Getting Out the Vote:
Assessing Technological, Social and Process Barriers to (e)Voting for People with Disabilities

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Prepared for
The Twenty-Seventh Annual APPAM Research Conference
3-5 November, 2005
Washington, DC

ABSTRACT:

In a representative democracy the process of selecting those who represent the electorate is critical and ensuring "fair" and valid elections has been of concern as long as elections have been held. In the United States, the voting process since early in the last century has generally moved to one of increasing inclusiveness and representation. A broadly recognized solution to the problem of mechanical failure in machine tabulation, electronic voting (e-voting) has been extensively debated in the literature, but mostly from a purely technological standpoint. While these machines have generally delivered on the promises of increased accuracy, more timely generation of results, and flexibility in terms of ability to address the needs of a wide range of capacities, they nevertheless operate within a complex environment moderated by social and behavioral variables. For voters with disabilities (VWD),[1] barriers to voting arise not only from physical factors such as inaccessible facilities, or limitations of voting technology per se, but from less recognized and more insidious cultural, social, or awareness related factors. This paper presents some of the preliminary findings of a pilot survey of voter satisfaction with the voting process, using manual and electronic voting and including voters with and without disabilities, to help assess and identify potential issues, barriers and opportunities that may impede the voting process for people with disabilities.

[1] For convenience we have truncated the expression "respondents to the voting survey with disabilities" to "Voters with Disabilities" (VWD).

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INTRODUCTION:

Governance, democratic or otherwise, is a messy business. In a representative democracy the process of selecting those who represent the electorate is critical, and by virtue of its complexity and the high stakes inherent in the outcome, one with potential for error (at best) or abuse (in a worse case). Ensuring "fair" and valid elections has been of concern as long as elections have been held, and while social/political rhetoric continually waxes and wanes, the voting process in the United States, since early in the last century has generally moved to one of increasing inclusiveness and representation. While much of the literature has focused on "big picture" (social or process elements) at one end, or on the mechanics of implementing new technologies of voting, at the other, less has been written about the issues of access to voting for people with disabilities in terms of the immediate context in which voting takes place.

For instance much of the concern expressed associated with the 2000 Presidential election related to validity of the electoral process in terms of who voted, who might have been excluded, or deterred from voting, and failure rates of the extant voting technologies in a climate of narrow majorities. To date, most of the proposed policy remedies to these problems have primarily focused on the macro (who voted) and micro levels (machine failure or failure of process dealing with mechanical objects). A broadly recognized solution

to the problem of mechanical failure in machine tabulation, e-voting, has been extensively been debated in the literature, but mostly from a purely technological standpoint.

While these machines have generally delivered on the promises of increased accuracy, more timely generation of results, and flexibility in terms of ability to address the needs of a wide range of capacities, they operate within a complex environment moderated by social and behavioral variables. For people with disabilities, these "meso-level" barriers to voting arise not only from physical factors such as inaccessible facilities, or limitations of voting technology, or as poll-worker lack familiarity with accessibility features of the machines, per se, but from less recognized and more insidious cultural, social or awareness related factors, such as poll worker perception of voters with disabilities, or misunderstanding of the limitations of their disability-related conditions.

When Americans went to the polls for the 2004 election, there were 6 major methods of voting being used by the counties: Direct recording electronic (DRE), Optical scan, Punch card, Lever, Paper, and Mixed systems. For the purpose of this study, Optical scan, Punch card, Lever, Paper tabulation systems are aggregated under the category of "manual voting". This research presents the preliminary findings of a pilot survey of voters' satisfaction with the voting process, using manual and electronic voting, and including voters with and without disabilities to help assess and identify potential issues, barriers and opportunities that may impede the voting process for people with disabilities.

VOTING AND PEOPLE WITH DISABILITIES:

One of the central concerns for people with disabilities, as well as the policymakers, advocates, and other groups who represent them and their interests, has been the continued existence of barriers to voting and electoral participation. Much of the scholarship on the issue of disability and voting within the past decade contains several common themes and starting points. First, many researchers have speculated that, during the past several decades, declining participation in American electoral politics, in general, could

result in the development of a representational bias in politics and policymaking. This shift theoretically reflects the interests, first, of the well-educated and affluent, social groups who are much more likely to vote than those with less education and more modest means; and second, of highly motivated issue-oriented voters, representative of strong grassroots organizing efforts. However, one study, by Schur *et al.* (2002), argues that people with disabilities are less likely to vote than individuals who have otherwise similar demographic characteristics. With such low electoral participation among individuals with disabilities, a third point of agreement among many researchers holds that correlations exist between low voter participation and the continued existence of barriers—social, economic, educational, physical, and political—encountered by individuals with disabilities.

Many researchers are interested in the ramifications of potential increased voter participation on the part of people with disabilities, as well as in understanding the many barriers to voting that they face. Not all researchers are unanimous about the causes of such low voter turnout. While some agreement exists that barriers to voting—such physical barriers as traveling to and entering the voting place, inaccessible or otherwise unusable voting booths and systems, and problems with interaction with poll workers—represent the greatest problems to electoral participation, disagreement persists over whether these barriers are the only reasons voters with disabilities do not vote.

The challenges to voting faced by people with disabilities surpass explanations of voter apathy generally offered as explanations for low voter turnout among certain social groups; however, some researchers have also argued persuasively for explanations which also consider resources, psychology, and recruitment. In addition, some researchers note that simply having access to the voting place and the capability to cast a vote is not enough. Exactly *how* individuals with disabilities vote is just as important, as an increasing shift toward electronic voting has heightened debates between issues of accessibility and privacy (Danielsen and Zimmerman, 2005). Despite these points of tension among researchers, a common interest in pursing means to increasing electoral participation

among people with disabilities remains, even as it forces a consideration of the potentially negative implications of increasing accessibility, such as a decrease in privacy.

Opening with observations that people with disabilities are less likely to vote than non-disabled individuals, Schriner and Shields (1998) examine an emerging emphasis of the disability rights movement to increase voter participation. They note that during the 1990s, much of the political activism of disability advocates was targeted at Congress and the President, but only after they had been elected to office. In addition, advocates tended to focus on specific policy objectives, such as passage of the Americans with Disabilities Act or reform of the Disabilities Education Act. Though such policy objectives met with great success, it remains necessary to boost voter turnout among people with disabilities, as it is clearly the primary vehicle for expression in democracy. Schriner and Shields review the requirements of the National Voter Registration Act of 1993 (the "Motor Voter" Act) and the tax code provisions which allow non-profit agencies to engage in voter turnout activities. Though laws such as the Motor Voter Act have made provisions designed to facilitate voter registration among individuals with disabilities, the authors suggest that registration is not enough and argue that people with disabilities still encounter inaccessible polling places, election officials reluctant to provide a secret ballot for individuals who require assistance to cast their vote, and negative public reaction to their participation. As a result, Schriner and Shields consider absentee voting as a promising voice for intensifying the disability voice in politics, despite criticisms that it may be viewed as a "second class" form of political participation. In addition, they note the role of disability service providers as advocates for their consumers, capable to educating about and identifying barriers to polling places and supporting efforts to overcome them.

Harrington (1999) considers more specifically the challenges faced by blind and visually-impaired voters in Texas, and he examines efforts by the disability community and Advocacy, Inc. to enforce the ADA and make elections more accessible to Texans with disabilities. The two objectives of this effort involved adapting the ballot for voters who are

blind and ensuring polling place access for voters with disabilities. To achieve its objectives, Advocacy, Inc. utilized litigation to protest physically inaccessible voting places and the lack of a secret ballot for blind citizens who wished to cast ballots without needing assistance from a third party. Harrington argues that the cases and resulting settlements provided evidence that the failure to provide for the needs of blind voters was not the result of technology, but rather "lack of vision by public officials" who failed to use readily available, simple technologies that would easily modify existing systems and accomplish ballot secrecy for blind voters.

The author also notes that mobility-impaired citizens fared almost as badly, as evidence suggested widespread non-compliance throughout Texas with ADA physical accessibility requirements, which discouraged and impeded voters with disabilities from voting. For blind voters, a number of simple means to provide voter accessibility while preserving voter secrecy could be deployed, including a walkman cassette player with a tape recording containing candidate/proposition information and step-by-step instructions for using the system, resulting in a completed ballot indistinguishable from all other punch cards. Harrington notes that other voting systems commonly used in Texas, one that electronically scans and counts paper ballots, traditional paper ballots, and lever machines can be adapted just as simply, quickly, inexpensively, and generally with "low-tech" means. Though the cases, originally decided in favor of the plaintiffs to provide enforcement of the ADA, brought favorable outcomes to the defendant, Texas's Secretary of State, on appeal, Harrington notes that subsequent cooperative efforts were more successful. Counties ensured that voting machines purchased in the future would have built in adaptations for blind voters and that in the meantime, ballots would be adapted—this time utilizing a telephone-based approach that allowed blind voters to talk on the telephone, receive directions, and use both hands (through telephone headsets) to punch the card ballot.

Just as Harrington makes a case that the ADA ensures people with disabilities the right to vote, Schriner and Batavia (2001) address the issue directly. They conclude that

narrow interpretations by regulatory agencies and the courts indicate that the ADA will not be sufficient to remove the barriers to voting encountered by people with disabilities. Instead, additional policy actions will be necessary to overcome the structural and other physical impediments to exercising the right to vote. In particular, Schriner and Batavia focus on the rulings of the Department of Justice not to require Braille ballots for blind voters (rather, just an equivalent), and to allow curbside voting. They argue that decisions allowing curbside voting and other alternate means acts contrary to the broad antidiscrimination mandate of the ADA by making it difficult for voters with mobility impairments to enjoy the "communitarian benefits of the electoral process" and "does not result in equal benefits for the person with a disability."

Leaving aside the legal issues surrounding voting rights for people with disabilities, some researchers have focused on the experiences of people with disabilities in the area of voting. Schur *et al.* reported on the results of a household telephone survey of 1,240 people following the November 1998 elections. The researchers found voter turnout to be more than 20 percentage points lower among people with disabilities than among people without disabilities who had otherwise-similar demographic characteristics. The study's findings also suggested that disability, apart from imposing resource constraints, often had social and psychological effects that decrease voter turnout due to decreased social capital and identification with mainstream society. The group's findings also support the idea that general mobility and major life transitions can be important influences on voter turnout in general, and raise questions about causal relations among age, employment, efficacy, and voter turnout.

In an earlier study, Schur and Kruse (2000) also observed that disability, by itself, could not account for differences in voter turnout between persons with disabilities and non-disabled voters. The study focused on people with spinal cord injury (SCI), who account for over one-third of the 521,000 wheelchair users in the United States under age 65. A particular advantage of Schur and Kruse's research was their decision to study a population

in which most of the people were raised as able-bodied individuals, so that as people with disabilities, they had education and early experiences similar to the general population. Schur and Kruse found that people with SCI who were wheelchair users had a voter turnout 10 percent less than non-disabled voters with similar demographic characteristics. Employed people with SCI were just as likely to vote as those non-disabled individuals with similar characteristics. The 10 percent gap, then, is completely attributed to those people with SCI who are unemployed, about two-thirds of the overall SCI population. While disability may be an important factor in determining whether or not people vote, Schur and Kruse, as well as Schur *et al*., argue that it is other factors which derive from disability, such as employment, education, and social and psychological characteristics, which are probably more important. In addition to employment, Schur and Kruse also observed that those individuals who had been wheelchair-users for five years or more and had been able to drive were more likely to vote than those individuals whose injuries were more recent.

Danielsen and Zimmerman (2005) consider the effects of electronic voting on individuals with disabilities, especially the blind and visually-impaired, in the wake of the controversies surrounding the 2000 election. Obscured in the movement to implement newer technologies such as direct recording electronic (DRE) touch-screen voting terminals has been the fact that for decades, disability rights proponents had sought to ensure equal franchise for individuals with disabilities. DRE technologies generate complex effects—though they address a number of "core accessibility concerns," newer electronic methods have left disability advocates some what conflicted when weighing the advantages of critical accessibility advancements against the ballot integrity issues that such paperless technologies create. Electronic voting for people with disabilities, Danielsen and Zimmerman argue highlights the dichotomy between privacy and accessibility in voting and

the risks of dissent among advocates otherwise similarly dedicated to the improvement of the electoral process.[2]

More specifically, regarding the ramifications of new electronic voting machines for people with disabilities, Danielsen and Zimmerman observe that their accessibility features "stand in stark contrast to a range of security and design flaws and, what is to some, a fatal lack of transparency."[3] They note that the rejection by election officials of such security, transparency, and verifiability concerns have worried disability advocates, who fear that the adoption of accessible voting technology will be slowed or halted by rising hostility to electronic voting machines.[4] Danielsen and Zimmerman argue that these competing concerns are beginning to be addressed by technologies that blend DRE and traditional optical scan (paper) systems, resulting in ballot-marking devices that feature the auditability of strictly paper-based systems while maintaining the advances in accessibility offered by DREs. However, such devices will not resolve all concerns that voters with disabilities may have, such as a lack of machines usable by the deaf-blind, continuing opposition to paper ballots based by voters who cannot handle paper (e.g. quadriplegics and persons with severe cerebral palsy).

Though more portable machines have made "curbside voting" available, some disability advocates worry that the practice is inequitable because it segregates them from the rest of the voting population, and they would prefer that states and counters act more aggressively to ensure that polling places are made accessible to people with mobility impairments. Perhaps even more

[2] Note: For example, Danielsen and Zimmerman note that much of the legislation aimed at improving the voting process for individuals with disabilities aimed to ensure privacy. The 1982 Amendments for the Voting Rights Act guaranteed that voters had the right to take a person of their choice into the voting booth to provide assistance, thus providing some security for visually or physically impaired voters who could bring a trusted family member or friend with them, rather than relying upon poll workers. Likewise, the Help America Vote Act of 2002 also went further to ensure privacy for voters with disabilities by requiring that at least one electronic, computer-based terminal with audio output through headphones and keypad interfaces be installed at each polling place.

[3] Note: In particular, the authors note that DREs (1) are closed systems, using hardware and software not subject to rigorous independent inspection and testing; (2) have not had the benefit of public approval in their selection; (3) are sanctioned by rules that deny voters the opportunity to observe, review, and question claims of voting machine vendors; (4) lack a paper record of voters' selections at the time that ballots are cast, thus not allowing voters to verify their choices.

[4] Responses have been varied: The American Association of People with Disabilities have opposed the printing of paper ballots outright, while the National Federation of the Blind do not oppose paper ballots but insist that the blind have some means to verify what is being printed.

important, however, are issues that Danielsen and Zimmerman identify regarding ballot recount law reform, inadequate poll worker training, unfettered and unsupervised access by vendor technicians (who have the greatest incentive to cover up technological problems) to voting machines on election day, and too many jurisdictions with inadequate technology contingency plans in the case of machine breakdowns. The authors conclude by noting that, "whatever the shortcomings of the new technologies, the possibility for progress in key areas—accessibility, accuracy, security—is quite real, especially if accompanied by simultaneous development of clear legislative and regulatory guidelines." They note that there exist many opportunities for collaboration and that stakeholders must work together to address concerns of certifying voting equipment, establishing election procedures, ensuring transparency, and above all, presenting a united front to voting system vendors at all levels. Otherwise, voting systems will be adopted that imperfectly address security and accessibility concerns separately, "one artificially cast against the other."

RESEARCH METHODOLOGY:

This research presents the preliminary findings of a survey of voter satisfaction with the voting process, using manual, and electronic voting, and including voters with and without disabilities to help assess and identify potential issues, barriers, and opportunities that may impede the voting process for people with disabilities. Survey participants (voters) were recruited from across the United States via list-servers maintained by various disability organizations, including the National Association of Councils on Developmental Disabilities, independent living centers, federally funded projects such as the Disability Business Technical Assistance Centers and the AT Act projects, as well as by solicitations in Georgia though mass media outlets such as public radio, and newspapers such as the

Atlanta Journal and Constitution. The intent was to cast a wide net that might yield an over sampling of people with disabilities.

The survey instrument (see Appendix A) consisted of closed and open-ended questions designed to determine the voter's satisfaction with the voting experience, as well as the usability and accessibility of voting machines for all voters, including those with disabilities. The instrument also queried respondents about the accessibility of information on the issues and the candidates to help voter make informed decisions prior to voting as well as the voter's ability to understand or obtain information on how to operate voting machines. The survey was divided into four sections: *Voting*, *Barriers to Voting*, *Your Satisfaction with Your Voting Experience*, and *Tell Us about You*. The instrument was pre-tested by staff members of CATEA and 2 blind JAWS users for comments on content, clarity, and accessibility.

The survey was administered between October 2004 and mid February 2005. The software application Survey Solutions – Professional Edition, developed by Perseus Development Corporation, was used to administer an accessible survey over the Internet and to collect data online into a database. This database was then imported into SPSS for standard statistical summaries of quantitative data analysis. Responses to open-ended questions were analyzed by formal content analysis procedure using two independent analysts who identified themes and reconcile their interpretation with help form a third analyst as necessary. For respondents who did not have access to the Internet or otherwise found the survey inaccessible, accommodations were made to take the survey over the phone. Over the 5 month period, 563 unique voter experiences/respondents participated in the survey.

RESULTS:

The 563 respondents to the voter satisfaction survey were assigned to two groups: those reporting having a disability (VWD) and those who reported they did not have a

disability, further disaggregated by type of voting machine used (electronic or not electronic). 58% of the respondents reported no disability, and 42% reported having a disability. The split between electronic or e-voting and all other methods of voting, henceforth referred to as manual was 400 (71%) electronic and 163 (29%) manual.

Table 1: Participant Characteristics (Voting and Disability Status)

Status		Frequency	Percent
Valid	Able manual	58	10.3
	Able e-voting	267	47.4
	VWD manual	105	18.7
	VWD e-voting	133	23.6
	Total	563	100.0

The majority (50.4% of the total number of respondents) of the respondents were in the age range of 35-54 years of age; however, they were a disproportionately educated group with 1.8% reported as not having complete high school or having a high school equivalency, 29.1% having a Bachelor's degree, and 32.7% having an advanced/professional degree. The disabled population shows a similar distribution although the percentages are not quite as high, with Bachelor's (23.6%) or advanced/professional degree (25.6) categories as the most highly represented. The self-inclusive survey is also skewed in terms of racial classification (White: 85.6%, Black or African American: 6.0%, Hispanic/Latino: 3.6%, Asian: 0.9%).

Table 2: Participant Age Distribution

	Age	Frequency	Percent
	0	5	.9
	18-34	159	28.2
	35-54	284	50.4
	55-74	111	19.7
	75+	4	.7
	Total	563	100.0

Table 3: Highest Level of Education Completed

	Educational Attainment		Frequency	Percent
no disability	Valid	Less than high school	1	.3
		High school or equivalent	10	3.1
		Some college	44	13.5
		Associates degree	8	2.5
		Bachelors degree	108	33.2
		Post-graduate study without degree	28	8.6
		Advanced/professional degree	124	38.2
		Total	323	99.4
	Missing	System	2	.6
	Total		**325**	**100.0**
VWD	Valid	Less than high school	9	3.8
		High school or equivalent	19	8.0
		Some college	37	15.6
		Associates degree	15	6.3
		Bachelors degree	56	23.6
		Post-graduate study without degree	36	15.2
		Advanced/professional degree	60	25.3
		Total	232	97.9
	Missing	System	5	2.1
	Total		**237**	**100.0**

Geographically, forty-five states and territories were represented by the respondents, although Georgia (with 51.7% of the respondents) was over-represented in terms of location of respondents[5]; this distribution was partially a function of the process of soliciting participants, following, the states of California, Pennsylvania, and Virginia (3.7%), (3.9%), and (3.6%) were respectively represented. The states of Florida, Louisiana, Maryland, North Carolina, New York, South Carolina, Texas, and Washington had between 2.0% - 2.3% of the respondents, all other states and territories ranged from 0.2% - 1.4%

[5] Note: GA's polls are 100% e-voting

of the respondents. There were no respondents from Idaho, Wyoming, South Dakota, Wisconsin, West Virginia, Mississippi, Rhode Island, or Vermont.

Other variables captured in the survey included the respondent's method of voting, type of election, success in casting a ballot and any assistance needed in doing so, as well as accommodations available and used, and the barriers encountered by the respondents when voting and casting their ballot. Survey analysis included examination of satisfaction with the voting experience, and quantification of the types of disabilities and other demographics. Lastly, a content analysis was conducted of the two open-ended survey questions.

Non-Disabled Voters vs. Voters with Disabilities (VWD)

Of the 13 questions related to voter satisfaction with the voting process, responses to 7 questions showed a statistically significant difference in how VWD viewed their experience when compared with voters without disability. These can be grouped into three categories:

- "satisfaction with voting *experience*" - VWD were approximately 10% less likely to report being satisfied with the experience;
- "satisfaction with *polling officials/place*" - VWD were 9%-18% less likely to report satisfaction with polling officials or place;
- "satisfaction with *voting machine accessibility*" - VWD were 7% to 20% less likely to report satisfaction with the equipment.

Voting

Approximately 80% of the survey responses relate to voting during the general election; of these, 74% of the respondents reported using an electronic device and 26% reported the use of a manual device. The number of voters reporting the use of absentee ballot was 10% overall; comparable to the responses of voters with disabilities, 11% of who reported using an absentee ballot. Of the 563 respondents only 8 (1.4%) reported that they were not able to cast their ballot, all of whom reported having a disability. More expected

was the fact that some seventy-five respondents (13.3%) reported needing assistance in the act of voting. Able-bodied (non-disabled) voters needing assistance made up 2% of the total respondents while 11.2% of the total respondents were voters with disabilities. Put another way, only 3% of the non-disabled population needed assistance while 26.6 % of the disabled population reported needing assistance.

Table: 4 Need Assistance in the Act of Voting

	Response		Frequency	Percent
no disability	Valid	No	314	96.6
		Yes	11	3.4
		Total	325	100.0
VWD	Valid	No	174	73.4
		Yes	63	26.6
		Total	**237**	**100.0**

Machine Accessibility Features and Barriers to Voting

Machine related features that might pose barriers to voting were addressed via three survey questions probing voting machines with built in accessibility accommodations. Seventeen (3.0%) respondents reported using the available adjustments; with use of headphones and volume control the most used adjustments.

Table 5: Use of Accessibility Accommodations

	Accessibility Feature		Responses	
			Frequency	Percent
PWD	(adjustments)	Text size	2	6.3%
		The ability to zoom in	1	3.1%
		Volume	11	34.4%
		Height	4	12.5%
		Headphones	12	37.5%
		Other (please specify)	2	6.3%
	Total		**32**	**100.0%**

Next respondents were asked to indicate any barriers to accessibility encountered and list any potential usability problem encountered while voting. There were 347 instances of reported barriers including size or display of the text, 71 (20.5%), problems with placement or design of controls 109 (31.4%), or audio/sound output 167 (48.1%). Not unexpectedly VWD reported experiencing an overall greater number of problems, with 209 (60.2%) instances vs. 138 (38.9%) instances for the non-disabled voter. Of particular interest is the fact that 16% of participants, overall, responded that the lack of privacy was a key concern in the use of e-voting machine.

General Observations from Open-ended Questions:

Some 253 respondents responded to at least one of the open ended questions, which asked for a description of any additional problems had while voting. While not large in terms of numbers, the nature of the responses merit some degree of examination especially as they deal not as much with problems with the technological (machine) aspect of the voting per se, but rather with human, process, or contextual aspects of voting:

On the positive side:

- 79% of those responding were in agreement with the statement "Using an electronic voting machine improved my voting experience." There was no statistical difference between the two groups.
- 81% of VWD's responded to the statement "I believe electronic voting machines will encourage more VWD's to vote". Interestingly, there was no statistical difference between VWD and people without disabilities.

With respect to problems with the voting process:

- 12% of the respondents reported complaints concerning use of a voting device that tended to *impact all users*. 97% of these respondents were electronic voters, 50% were VWD and 45% were VWD using electronic voting
- 9% of the respondents reported complaints regarding *poll worker activity* that impacted all voters with 86% of these having used electronic voting, 36% VWD, and 29% reporting that they were VWD and having used electronic voting machines

- 5% reported complaints regarding poll worker activity that somehow impacts accessibility of voting; 65%of these respondents were electronic voters, 80% were VWD and 33% were VWD using electronic voting.
- 6% reported complaints concerning use of a voting device that primarily impacted VWD; 77%of these respondents were electronic voters, 77% were VWD and 66% were VWD using electronic voting.
- More than twice the percentage of VWD's (16% *vs*. 7%) compared to able-bodied respondents disagreed with the statement that "It was clear that the polling officials understood how to operate the electronic voting machines."

CONCLUSIONS:

Fifteen years after the implementation of the ADA, and three years out from passage of the Help America Vote Act of 2002 (HAVA), results of this preliminary survey suggest that, overall, people with disabilities continue to report greater problems with all aspects of the voting process than people without disabilities. While e-voting machines do represent a solution to some of the problems of voting, as currently implemented, they still (if inadvertently) present additional barriers for some voters.

Overall, voters indicated that e-voting was a significant improvement over manual voting. Accessibility features, again, were appreciated by both able bodied voters and VWD; however specific features, such as ability to adjust the text, were identified as needing improvement. As these machine technology considerations have been studied elsewhere, we feel that a more understanding is needed of the "soft" human factors (or meso-level) issues related to poll worker awareness and understanding of the specific needs of VWD, the complexities of adjusting voting machines to the needs of individual voters, and such process related issues as machine placement, management of voters slowed by voters that might need more time to work with the machines, and general levels of frustration with alteration of familiar voting processes. While it is not unreasonable at this point to suggest that improved outreach and awareness efforts need to be undertaken to insure that poll

workers aware of the constraints and characteristics not only of the voting machines, but more importantly, of voters with disabilities. Additional research that can provide increased resolution on these issues (needs of VWD as well as the processes by which poll workers engage VWD) will allow the development of improved training and materials. The findings of this preliminary study points to aspects of the voting process which might still be problematic. The issues of access to voting facilities (macro level barriers) and fine-tuning machine technologies (micro-level barriers), have been relatively well identified, but the meso-level process barriers, consisting of not one but an array of interrelated potential barriers, represent a policy problem area that can be addressed once sufficiently understood.

Thus, while not by any means conclusive, the findings suggest that while e-voting can assist in reducing barriers to voting by people with disabilities, 1) continued technological efforts need to be made to fine tune their efficacy; and 2) increased efforts need to be made to improve the voting context (human as well as environmental factors) in which voting machines operate.

ACKNOWLEDGMENTS:

The authors wish to acknowledge the research contributions of Mike Williams, Carl Blunt, Dennis Folds, in conducting this study. This research was conducted under the Information Technology Technical Assistance and Training Center (ITTATC) at Georgia Institute of Technology's Center for Assistive Technology and Environmental Access (CATEA) a unit of the College of Architecture. ITTATC is sponsored by the National Institute on Disability and Rehabilitation Research (NIDRR) of the U.S. Department of Education under grant number H133A000405. The opinions contained in this publication are those of the grantee and do not necessarily reflect those of the U.S. Department of Education.

REFERENCES:

Danielsen, Christopher S. and Matt Zimmerman. "Electronic Voting," *Human Rights: The Journal of the Section of Individual Rights & Responsibilities* 32, no. 2 (Spring 2005): 9-12.

Harrington, James C. "Pencils Within Reach and a Walkman or Two: Making the Secret Ballot Available to Voters Who Are Blind or Have Other Physical Disabilities," *Texas Journal on Civil Liberties & Civil Rights* 4, no. 2 (Summer/Fall 1999): 87-105.

Schriner, Kay and Todd G. Shields. "Empowerment of the Political Kind: The Role of Disability Service Organizations in Encouraging People with Disabilities to Vote," *Journal of Rehabilitation* 64, no. 2 (April-June 1998): 33-38.

Schriner, Kay and Andrew I. Batavia. "The Americans with Disabilities Act: Does it Secure the Fundamental Right to Vote?" *Policy Studies Journal* 24, no. 4 (2001): 663-673.

Schur, Lisa and Douglas Kruse. "What Determines Voter Turnout?: Lessons from Citizens with Disabilities," *Social Science Quarterly* 81, no. 2 (June 2000): 571-587.

Schur, Lisa, Todd Shields, Douglas Kruse, and Kay Schriner. "Enabling Democracy: Disability and Voter Turnout," *Political Research Quarterly* 55, no. 1 (March 2002): 167-190.

APPENDIX A

(Voter Survey)

The survey should take 8 - 13 minutes to complete, and it has the following 4 sections:
Voting
Barriers to voting
Your satisfaction with your voting experience
Tell us about you

You will not be asked every question in the survey, so do not expect the question numbers to go in numeric order.

Although it is important for voting officials to provide a polling place that has basic accessible features needed by most voters with disabilities, such as parking, sidewalks, building entrance, and hallways these features are not the focus of this survey.

Please answer each question carefully. If you have any questions or if you would prefer a paper copy of this survey, please email Robert Roy at rob.roy@catea.org or call 404-894-1412. If you would prefer to participate in this survey by telephone, please contact Mr. Roy at the above email or phone number to schedule a phone interview. For TTY service, call the ITTATC project toll free at 1-866-948-8282.

Voting:

1. In what type of election did you vote most recently?
   - ❍ Primary
   - ❍ General
   - ❍ Run-off
   - ❍ Special
   - ❍ State only
   - ❍ Local only (Town, City, County)
   - ❍ Other (define) _____

2. Did you vote on election day or via absentee ballot?
   - ❍ Election day
   - ❍ Absentee ballot

3. Were you successful in casting your ballot?
   - ❍ Yes
   - ❍ No

4. Did you need assistance in the act of voting?

- ❍ Yes
- ❍ No

4a. Please indicate the area(s) in which you needed assistance. (Check all that apply.)

- ❑ Understanding the general procedures involved in voting
- ❑ Reading the ballot
- ❑ Entering your choices/marking your vote
- ❑ Understanding the instructions on how to use the voting machine

5. Did the ballot include some or all of the text of any referenda, constitutional amendment or proposition?

- ❍ Yes
- ❍ No
- ❍ Do not remember

6. Did the ballot include some statements for and against or explanation of the referenda, constitutional amendment,
or proposition?

- ❍ Yes
- ❍ No

7. Did you vote or attempt to vote using an electronic voting machine? An electronic voting
machine is one that uses electronic ballots displayed on computer screens, and the ballots are
counted automatically. You make your choices by touching the screen or using control buttons.

- ❍ Yes
- ❍ No

8. Which of the methods below did you use to make your choices on the voting machine? (Check all that apply.)

- ❑ Touching a screen
- ❑ Pushing a button
- ❑ Other _____
- ❑ Do not know or do not remember

9. Below is a partial listing of voting machine model names and manufacturers. Please
select the voting machine you used.

- ❍ Vote-trakker by Avante International Technology
- ❍ ELECTronic 1242 by Danaher
- ❍ AccuVote-TS or AccuVote-TSX by Diebold
- ❍ iVotronic by Election Systems & Software
- ❍ eSlate by Hart InterCivic

- ❍ Infinity by MicroVote General Corporation
- ❍ AVC Advantage by Sequoia Voting Systems
- ❍ AVC Edge by Sequoia Voting Systems
- ❍ Patriot by UniLect Corporation
- ❍ None of the above (please specify)

_____

- ❍ Do not know, not sure or do not remember

Barriers encountered:

10. Could the voting machine be adjusted to accommodate special needs (such as text size, contrast, volume)?

- ❍ Yes
- ❍ No
- ❍ Do not know or do not remember

10a. Did you use any of these adjustments?

- ❍ Yes
- ❍ No

10b. Please indicate the adjustments you used. (Check all that apply.)

- ❑ Text size
- ❑ The ability to zoom in
- ❑ Contrast
- ❑ Volume
- ❑ Height
- ❑ Headphones
- ❑ Other (please specify) _____

11 Listed below are a number of potential barriers to accessibility. Please indicate any that you encountered while voting. (Check all that apply.)

Visual Display

- ❑ Size of the text was too small
- ❑ Contrast of the text against the background was poor (white on black vs. black on white text or contrasting colors)
- ❑ Controls did not have unique or discernible shapes
- ❑ Controls did not have contrasting colors

Labels and Controls

- ❑ Size of buttons, controls or keys
- ❑ Location/positioning of buttons, controls or keys
- ❑ Identity/labels of buttons, controls or keys was poor
- ❑ No Braille labels
- ❑ Braille label placement
- ❑ The Braille was illegible/unreadable

Audio Output

- ❑ There was no voice output
- ❑ Poor quality of speech output (spoken words were not clear)
- ❑ There was no adjustment for voice rate
- ❑ There was no adjustment for voice pitch
- ❑ Was unable to use headphones or headphones were not available
- ❑ The audio and visual information did not match

11d. Listed below are a number of potential usability problems.
Please indicate any that you encountered while voting. (Check all that apply.)

- ❑ The printed instructions did not make sense
- ❑ The spoken instructions did not make sense
- ❑ Did not allow me to move at my own pace
- ❑ Poor ballot organization
- ❑ Not able to review before finalizing your vote
- ❑ No write in capability
- ❑ The ballot was not provided in a language I understand
- ❑ Lack of privacy
- ❑ Poor wheelchair/scooter access
- ❑ There was too much noise- it was hard to think
- ❑ There was too much light, making it hard to read the ballot
- ❑ There was not enough light, making it hard to see the ballot
- ❑ The use of color made reading the instructions and voting difficult
- ❑ Could not jump to a specific page/location in the ballot
- ❑ Did not know the length of the ballot or how much of the ballot I had left to complete
- ❑ The use and functions of buttons, levers or other controls was confusing
- ❑ Could not scroll through the ballot
- ❑ Did not offer confirmation of input
- ❑ I did not encounter any of the usability problems listed above

12. In the space below, please describe any additional problems you had while voting.

_____
_____
_____
_____
_____
_____
_____
_____
_____

Satisfaction:

Please indicate the strength of your disagreement or agreement with the following statements:

13. The information that was available to me before Election Day on the issues and candidates
was accessible.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree

14. Where do you usually get your information about election issues and candidates? (Check all the apply.)
- ❑ the TV
- ❑ local newspaper
- ❑ national newspaper
- ❑ news magazine
- ❑ web sites
- ❑ family
- ❑ friends
- ❑ co-workers
- ❑ town hall meetings or political rallies

15. I consider myself a well-informed voter.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree

16. The instructions for using the voting machine were clear and easily understood.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree
- ❍ Do not know or do not remember

17. It was easy to change a vote before I cast my ballot.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree
- ❍ Do not know or do not remember

18. For the candidate I selected, it was easy to tell where to mark my choice.

- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree

19. On the ballot, the choices for each office were clearly separated from one another.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree
- ❍ Do not know or do not remember

20. If I chose to do so, it would have been easy to make a straight-party vote.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree
- ❍ Do not know or do not remember

21. While casting my ballot, I was comfortable and confident.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree

22. I am satisfied with my voting experience in this election.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree

23. I believe the polling officials understand accessibility issues.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree
- ❍ Not Clear

24. I am satisfied with the overall level of accessibility of the polling place I used.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree

25. I am confident that the vote I cast will be counted.

- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree

26. I believe electronic voting machines will encourage more people with disabilities to vote.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree

27. I am satisfied with the information about electronic voting machines that was available to me before Election Day.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree

28. I am satisfied with the level of accessibility of the electronic voting machines.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree

29. Using an electronic voting machine did not increase my anxiety level.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree

30. Using an electronic voting machine allowed me to be more independent.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree

31. The screen of the voting machine was large enough to allow me to read the ballot.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree
- ❍ Do not know or do not remember

32. It was clear that the polling officials understood how to operate the electronic voting machines.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree
- ❍ Do not know or do not remember

33. Using an electronic voting machine improved my voting experience.
- ❍ Strongly Disagree
- ❍ Disagree
- ❍ Agree
- ❍ Strongly Agree

Demographics (about you):

34. Please indicate the total number of times you have voted in a public election (general, primary, other).
- ❍ One
- ❍ Two
- ❍ Three
- ❍ Four or more

35. How many times have you voted using an electronic voting machine?
- ❍ One
- ❍ Two
- ❍ Three
- ❍ Four or more
- ❍ Never

36. In which state or territory do you live?
State _____

37. What is your zip code?
Zip / Postal Code _____

38. Do you have a limitation that affects your vision?
- ❍ Yes
- ❍ No

Demographics (about you):

38a. Describe your visual limitation(s).
- ❑ Blindness
- ❑ Limited sight (such as blurred vision or low vision)
- ❑ Difficulty seeing colors (color blindness)
- ❑ Other _____

38b. Which assistive aids do you use to read written material?
- ❑ Magnifier
- ❑ CCTV
- ❑ Braille devices
- ❑ Reading machine
- ❑ Computer screen reader
- ❑ Computer screen magnification program
- ❑ Other _____

39. Do you have a limitation that affects your hearing?
- ❍ Yes
- ❍ No

39a. Describe your hearing limitation(s).
- ❑ Deaf
- ❑ Hard of hearing (partial hearing loss)
- ❑ Tinnitus (ringing in the ears)
- ❑ Other _____

39b. Which assistive devices do you use?
- ❑ Hearing aid
- ❑ Cochlear implant
- ❑ Telephone amplifiers
- ❑ Assistive listening device (ALD)
- ❑ TTY/TDD
- ❑ Other _____

40. Do you have a sensory limitation(s) other than hearing or vision?
- ❍ Yes
- ❍ No

40a. Describe your limitation.
- ❑ Sense of touch
- ❑ Sense of balance
- ❑ Other _____

40b. Which assistive aids do you use?
- ❑ Cane
- ❑ Walker
- ❑ Rolling walker
- ❑ Wheelchair
- ❑ Scooter
- ❑ Other _____

41. Do you have a voice and/or speech limitation?
- ❍ Yes
- ❍ No

41a. Describe your limitation(s).
- ❑ Inability to produce any speech at all (aphonia or inability to talk)
- ❑ Voice quality (hoarseness or dysphonic or voice loudness)
- ❑ Fluency/stuttering (words come in spurts)
- ❑ Clear speech (others cannot understand what you say)
- ❑ Other _____

41b. Which assistive aids do you use?
- ❑ Augmentative communication device
- ❑ Voice amplifier
- ❑ Fluency aid
- ❑ Artificial larynx
- ❑ Speaking valve
- ❑ Other _____

42. Do you have a physical limitation that affects the use of your hands and/or arms?
- ❍ Yes
- ❍ No

42a. Describe your hand and/or arm limitation(s) (upper mobility).
- ❑ Complete loss of use of arm(s)
- ❑ Restricted range of arm movement
- ❑ Loss of strength in the arm(s)
- ❑ Complete loss of use of hand(s)
- ❑ Restricted range of hand movement
- ❑ Loss of strength in the hands
- ❑ Loss of fine movement (dexterity)
- ❑ Pain
- ❑ Other _____

42b. Which assistive aids do you use?
- ❑ Reach sticks
- ❑ Manipulation sticks

- ❑ Grasping aids
- ❑ Forearm supports
- ❑ Prosthetic systems
- ❑ Sticky keys on computers
- ❑ Slow keys on computers
- ❑ Mouse keys on computers
- ❑ Computer on-screen keyboards
- ❑ Head pointing devices
- ❑ Special computer keyboards
- ❑ Other _____

43. Do you have a limitation that affects the use of your legs and/or feet?

- ❍ Yes
- ❍ No

43a. Describe your leg and/or feet limitation(s).

- ❑ Loss of leg or foot
- ❑ Paralysis
- ❑ Restricted range of leg movement
- ❑ Cannot control leg movement
- ❑ Loss of strength in the leg(s)
- ❑ Pain
- ❑ Other _____

43b. Which assistive aids do you use?

- ❑ Cane
- ❑ Walker
- ❑ Rolling walker
- ❑ Wheelchair
- ❑ Leg brace or orthotic device
- ❑ Prosthetic device
- ❑ Scooter
- ❑ Reaching aid
- ❑ Other _____

44. Do you have a limitation that affects the way you understand, think or learn about
things (cognition)?

- ❍ Yes
- ❍ No

44a. Describe your cognitive limitation(s).

- ❑ Focusing attention
- ❑ Thinking
- ❑ Reading
- ❑ Writing

- ❑ Calculating
- ❑ Solving problems
- ❑ 7
- ❑ Applying knowledge
- ❑ Learning and applying knowledge
- ❑ Other _____

44b. Which assistive aids do you use?

- ❑ Timer/reminder devices
- ❑ Reading aids
- ❑ Word prediction/completion software
- ❑ Dictionary/thesaurus
- ❑ Assistive listening device
- ❑ Electronic organizer
- ❑ Non-electronic organizer
- ❑ Screen reader
- ❑ Other _____

45. Do you have a limitation not covered by the selections previously described?

- ❍ Yes; please describe _____
- ❍ No

46. What is your age?

- ❍ 18 - 34
- ❍ 35 - 54
- ❍ 55 - 74
- ❍ 75+

47. What is the highest level of education you have completed?

- ❍ Less than high school
- ❍ High school or equivalent
- ❍ Some college
- ❍ Associate's degree
- ❍ Bachelor’s degree
- ❍ Post-graduate study without degree
- ❍ Advanced/professional degree

48. What is your current household income in U.S. dollars?

- ❍ $ 0 - $ 8,100
- ❍ $ 8,101 - $14,556
- ❍ $14,557-$21,337
- ❍ $21,338-$29,999
- ❍ $30,000-$39,999
- ❍ $40,000-$49,999
- ❍ $50,000-$74,999
- ❍ $75,000-$99,999

- ❍ $100,000 +

49. What is your race/ethnicity? Check all that apply.
- ❑ American Indian or Alaska Native
- ❑ Black or African American
- ❑ White
- ❑ Asian
- ❑ Hispanic/Latino
- ❑ Native Hawaiian, other Pacific Islander
- ❑ Other specify _____

50. If you have any experiences (positive or negative) about voting that you would consider sharing
with us, please do so in the space below.

_____
_____
_____
_____
_____
_____
_____