core requirements including:

- Finalizing Performance Requirements and Workmanship Requirements
- Integrating Requirements with Human Factors and Security Subcommittees
- Resolve the Reliability Requirement Issue on Mean Time between Failure
- Develop new requirements for Quality Assurance and Configuration Management
- Develop Draft Standards on Data to be Provided
- Develop Draft Testing Standard

(Dr. Goldfine's complete presentation is available for review at: http://vote.nist.gov/meeting20060329.htm.)

Mr. Craft expressed his concerns with respect to NIST's future work on system validation and configuration management. "If every Elections Administrator in this country is not capable of either validating or getting to consulting services that will help them validate their voting system to prove that it is in fact a certified system, all of this work is for nothing." He noted that very few people had this expertise.

Mr. Berger asked Dr. Goldfine if he had an estimate for costs to test to the 2005 standards. Dr. Goldfine indicated he does not have an estimate. Dr. Rivest asked Mr. Goldfine to describe the metric for a reliability requirement for voting systems. Dr. Goldfine indicated that it would center on mean time between failure or a similar usage rate.

In regards to Mr. Craft's previous remarks, Dr. Harding expressed his concern with the lack of individuals with expertise to validate voting systems nationally. Dr. Williams

noted that there are some qualified people in this area but most of them work for vendors or states and have conflicts of interest.

The Chair adjourned the meeting for a one-hour lunch break.

March 29, 2006: Afternoon Session # 1

The Chair called the meeting to order and asked Mr. Phil Greene to call the roll.

Mr. Greene called the roll and reported fourteen in attendance. He notified the Chair that the meeting could proceed with a quorum present.

Dr. Semerjian called on Dr. David Flater to continue the Core Requirements and Testing Preliminary Report.

Dr. Flater provided an outline of his presentation to review requirements for:

- Casting
- Closing polls (with a focus on early voting)
- Counting
- Reporting
- Conformance clause (with a focus on classes).

(Dr. Flater's complete presentation is available for review at: http://vote.nist.gov/meeting20060329.htm.)

Within the casting requirements, Committee members voiced concern over specifications for electronically assisted ballot markers (EBMs) and electronic ballot printers (EBPs) - a subset of EBMs as well as half-finished ballots.

Secretary Gale delineated a legal distinction between these types of paper printouts. "One of my concerns focuses on the voter verifiable paper audit trail (VVPAT) producing a piece of paper that is not a ballot. The electronically assisted ballot marker produces a paper ballot. It is the genuine document that registers the vote that is cast by the voter, where the verifiable paper audit trail document is not the official ballot. So there is a fundamental legal difference between the products of those two pieces of voting equipment. Maybe the essence of the construction and the function is similar enough to combine them, and I can understand why you need to cover new forms of equipment. But if the outcome of this is that the paper ballot of an EBM is identical with a voter verifiable paper audit trail record, then it's fundamentally in error."

Dr. Flater assured Secretary Gale that the EBMs and VVPAT systems are classified separately in the draft standard.

Mr. Craft voiced concerns over requirements for half-finished ballots. "That is an issue that is going to be covered by state elections codes and will vary from state to state. The voting systems are going to have to accommodate the requirements of the state in which they are fielded. And the important thing for the voting system is the way it handles that

condition. It needs to be entirely predictable and entirely determinable so there is no question as to whether that ballot is going to be saved or whether it will be canceled in the event of that catastrophic failure. It needs to be a known quantity and it needs to be tested. Then the states will have to specify the way that abandoned ballots are handled when they buy their voting systems."

Discussion continued on state policy issues related to half-finished ballots on malfunctioning voting machines and voter intent. Mr. Craft weighed in strongly here. First off, you cannot determine the voter's intent. Period. It cannot be done. You can come to objective conclusions as to whether the voter made a clear indication of his choices. Still, even in those kinds of determinations, the state election code will probably address how to handle that. If not, then their court cases hopefully will. Obviously we know the voter left the dead machine with a half-completed ballot on it. Did he leave with the belief that the vote was counted or not? What are the rights and responsibilities of all the parties involved in that situation? That is an issue for state election codes, and it's not something that we should be dictating in our federal standard, unless Congress wants to pass a law that controls it."

At the request of Secretary Gale, Ms. Miller described the procedures in the District of Columbia for handling spoiled ballots. "The ballot would be remade and then cast at another point. But it certainly is a defined process in place that is addressed by our law and our procedures where the law was lacking." She noted that the ballot is identically marked and can be traced back to the spoiled ballot so that there is a clear record of the voter's choice.

Dr. Semerjian stated the need to broaden the case to include procedures for Direct Recording Electronic (DRE) voting machines and their failure in the middle of casting a ballot. Was that ballot recorded or not recorded? "If you don't have a paper system, doesn't that remain a question? I am not the expert here, but my impression is you want to know what the machine will do in such a case. "

Mr. Berger noted that further discussion of this issue would be appropriate for a future core requirements teleconference where all TGDC members with expertise could participate if the agenda was published in advance.

Committee members expressed concern over the wording for requirements related to marking an optical scan ballot and notification of under votes or over votes. Specifically, Dr. Williams was troubled with the proposed requirement, as written, related to returning an over-voted ballot, specifically, "that a ballot scanner be able to provide feedback to the voter that identifies specific contests or ballots when an over-voted ballot is rejected." He noted that the requirement added complexity and cost to the process. "When a voter submits a ballot to a ballot scanner, they fully expect it to go through the scanner. But they do not deliberately submit bad ballots. And so when it comes back, it's a little bit startling and a surprise. What happens now is that the poll worker goes over and explains the reason for the returned ballot to them. Now who benefits from this? Well, if your ballot is to be corrected, the only way you can correct it is to spoil that ballot and issue a new ballot. So the poll worker has got to get involved again. The only person that could

benefit from this requirement of avoiding the poll worker is a voter who over votes a ballot deliberately."

The Committee continued debate on this issue. Ms. Purcell noted that the optical scan systems in Arizona did provide the poll worker with a printed message that indicated which races were over voted. "The poll workers are instructed to show the message on the paper tape to the voters."

Dr. Williams mentioned that the messages on the tape printout were not easily understood by the voter.
Secretary Gale indicated that smaller counties in Nebraska used optical scanners that provided notification of over votes. "For example, it will say too many votes in the Secretary of State's race. You do know why the ballot is being rejected. You do not necessarily know how to get a new ballot. That is where a poll worker would have to help. But you know why the ballot came back at you."

Ms. Miller stated that the over-voting notification is specific to the type of optical scanner. "The District of Columbia optical scan tape just prints 'over vote.' The system does not indicate which race. It just indicates an over-voted ballot."

Mr. Craft noted that the voter notification issue illustrated his point of the need for research and analysis by NIST before proposing a new requirement such as the one under discussion. Another Committee member noted that the proposed requirement as written was very similar to the language in the 2002 voting systems standard with some changes to reflect language in the Help America Vote Act.

Dr. Williams emphasized the need to consider the impacts of all proposed requirements. "These voting systems are bought by jurisdictions with very limited resources and operated by people with minimal training. So complexity and cost are big issues. When we are talking about adding features to a voting system, we should do a complexity and cost analysis. And that is the point I'm trying to make. I am not sure we're doing that initial analysis."

Ms. Quesenbery referred to the earlier discussion of minimum standard setting versus high-end standards raised by Secretary Gale. "I think one of the things that we might want to be really clear about is what we mean by an adequate notification to the voter. Are we setting a minimum standard, an optimal standard, or a major standard? There must be some notification to the voter, but that doesn't mean that a system might not get more elaborate if the manufacturer thought there was a market for that feature. So this is a good example where the notification is more than just a requirements issue. You also need to consider an acceptable way to implement the requirement that does not violate privacy, that is usable for the poll worker, and that is usable for the voter."
The Committee reflected on ways to continue discussion on core requirements. Mr. Craft asked the Chair if NIST had received enough direction at this meeting with respect to their future work. "I guess a question for NIST staff is, do you feel you have sufficient direction from the Committee and the discussion today to start moving forward, or does

the fact that we have departed from the plan you brought cause a problem we need to talk about before we get out of here today?"

Dr. Semerjian suggested to Mr. Skall that a future core requirements subcommittee meeting be devoted to these issues. "Notify all members of TGDC and make sure that they have an opportunity to participate to clarify any issues and make sure that there is a consensus in the direction that we want to proceed."

Mr. Skall agreed and recommended that Committee members provide written comments as well in advance of the subcommittee meeting.

The Committee discussed how to more effectively gain input from the vendor community. Mr. Craft stated the need to get vendor input early on in the process. "I think we are missing the mark. The mark that I am after is, number one, getting the vendors involved earlier so that when NIST staff brings the idea or the problem to the TGDC, we have the vendors' input in that already."

Dr. Goldfine noted that the subcommittee structure does not allow input from specific groups during their meetings. The Chair recommended notifying the vendor community of important topics ahead of the subcommittee teleconferences and soliciting their input in writing.

Mr. Berger raised the possibility of putting the VVSG 2007 out for written ballot similar to the standards processes followed by the Institute of Electrical and Electronics Engineers (IEEE) and other standards organizations. "What that allows for is a compilation of the comments from the different balloters, and then in the plenary meetings, a focus on the items of concern especially if there are conflicting comments. What that process also allows, and this happens quite frequently, is submission of comments from those who may not be qualified to vote. Those comments can be compiled either together or separately. It is not easy, but it tends to work through the process pretty well."

The Chair noted that the TGDC was involved with the development of voluntary guidelines that are recommended to the EAC under a process mandated by HAVA. Mr. Skall noted that the EAC conducts the public review process once the TGDC provides the initial recommendations. To initiate a written ballot process would add significant delay to the work of NIST and the Committee. Dr. Harding recommended the consideration of advisory groups to each of the working subcommittees.

Mr. Berger reported to the Committee that he has provided the IEEE Electromagnetic Compatibility Society Standards Development Committee with a copy of the core requirements under consideration. The specialists in this area will provide comments on the requirements to NIST. He indicated that he was not convinced that the current public comment process was as efficient as the written ballot method used by other scientific and technical groups.

Dr. Semerjian noted the public availability of all the requirements under consideration at this meeting and on the Internet in advance of the meeting.

Dr. Williams referenced the more manageable time frame for delivery of the VVSG 2007 when compared to the nine-month delivery schedule for the VVSG 2005. “Why can’t we spend more time to review these documents, and take more time to formulate intelligent responses to them instead of considering these 400 pages all at once?”

Mr. Wack indicated that NIST would continue to improve the availability of the material on the voting web site and the identification of important issues ahead of subcommittee teleconferences.

Mr. Craft offered a suggestion to NIST to sort through the draft requirements document in advance of the plenary meeting to extract the critical issues. “The Committee should not have to sort through the 400 pages, or the part of those 400 pages that rise to the level requiring a decision of the TGDC. We should have confidence that our past directives to NIST are being followed. We should have new issues brought to us where NIST needs direction, and we should be briefed with appropriate research to make informed decisions about those issues. There is nobody up here who can afford to read a 400-page document slowly enough to comprehend it, to look at all the issues, to define terms, and look beyond it to the research behind it. We have other jobs. I think in working with the Committee, the research staff at NIST is going to have to do a little better job of giving the Committee the feeling that our previous motions have been carried forward, an understanding of how those tasks are going, and then an understanding of the actual issues coming before us. To have an issue before us where nobody in the room who knows about the facts behind the issues is allowed to speak about it, that kind of format simply is not going to work.”

The Chair stated that before the upcoming break, the Committee needed to make a decision on whether to accept the Core Requirements reports as presented. With the understanding that NIST would take the Committee members comments under advisement, Dr. Semerjian offered the following motion for the Committee’s consideration. “We believe that the preceding preliminary reports of technical support titled Core Requirements and Testing Subcommittee preliminary reports for next VVSG iteration responds to TGDC resolutions 24-05, 25-05, 27-05, 29-05, 31-05, and 32-05. Unless there are supplemental directions or corrections, the technical support and related work product will continue to be developed consistent with this preliminary report.”

A motion was made to accept the Core Requirements Reports as written. The motion was seconded. On a voice vote, the motion passed unanimously (see Table 1).

The Chair adjourned the plenary meeting for a fifteen-minute break.

March 29, 2006: Afternoon Session # 2

The Chair called the meeting to order and opened the floor to Dr. Sharon Laskowski to present the Preliminary Report of the Human Factors Subcommittee.

Dr. Laskowski thanked the Chair. She noted that her presentation would be a progress report on addressing the relevant resolutions that apply to human factors in voting systems. Her presentation covered the following areas:

- Usability performance requirements
  - how to test and how to identify a benchmark
- Plain language guidance for ballots, instructions, error messages
- Guidance for ballot design
- Guidance for interaction design
- Usability of standards
- Further refinement of accessibility guidelines
- Test methods [after VVSG 2007]
- Specific issues that have arisen.

(Dr Laskowski's full presentation is available for review at: http://vote.nist.gov/meeting20060329.htm.)

Dr. Harding thanked Dr. Laskowski for her work. He asked a question concerning the environment where the human factors testing would take place. He indicated his concern that a laboratory environment did not adequately mirror an actual voting location.

Dr. Laskowski noted that the initial test was a conformance test of the voting equipment. "So we have to control all the variables. So yes, it must be tested in the lab for that reason. But I suspect you are alluding to the fact that there are other issues in deployment and accessibility when you do testing. For this initial test, we're just looking at usability of the system that is not designated as accessible. Follow-on work is really looking at special requirements for developing the conformance test for accessibility. And then you are absolutely right, we have to look at some other environmental factors as well."

Ms. Quesenbery noted that "laboratory" in this instance was a term of art. Dr. Laskowski followed with the caveat that in conformance testing, the environment must be controlled. Dr. Semerjian offered an alternative term, "controlled environment."

Ms Quesenbery commented "the point of this is that it be a repeatable test, that anybody following the test protocol properly with any piece of equipment should get repeatable results. So there are, as Dr. Laskowski said, a lot of issues about how do you constrain that test."

Dr. Laskowski concluded, "Yes, we have to constrain because we have to validate it that we get reliable results, so that the test is fair across voting equipment."

The Chair offered the following motion for consideration. " NIST believes the preceding Preliminary Reports of technical support titled: The Human Factors and Privacy Subcommittee Preliminary Reports for the next VVSG iterations respond to TGDC Resolutions 2-05, 3-05, 4-05, 5-05, 6-05, 8-05, 9-05, 10-05, and 11-05. Unless there are

supplemental directions or corrections, the technical support and related work product will continue to be developed consistent with this Preliminary Report. Are there any questions, further directions, or corrections?" The Chair recognized Mr. Craft.

Mr. Craft asked a question regarding voter instructions. "A big element in the usability of the voting system is the instructions given to the voter by the polling place worker. And I think a key element of the usability is how well the voter can use the system in spite of fairly poor inconsistent instructions. So is that going to be another dimension for research?"

Dr. Laskowski noted that another human factors resolution does indeed deal with the polling place. "We are going to script out typical instructions but not poor instructions because we're doing very sparse instructions for unassisted voting. We are trying to capture the usability of that equipment. Now you are right. In terms of deployment it could really mess up the usability of the voting system. You can't test that in the test lab on the equipment, which is why we want to make sure that we refer to other supplemental guidance for poll worker training and point that out clearly as well as document that elsewhere. Otherwise we're introducing so many different variables into the conformance test that we won't really get a reliable, valid measure of the usability of the system."

Dr. Harding asked a question with regards to future work into the use of pictures to complement the voter instructions as a way to address literacy and cognitive concerns."

Dr. Laskowski noted that this was a separate area for later research. "Once you start introducing icons and pictures, some research needs to be done because of the possibility of introducing bias. If you introduce pictures, do you introduce pictures for all the instructions and navigation as well as, say, the candidates? There are many issues here. Our current research project focuses only on the language. Icons are another research topic. It is on our list, but further down our list of priorities. We are trying to get the biggest coverage possible first, and then go down further into the population requiring usability research."

Dr. Laskowski concluded her presentation. "Dr. Harding had a question about going into the polling location for usability testing, and there are issues here which have to do with accessibility testing. The usability tests we are developing for conformance do not address usability testing for improved accessibility because we need a slightly different version of the tests. Some of the equipment will be different, and the benchmarks are going to be different. For example, if you have an audio interface, we know that the benchmark is going to be slower. We need to ask what an acceptable rate is for that. So there are some disability-specific issues. Also you need to define the demographics for testing for classes of disabilities. So that is the next step. Finally, we are always looking for what can be moved from the accessible system requirements to general requirements. I know in the current version of the VVSG, there were some font and color requirements that wound up in the accessibility section. These I think could easily be moved into the general equipment section with really no cost to the vendors, or very little cost. Some of that is already addressed in fact on most of the current DREs."

Dr. Harding moved to accept the Human Factors preliminary report. The motion was seconded. The Committee voted unanimously by voice vote to accept the Human Factors Report (see Table 1).

The Chair thanked Dr. Laskowski and opened the floor to Dr. Hastings , Mr. Kelsey, and Mr. Wack to present the Security and Transparency Preliminary Reports.

The Chair thanked Dr. Laskowski and opened the floor to Dr. Hastings, Mr. Kelsey, and Mr. Wack to present the Security and Transparency Preliminary Reports.

Dr. Hastings thanked the Chair and provided a summary of the draft requirements for cryptography and access control. His presentation covered the following draft VVSG 2007 cryptography requirements:

- The integrity and confidentiality of the communications shall be protected by cryptographic means unless either:

  (a) the communications channel between the components is entirely within a protected physical enclosure of the voting system; or
  (b) the integrity and confidentiality of the communications is documented not to be necessary for the reliability and security of the voting system.

Dr. Hastings also covered the plans for the access control requirements to include:

- More specificity and broadening
  - Identify people, applications, and components with respect to their role in the voting system,
  - Expand authentication techniques,
  - VVSG 2005 and IEEE P1586 are password-centric,
  - Biometrics, cryptographic tokens, etc., and
  - Use modes of operation to limit access and functionality.

Dr. Hastings concluded his presentation with a brief review of other VVSG 2007 security requirements including:

- Software Installation and Update
- Setup Validation
- Physical Security
- Hardware Security
- Independent Verification (IV)
- System Integrity Management
- Threat Analysis Appendix.

(Dr. Hastings full presentation is available for review at: http://vote.nist.gov/meeting20060329.htm.)

Dr. Hastings yielded the floor to Mr. Kelsey who provided a summary report on open-ended evaluation of voting systems. His presentation began with a brief history of the recent work in open-ended evaluation including:

- TGDC resolution on open-ended vulnerability testing (OEVT)
- Preliminary threats presentation/paper
- OEVT presentation last year
- Informal identification of threats
- NIST Threats to Voting Systems Workshop
- Brennan Center threat analysis.

His presentation addressed the following questions:

- What is open-ended testing?
- Why do we need it?
- How do we plan to do it?
- What do we still need to know?
  - Technical Questions
  - Policy Questions.

(Mr. Kelsey's full presentation is available for review at: http://vote.nist.gov/meeting20060329.htm.)

Mr. Kelsey yielded the floor to Mr. Wack for his report updating research into requirements for voter verified paper audit trails (VVPAT). Mr. Wack thanked Mr. Kelsey. His overview of the research included:

- Statistics on VVPAT Usage
- Current VVPAT systems
- Broadening VVPAT to non-DRE systems
- Ramifications to existing requirements
- VVPAT auditing
- Future directions for VVPAT in VVSG 2007.

His VVPAT statistics included:

- 26 states have enacted legislation for paper trails, with 13 proposed
- For 2006, 40% of registered voters expected to use op scan equipment
- 38% to use DRE equipment
- VVPAT will be used in 5 states.

With respect to VVPAT in the 2007 VVSG, Mr. Wack noted:

- Requirements may still change because of interrelationships with other areas, e.g.,
  - Linking requirements to tests
  - Usability/Accessibility research
  - Electronic and paper record formats

  - Relationship to Independent Verification.
- Requirements will permit wider range of approaches to providing VVPAT.
- More focus on providing uniformly auditable approaches to VVPAT.

Mr. Wack concluded with a listing of open issues that will require more research. They included:

- Bar codes – a good idea in general?
- Usability, privacy and paper spools
- Ease of auditing VVPAT records
- Common formats for all cast ballot records (e.g., Election Markup Language [EML]).

(Mr.Wack's full presentation is available for review at: http://vote.nist.gov/meeting20060329.htm.)

The Chair thanked the three presenters and offered the following statement to the Committee. "NIST believes the preceding Preliminary Reports of technical support titled: Security and Transparency Subcommittee (STS) preliminary reports for next VVSG iterations respond to TGDC Resolutions 12-05, 14-05, 15-05, 16-05, 17-05, 18-05, 21-05, 22-05, 23-05, 35-05, and 39-05. Unless there are supplemental directions or corrections, the technical support and related work product will continue to be developed consistent with this Preliminary Report. Are there any questions, further directions, or corrections?"

Mr. Berger thanked the presenters and offered a question to Mr. Wack. "The VVPAT is intended to be a solution to a problem. I just would like you to reflect on whether the standards are written such that, if a better solution comes along, they can be qualified?"

Mr. Wack provided a brief description of a dual verification approach to this matter. "Our subcommittee has been pushing the concept of 'Independent Dual Verification' or 'Independent Verification (IV).' And that work is evolving right now. We have had a lot of very active discussions trying to boil down what we really need for a record of a voting system that is independently verifiable and can be used in recounts and audits, at the same time basically proving that the machine is functioning correctly. We do not have specific answers for that at this point. We're still going down that path. The VVPAT requirements essentially should be a subset of the IV requirements. So we do not want them written in any way that precludes alternative approaches that perhaps are more flexible than paper. If there are other ways of verification that don't necessarily involve paper, we would want to definitely explore those ways."

Mr. Karmol asked for a point of clarification with regards to the use of the term VVPAT. "Maybe I missed something in one of our subcommittee meetings, but didn't we change the term here to 'Voter-Verifiable Paper Audit Trails'?

Mr. Wack thanked Mr. Karmol for the clarification, which he noted was indeed correct. "And it is true. It's not voter verified, it is potentially voter verifiable. We do not know the numbers of voters who actually verify VVPAT records."

The Chair stated the correction for the record.

Secretary Gale asked whether electronic ballot markers (EBMs) fit into requirements for VVPATs. “I don’t see that you’ve tied the EBM into this particular presentation - for example, an Automark ballot as a Voter-Verifiable Paper Audit Trail. And I guess that is good from my point of view. I think they are two distinctly different products.”

Mr. Wack answered that, from his viewpoint, the EBM produces a ballot. “If the voter picks up the ballot and can inspect the ballot and put it into a tabulator system, that in essence is a Voter-Verified Paper Audit Trail. You do end up with two records-electronic and paper. The voter has verified one of them and that record can be used in recounts, or it can be used in high-quality audits. So we contend that in essence you are creating a Voter-Verifiable Paper Audit Trail when you’re using an EBM with an optical scan tabulator system.”

Secretary Gale described both a greater distinction and difficulty with the classification as presented. “I don’t think the courts of law have resolved that issue of what is a ballot here. But I think it’s very clear the Automark paper ballot is the official cast ballot. With the DRE Verifiable Paper Audit Trail, the official ballot is the electronic record. The paper record may be used and may not be used. So I hate to have a system that has a very clear product, a paper ballot that is tabulated, suddenly put into this morass of confusion and fog that revolves around the DRE VVPAT. To combine them sounds like you’re mixing apples and oranges. You are prejudging some issues that the courts of law are going to have to address eventually.”

A Committee member asked Mr. Wack if he considered whether a manually marked ballot scanned in an op scan tabulator fit within the VVPAT classification.

Mr. Wack admitted that there were accuracy issues with this type of ballot, and he did not have a definitive answer. “Briefly, the problem, as I see it, is that if you have hand-marked or manually marked paper ballots, you have a record that is potentially ambiguous. While the majority of ballots are most likely scanned accurately, this is not always the case, due to marginal marks. So can it be used to create an unambiguous audit trail? If you gave the ballot to three sets of election judges, would they all come up with the same results? I don’t know the answer to that yet. Actually David Flater has been doing active research on accuracy requirements for the manually marked ballot. I get back to our premise to above all do no harm. I felt we were safe in broadening the classification to Electronic Ballot Marking devices that produce a machine ballot, but not a hand-marked ballot.”

Dr. Rivest then responded to Senator Gale’s concerns regarding the VVPAT distinction from various paper ballot classifications. “We have voting systems which, as pieces of equipment, produce multiple records. Some of the records may be paper, some of them may be electronic, some of them may be paper marked by the voter; and so on. Then the question that you raised poses a very interesting distinction: which is the ballot of record? As you note, it is a matter of state law typically. The security subcommittee has not paid

attention to that distinction as a matter of policy because states do vary on this matter. If a vendor was to submit a voting system for certification, then, under your interpretation, the vendor would have to specify the ballot of record produced by this machine. The system would only be certified in that usage mode. To my understanding, we have not had vendors submitting voting systems where they specified the ballot of record for certification in that usage mode. If the Committee wants to explore this requirement, that would be an interesting direction for further discussion. It may be very helpful for exactly the kinds of reasons you suggest, but my understanding of our task here is to not take those policy considerations into account."

The Committee then engaged in extensive discussion on the issues pertinent to VVPATs and various ballot distinctions. Dr. Schutzer recommended further human factors research objectively measuring voter distinctions between electronic and paper records. Mr. Berger indicated that Dr. Selker of MIT had undertaken a study indicating that five percent of voters look at the paper record. Ms. Quesenbery cautioned that this observation was not the result of a controlled scientific study of whether voters verified the record. Mr. Berger asked Ms. Quesenbery for her opinion of the validity of Dr. Selker's observations that five percent of voters look at a printed record for verification."

Ms. Quesenbery expressed her concerns. "I haven't done the research. I think the results depend a great deal on the instructions voters were given. I think it would depend a great deal on the presentation of the instructional material including how and when it was presented. And it would also depend a great deal on the state election laws. Another question is, does it matter if only a few people check the paper record?"

Dr. Rivest offered his viewpoint. "I too think there is a misperception that everybody needs to check the voter-verified paper audit trail in order for it to be an effective deterrent against somebody trying to introduce malicious software. Even if only a small fraction of people do check the paper record, and they do raise an alarm when they see a discrepancy, you have received good proof there that the paper does not agree with what they voted. You will have detected fraud. So that even if the number were smaller than commonly thought was necessary, it could still be very effective as a deterrent."

Secretary Gale emphasized that the Committee needed more clarity on the distinctions related to the various voter records. "I think it is a fundamental thing that we have to decide, because a manually marked ballot in the minds of every voter is an official ballot. Maybe they are not so sure about an electronic ballot, and maybe that is why they need this paper trail. But in Nebraska with the Automark EBM system, we are going to end up with two kinds of ballots. We are going to have the manually marked ballot, and we are going to have a ballot marked through the Automark equipment that becomes an official ballot as well. But we are going to call the ballots two different things. Everybody is saying the manually marked ballot is fine. That ballot does not have to be called a verified paper trail. But the electronically marked ballot that comes through the Automark is going to have to be called a verified paper trail, which may or may not be recognized as a ballot by the courts of law. So it seems to me the electronic and manually marked ballots are exactly the same thing. You have a manually marked ballot, and you have a piece of equipment that marks your ballot by your direction, and they both are the

official ballot for recount purposes in Nebraska and every other state that uses them. However, the official ballot under the DRE standards, as I understand them, is the electronic ballot, and the paper record here is only for use in the event of a court contest in the election."

Mr. Wack pointed out the complication in states where the statutes mandate the VVPAT paper spool record as the vote of record in a recount. "In the NIST research on independent verification systems, we have not addressed the policy issue distinction concerning the disposition of paper as either the ballot of record or an ancillary audit record."

Secretary Gale summarized his concerns with respect to the official certification of election results in Nebraska and other states using optical scan with electronic ballot marker systems. "When the canvassing board sits, they are certifying the election based upon the certification of county officials for certified paper ballots. Those paper ballots are either manually marked or they are electronically marked, but they are paper ballots. That is what we certify."

Another Committee member stated his understanding of the issue for states using DRE voting systems with paper printers. Many of those states certify the electronic vote of record unless the election is contested or there is need for a recount. "It is a matter of state law but I think that confusion has to be resolved for the Committee so that we are not trying to answer a political policy issue through some equipment guidelines."

The Chair asked Commissioner Davidson to comment on the policy issues here and how best for the Committee to proceed here. Commissioner Davidson indicated the need for the EAC to reflect on the matter. She indicated that she would report back to the Committee on the matters at hand.

The Chair thanked Commissioner Davidson and opened the floor for a motion to accept the Preliminary Reports of the security subcommittee without revisions, corrections, or additions. The motion was made and seconded. The Chair asked for a voice vote. The motion passed unanimously with one member opposed (see Table 1).

Dr. Semerjian opened the floor for the introduction of resolutions. He recognized Dr. Harding.

Dr. Harding thanked the Chair. He referenced the sixteen years of work that the U.S. Access Board spent to develop precise verifiable standards for accommodations for people with disabilities. "Yet, no matter where I go in the country, they are implemented differently. So it makes me want to move a motion to increase the interaction by the EAC, and specifically the TGDC, with the disabled community during the development of the VVSG 2007."

The motion as initially proposed by Dr. Harding read:

The TGDC directs the Committee Chair and the subcommittee chairs to work in consultation with the EAC Commissioners to develop a strategy to involve the disabled community in the review of the relevant VVSG 2007 requirements under consideration. The outreach and interaction could include public hearings and other unique events that address voting requirements for the disabled and specifically cognitively disabled voters.

Mr. Craft seconded the motion.

The Chair opened the floor for discussion and recognized Secretary Gale.

Secretary Gale questioned how best to undertake this strategy to interact early on with the disability community to address specific needs. “The same thing could be said of vendor input, for example, in terms of promoting their earlier involvement. It seems like there already is an established order and procedure in place. As we have been hearing today, the Committee develops resolutions and recommendations. Eventually there are public hearings at which all relevant and interested parties and groups get to testify and submit written commentary and testimony. If we keep moving that process earlier and earlier, it seems like it makes this Committee overburdened with participation by particular interest groups before we develop recommendations that the public can examine. For example, how do you decide what vendors are going to be consulted early on? In terms of those voters with cognitive disabilities, are we able to identify all representative organizations and groups to be consulted without other disability groups objecting?”

Dr. Harding agreed. He noted that with the development of the 2005 VVSG, the needs of the cognitively disabled were not addressed. He emphasized that this group is still disenfranchised during the current development of the 2007 standards. Mr. Craft asked Dr. Harding whether there were specific outreach activities that would assist the issues of the cognitively disabled voters. Dr. Harding indicated that it would be helpful to change some of the ‘should’ requirements in VVSG 2005 to ‘shall’ requirements in 2007. Ms. Quesenbery recommended that a future public hearing might be valuable in guiding the work of the human factors subcommittee in addressing the needs of the disabled community.

Commissioner Davidson indicated to Dr. Harding that many of the ‘should’ recommendations from the TGDC were changed to ‘shall’ recommendations by the EAC in the final VVSG 2005 document.

Dr. Harding withdrew his motion with the understanding that Dr. Laskowski would distribute to the entire TGDC a list of the human factor requirements in VVSG 2005 that were changed from ‘shoulds’ to ‘shalls.’

Dr. Rivest returned to the issues of statewide voter registration systems and whether requirements for them were in the scope of the Committee. A TGDC member asked the Chair to consider an opinion from counsel on this matter. Dr. Rivest agreed that this might clarify the issue. He first quoted the pertinent language in HAVA referring to guidelines “on computer networks, computer data storages, and voting systems, including the computerized list required under Section 303(a).”

The Chair asked the EAC for a ruling here.

Commissioner Davidson indicated that the EAC's general counsel will look at the issue, and the EAC will then provide guidance to the Committee.

Dr. Rivest thanked the Commissioner.

The Chair initiated a discussion of the dates for and length of the next TGDC meeting. There was also discussion of where to hold the next meeting. The initial opinion, to be followed up with formal input from all members, was to hold the meeting on December 4-5, 2006, at NIST. NIST will look into starting the meeting on December 4th late in the morning.

Dr. Semerjian thanked the NIST staff for their efforts and thanked the TGDC members for their active participation. He adjourned the sixth plenary session of the Technical Guidelines Development Committee.

TGDC Resolution Voting **Plenary meeting** **March 29, 2006**

Resolution Number	Williams	Berger	Karmol	Craft	Gale	Elekes	Gannon	Harding	Miller	Purcell	Quesenbery	Rivest	Schutzer	Turner-Buie	Semerjian	Tally Y-N-A
03/29/06 AM Roll Call	√	√	√	√	√	√	√	√	√	*	√	√	√	√	√	14 Note: Turner Buie was present via telcon but could not be heard. Comms. problem fixed at 10:30 am
Reesolution 01-06																Passed by Unanimous Voice Vote
03/29/06 PM Roll Call	√	√	√	√	√	√	√	*	√	√	√	√	√	√	√	13 Note: JR Harding joined the meeting by telcon at 2:10 pm
Core Requirements Preliminary Reports																Passed by Unanimous Voice Vote
Human Factors Preliminary Report																Passed by Unanimous Voice Vote
Security Factors Preliminary Report																Passed by Voice Vote: One No Vote (Gale)

Table 1

Y=Yes N=No A=Abstain

*=Not Present for Vote