Effective Designs for the Administration of Federal Elections

Section 7: Research report: Nine research events

June 2007

U.S. Election Assistance Commission

Overview

The design best practices in this document are the results of a user-centered process involving subject matter experts, election officials, and representative voters. Nine of the ten research events the contractor conducted between May and December 2006 are summarized in this section. Section 6 details the tenth event, a case study of pilot tests in Nebraska's 2006 general election.

Report goals

This section presents a chronological account of research activities, communicates research findings, and provides the basis for making best practice recommendations.

Research goals

Goals were established to develop best practice recommendations at the outset of the user-centered design process. They included the following:

— Expanding the body of knowledge and the library of best practices shared among election officials serving citizens.

— Increasing the likelihood that voting will be an easy, efficient, and accessible experience.

— Exploring the effectiveness, flexibility, and scalability of design best practices that have been identified and proposed for application in polling place voter information materials and in various ballot types, both optical scan and direct-recording electronic (DRE).

— Understanding how election materials are used in typical environments and exploring the impact of environmental factors (e.g., location, lighting, temperature, traffic patterns, noise level) on the success of the prototypes.

— Providing voters of various physical and language abilities the opportunity to directly participate in the development and evaluation of design best practices, increasing the likelihood that the needs of these audiences will be met effectively.

— Understanding legislative imperatives and operational challenges of the election design environment at the State and local levels.

— Understanding the attitudes, behaviors, challenges, and needs of citizens who have a right to vote accurately, independently, and easily. Also, identifying models for common voter experiences.

— Understanding common practices in ballot and voter information design and development.

Research methodology

The contractor used the following research methods:

— *Observing elections.* In 2006, the contractor observed primary elections in two New Jersey jurisdictions (rural and urban) and general elections in two of Nebraska's rural counties. The general election observations occurred during the pilot test of localized optical scan ballots and voter information prototypes.

— *Conducting field interviews.* The contractor conducted conversations with election officials in their work environments when possible. Informal interviews with poll workers and election staff at primary and general elections also influenced the decisions.

— *Consulting experts.* The team sought input from a variety of language, literacy, usability, accessibility, and production experts representing a range of voter interests. The contractor interviewed election officials with both State and local responsibilities representing populations diverse in culture, language, population density, and income. For production insights, the team contacted the largest domestic manufacturers of commonly used election equipment.

— *Reviewing existing materials.* Ballot examples from the United States and overseas were reviewed to understand how issues, particularly low-literacy issues, are addressed.

— *Conducting usability evaluations.* Fifty-four usability evaluations with voters in seven States were held.

— *Focusing on prevalent voting technologies.* To help States meet 2002 Help America Vote Act (HAVA) requirements for ballot design and publicly posted voting information on Election Day, the contractor developed solutions for optical scan and DRE ballot formats, and established a voter information system that exceeds minimum requirements.

Materials studied

— *Voter information*

— *Optical scan ballots*

— *Full-face DRE ballots*

— *Rolling DRE ballots*

Guiding criteria

To meet existing election design requirements, the contractor used specifications from the following resources:

— *Legislation.* The work focused on HAVA sections 241(b)(2) and 302(b), which state requirements for the design of ballots and voter information on Election Day. The contractor also reviewed the Americans with Disabilities Act (ADA) and followed the language requirements of the Voting Rights Act of 1965.

— *2005 Voluntary Voting System Guidelines (VVSG).* The contractor paid specific attention to section three, "Usability and Accessibility Requirements." Toward the end of the project, the team received briefings on unpublished 2007 VVSG updates for consideration in final recommendations.

— *Simple language requirements.* The contractor benefited from the expertise of Ginny Redish, her associates, and their simple language reports for the National Institute of Standards and Technology (NIST). Low-literacy experts at the Queens Borough Library in New York City and the National Institute for Literacy also provided language and design input.

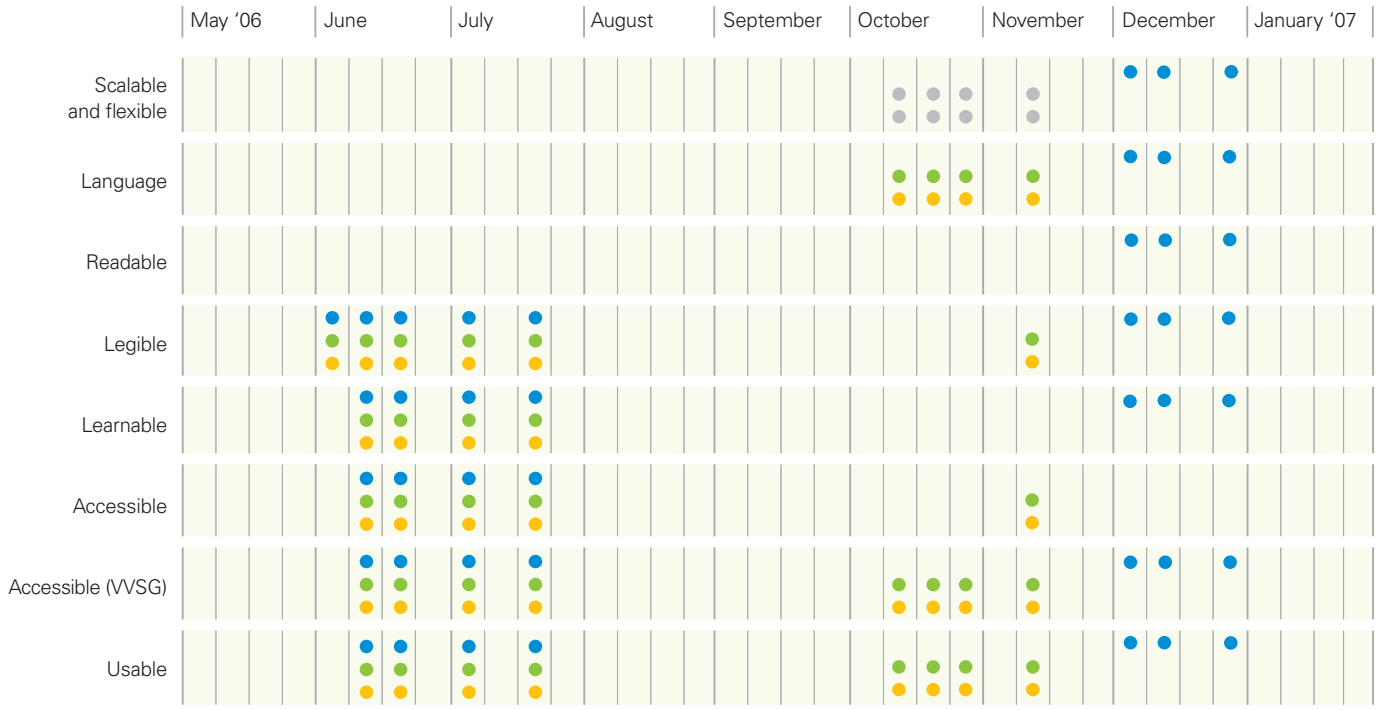
Participants

Research subjects included registered voters, election officials, and various subject matter experts with knowledge valuable to the work of election design. See section 8 for a complete list of participants.

— *Voters.*

Thy contractor interviewed people age 21 years and older without limiting education level, occupation, income, ethnicity, or gender. Participants were located by professional recruitment agencies, online recruiting services, and pilot-test jurisdictions in Nebraska.

The following table shows voter participation in the research and design process by date, material, and focus.



This chart shows when (time is displayed horizontally) and how (success criteria are displayed vertically) voters were involved in the design process via usability testing and observations. The colored circles indicate type of materials studied at each event—voter information in yellow, optical scan ballots in green, and rolling DRE in blue. During these research events, the research team explored aspects of the voting experience important to voter success—for example, ballot usability, legibility and readability, and other topics shown on the table's left side.

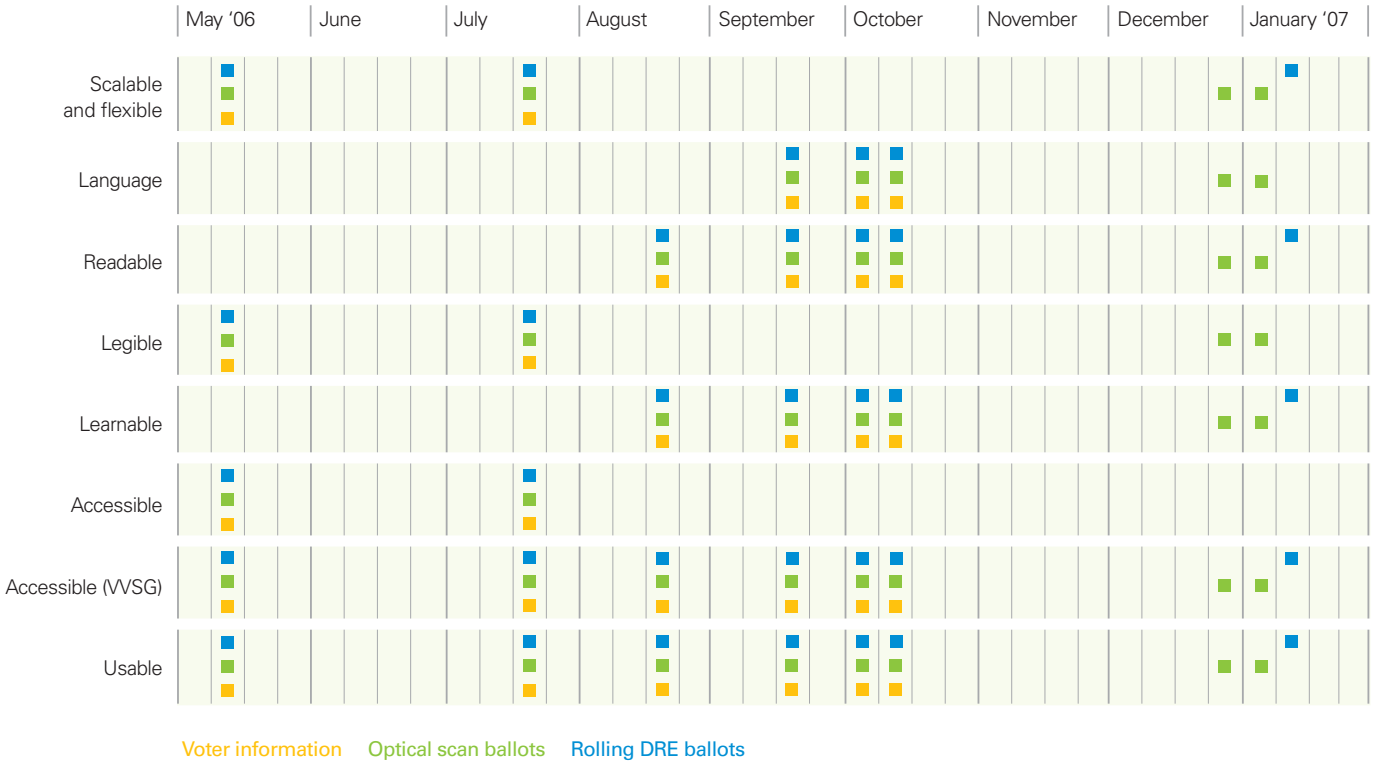
— *Election officials.*
Officials responsible for local, State, and national election management were observed and interviewed. Many participants were members of the Election Assistance Commission (EAC) standards and advisory boards or were recommended by the EAC.

The following table shows election official participation in the research and design process by date, material, and focus.

The team engaged officials throughout the course of research. The colored triangles indicate the type of materials presented to election officials for review at each event—voter information in yellow, optical scan ballots in green, and rolling DRE in blue—and correspond to the vertical research goals listed at left.

— *Experts.*
Specialists, advocates for user groups with special needs, and other elections professionals were interviewed and consulted. References for experts came from EAC standards and advisory boards, election officials, the contractor's network of contacts, and other experts.

The following table shows expert participation in the research and design process by date, material, and focus.



The team engaged experts throughout the course of research. The colored squares indicate the type of materials presented to experts for review at each event—voter information in yellow, optical scan ballots in green, and rolling DRE in blue—and correspond to the vertical research goals listed at left.

Assumptions
The researchers used the following assumptions in planning research and design activities:

— Audio design is product-specific. Without engaging with a technology partner for rolling DRE development, audio solutions will not be included in best practices.

— Given the full-face ballot systems, expert input, and examples available to us, design best practices for paper-based full-face ballots can be extrapolated from the optical scan findings.

— Experts sufficiently represent audiences and issues for which they advocate, eliminating the need to test extensively with each represented population.

— Ethnographic and qualitative inquiry best support the identification of patterns, behaviors, and unspoken needs of voters and election officials. By studying what people do (observations and usability studies), rather than what they say (surveys and focus groups), the team can uncover not only how people generally react to materials but also why. To protect voters' individual privacy, time and accuracy studies, though considered, were not pursued.

Recommendations

Language and content
Emphasize voter needs over administrative and vendor requirements.

— Use clear, concise language (simple language) for all content.
— Use one language per ballot. To meet usability standards, display no more than two languages.
— Summarize long ballot measure text as another option (alongside required formats) to improve communication and usability for voters.

Text use and size
Use upper- and lowercase sans serif type, set at a minimum of 12 points for all ballot content voters will read. Given the choice between adequate type size (12 points) and fewer pages, ballots with 12 point type and more pages were found to be more usable than those with fewer pages and smaller type. Ballot legibility and ease of comprehension for voters are more important than printing costs.

— The Univers type family is a common, readable, and consistent font choice for all materials.
— Non-Western typefaces should be selected on the basis of simplicity, compatibility with the Univers type family, and for cultural appropriateness. In the applications shown, LeHei Pro is used for Chinese.
— The typesetting of the ballot measure text is critical. Too many or too few characters per line inhibit legibility and comprehension. The goal should be 40–60 characters per line. Research indicates that many users find line lengths of more than 60 characters or less than 20 characters hard to read.
— There is a direct relationship between type size and line spacing (leading). Lines of type that are too close together or too far apart inhibit legibility and comprehension. Typical optical scan ballot measure content in these best practices is set at 12 points, with 2 points of line spacing.

Color
Use a second color functionally and exclusively for instructions on optical scan ballots.

— On rolling DRE ballots, the strategic application of color effectively differentiates levels of information and voter activity.

Icons and graphics
Accurate instructional illustrations help voters (especially less literate voters) understand requirements, processes, and options.

— Use informational icons such as  ,  , or  to draw attention to unique or important areas of the ballot or to improve the voter's ability to scan dense information.
— Political party icons are not encouraged, as literacy experts and design professionals believe they simply confuse many voters.

Specific recommendations by material

	Voter information	Optical scan / full-face ballots	Rolling DRE ballots
Language and content	Person-to-person communication is preferred by voters in polling places—reading posted information is not their first impulse. Repetitive placement of information supports voter needs at various stages in the voting process. Long, required text (such as Bill of Rights data) is most easily accessed in table, booth, or binder formats, not in wall displays.	Bold/regular text use effectively differentiates languages derived from a common alphabet on two-language ballots. Languages derived from different alphabets do not require bold/regular differentiation. Long text (such as referendums) is most easily read in a two-column, side-by-side format. Column labels on full-face ballots help orient voters and enhance readability.	Repetitive and consistent interactions are helpful to voters, particularly low-literacy voters. Limiting one contest per screen reduces incidents of undervoting. Voters appreciate knowing ballot length and contents before voting.
Text use and size	Titles should be shown at a size which is easily scanned and read by most voters at a distance of six feet when displayed on a wall.	Usable type size takes precedence over ballot length.	Default setting should address the needs of the majority and provide additional settings, for those voters who need to adjust text size or increase contrast.
Color	Titles in white text against colored ADA-compliant backgrounds are easiest to read.	A second color tint effectively differentiates and calls attention to ballot instructions. Tint background on contest titles enables scanning.	Reserving color use for system messages and navigation focuses users on critical voting functions.
Icons and graphics	Use of informational icons calls attention to important steps and processes and aids low-literacy users.	Heavier vertical lines between columns support column-by-column reading. Use of informational icons calls attention to important steps and processes and aids low-literacy users.	Use of informational icons calls attention to important steps and processes and aids low-literacy users.
Other	Voter information materials should prioritize optimal user experiences first and address compliance with standards second.		Evaluation participants successfully mastered the system despite differences in age, experience, and voting history.

Events

This table highlights the materials in focus during each research event.

No.	Pages	Events	Voter information	Optical scan ballots	Full-face DRE ballots	Rolling DRE ballots
1	7.11–7.13	Expert reviews at EAC Standards & Advisory Board meetings	●	●		●
2	7.14–7.17	Observations of New Jersey primary elections	●	●	●	
3	7.18–7.21	National usability evaluations	●	●		●
4	7.22–7.24	Literacy, international, and elections usability expert input	●	●		●
5	7.25–7.27	Multiple language review	●	●		●
6	7.28–7.31	Studies with literacy experts		●		●
7	7.32–7.35	Expert reviews of paper ballots		●		
8	7.36–7.41	Rolling DRE usability evaluations				●
9	7.42–7.44	Expert reviews of rolling DRE ballots				●

How to read events

Following a standard qualitative research protocol, each event summary documents the following aspects of study:

— Title and location
— Research session goals (see paragraph below for specific goal descriptions)
— Methodologies used to achieve goals
— Research materials
— Research participants
— Summary of findings, conclusions, or actions

User requirements

— *Usable:* Tasks are efficient, accurate, and easy.

— *Accessible:* Materials are usable by people with disabilities (low vision and reduced mobility specifically, which do not always require accessibility solutions from rolling DRE hardware).

— *Language:* English and non-English reading options are clear and understandable.

— *Legible:* Typewritten characters and paragraphs are easily read.

— *Readable:* Ideas presented are clear and easily understood.

— *Learnable:* Tools, skills, and new concepts are easily mastered.

— *Credible:* The voting process is authentic, capable, and trustworthy.

Production requirements

— *Scalable:* Adjustments in content quantities are easily handled.

— *Flexible:* Adjustments to changing conditions are easily handled.

— *Reusable:* Re-creations are easy and effective.

Event one: Expert reviews at EAC Standards & Advisory Board meetings

Washington, DC
May 13–14, 2006

Overview

The contractor conducted informal interviews with selected attendants from the EAC Standards and Advisory Board sessions.

Materials studied

Voter information	●
Optical scan ballots	●
Full-face DRE ballots	
Rolling DRE ballots	●

Research goals

Clarify user requirements	Usable	●
	Accessible	●
	Language	
	Legible and readable	●
	Learnable	
	Credible	
Clarify production requirements	Scalable	●
	Flexible	●
	Reusable	●
Clarify legislative requirements		●
Clarify standards requirements (non-legislative)		●
Clarify existing practices		

Methodology overview

Expert interviews	●
Expert feedback on prototypes	●
Usability evaluations	
Observations	
Field interviews	●
Reviews (non project materials)	

7.12	Nine research events	Events	Event one	

Participants

— Alexia Morrison, Election Specialist, Nebraska Secretary of State Office
— William Campbell, City Clerk, Woburn, Massachusetts
— Howard Sholl, Deputy Administrative Director, Department of Elections for New Castle County, Delaware
— Doug Lewis, Executive Director, The Elections Center
— Nancy George, Voter Information Coordinator, AARP
— David Baquis, Accessibility Specialist, United States Access Board
— Paul DeGregorio, Chairman, U.S. Election Assistance Commission

General findings summary

Topic	ID	Finding	Conclusion
Legislative requirements	1	HAVA requirements and user-centered design practices can be in conflict with State and local elections legislation—making improvements for users difficult as a result.	Best practices should include realistic and incremental steps to support larger changes over time.
	2	Varied elections legislation makes single design solutions difficult to define, implement, and enforce.	
	3	Local legislative requirements do not often position the user/voter at the center of the design process.	

Voter information summary

Topic	ID	Finding	Conclusion
Production requirements	1	Officials responded readily and favorably to voter information materials.	Create easily modified/downloaded templates to promote easy adoption by officials. Ensure materials are designed to meet logistical challenges of inventory, storage, transportation, and budget while supporting voters' needs.
	2	Improvements to voter information materials offer fast, tangible evidence of progress for election officials. Generally, there are fewer legislative constraints on voter information materials than ballots.	
	3	Materials and content are reused (where possible) in elections.	

7.13	Nine research events	Events	Event one	

General findings summary

Topic	ID	Finding	Conclusion
General requirements	1	Prototypes reviewed by officials and experts were considered generally successful.	Feedback from officials and experts influenced plans for formal usability tests and further research.
User requirements	2	Election officials discussed pros and cons between natural/electronic audio strategies in rolling DRE ballots. Some indicated a preference for digital audio, because this offers the ability to change speed and pitch while allowing users to skip sections of the ballot that don't interest them. Advocates of natural voices noted that they are easier for many people to understand and are friendlier than digital solutions. This is an important consideration when many voters, not just those with hearing loss, can be intimidated by the voting process.	Further interviews should be conducted with accessibility experts to understand the pros and cons of each approach.

Next steps

— Collaborate with Alexia Morrison of Nebraska State Board of Elections to determine whether a pilot study during the November 2006 general election will be feasible.

— Plan usability tests of current prototypes with voters.

— Follow up with experts on voter accessibility requirements, particularly visual impairment issues.

Event two: Observations of New Jersey primary elections

Newark, NJ (urban setting)
Hunterdon, NJ (rural setting)
June 6, 2006

Overview

The contractor observed operations in two counties with contrasting environments, population densities, and cultures. Polling places the contractor visited in these counties included a fire station, a Veterans of Foreign Wars (VFW) hall, a high school gymnasium, and a school cafeteria.

Materials studied

Voter information	●
Optical scan ballots	●
Full-face DRE ballots	●
Rolling DRE ballots	

Research goals

Clarify user requirements	Usable	●
	Accessible	●
	Language	●
	Legible and readable	●
	Learnable	●
	Credible	●
Clarify production requirements	Scalable	●
	Flexible	●
	Reusable	●
Clarify legislative requirements		●
Clarify standards requirements (non-legislative)		●
Clarify existing practices		●

Methodology overview

Expert interviews	
Expert feedback on prototypes	
Usability evaluations	
Observations	●
Field interviews	●
Reviews (non project materials)	

Participants

— Carmine Casciano, Commissioner of Registration, Superintendent of Elections, County of Essex, New Jersey

— Richard Lynch, Office of the County Clerk, Hunterdon County, New Jersey

— Voters

— Poll workers

7.15	Nine research events	Events	Event two

General findings summary

Topic	ID	Finding
Familiarity	1	Despite differences between the two counties observed, there was an informal, small-town atmosphere in all polling locations. Three factors contributed to this perception: 1) Poll workers were "veterans" in their roles and at their locations; 2) Turnout was low for the primary election and voters appeared to be dedicated, enthusiastic, and familiar with the local voting process; and 3) Most voters were of the same age-group as poll workers and seemed to be acquainted with them outside the Election Day context.
Translations	2	Poll workers at Newark locations included English, Spanish, and Portuguese speakers, though only English and Spanish were required on the ballots. The English-speaking observation team noted few interactions taking place in non-English languages.
Experience	3	Most of the poll workers the contractor interviewed had at least 4 years of experience but many had more than 10 years. Each poll worker tended to serve in the same polling location and shared casual conversation with voters while conducting election proceedings. The balance between helping voters, who were apparently social acquaintances in many cases, with new equipment while honoring their privacy appeared to pose a challenge to poll workers.

Voter information summary

Topic	ID	Finding	Conclusion
Logistics	1	The signs did not come with instructions. Poll workers claimed to "just know" how to hang signs based on available wall space, where the right location seemed "obvious," or they just "knew where voters would look."	Signs should be labeled as indoor or outdoor and with a publication ID. Poll workers and therefore voters may benefit from sample floor plans explaining how and where posters based on ID should be displayed to enhance the flow of traffic and improve the overall voter experience. Best practices outlining optimal hanging height and sequence will also improve the readability and impact of voter information signs.
	2	In one Newark polling place, voter information posters were delivered mid-morning, hours after polls had opened. The purpose and placement of the voting information was unclear to poll workers, despite their experience. Twenty minutes after the voter information arrived, and with few voters present, poll workers continued to debate what to do with the new posters.	Plans should include a checklist of posters required so that those packing and receiving polling place kits can identify missing items before opening the polls.
	3	Polling place sign pick-up and delivery was inconsistent and not well organized. Large instructional posters for the DRE were packaged in the Sequoia AVC Advantage equipment and delivered to the polling place the night before Election Day. These materials were also returned for storage in the machines after the election. Along with provisional and emergency ballots and affidavits, the elections judge picked up other signs the night before the election for hand delivery the morning of Election Day.	Develop solutions for streamlining and organizing the transfer of voter information materials to polling locations.

7.16	Nine research events	Events	Event two

Voter information summary (continued)

Placement	4	The physical environment at many polling places prevented optimal information flow. Some locations were small and busy, with little room to post signs in such a way that they could help guide voters through a logical flow of information. Other locations were large and posters got lost.	Best practices should provide guidance regarding the size and number of posters to be displayed in various settings. Develop voter information packages appropriate for large and small locations and tailored to address the number of voters anticipated to participate.
Poster and font size	5	Voter information signs were typically 8.5" x 11" and appeared to be photocopied. There were two exceptions to this: the New Jersey Voter Bill of Rights was 11" x 17" and a "How to Vote" sign was 28" x 36", mounted on foam core.	The best practices recommendations should be sensitive to limited production skills, tools, finances, and equipment available to election officials.
Production	6	Most posters were relatively generic, optimized for ease and speed of production rather than quality of user experience. Most likely, a basic design program was used to create the signs, which were then photocopied by the county. Directional signs, for example, arrows guiding voters through hallways to a voting location, were handmade in some locations.	Quality of voter information materials should appropriately reflect the importance of the voting process.
Awareness	7	Few people paid attention to voter information. Voters who did approach signs stood quite close to them. This could indicate that voter information materials were poorly placed, unnecessary, or illegible.	Citizens should be able to identify the purpose of a voter information poster from a distance. Most people should be able to read details standing a comfortable distance from the wall, approximately 3 to 4 feet.
Instructions	8	Poll workers were somewhat unfamiliar with the new equipment used in New Jersey. Poll workers in Newark referred to voter information posters when instructing voters. Unfortunately, "How to Vote" signs instructed voters to cast their ballot by pressing a yellow Cast Vote Button, however, the actual Cast Vote Button on the equipment was red. When poll workers told voters in the booth to press the yellow button, sometimes repeatedly, voters were unable to cast their ballots. Upon realizing the discrepancy, voters appeared less confident in the system. Some poll workers and voters suggested that a model voting machine be used to demonstrate the process before entering the booth rather than relying solely on postings.	Encourage poll workers to offer information to voters in multiple ways, reinforcing verbal instructions with simple and accurate written instructions when possible. Confirm that information on instructional posters matches ballot and equipment. Consider providing hands-on, on-site demonstrations of voting technology to both voters and poll workers.
Information flow	9	Despite effective voter information materials, poll workers play a primary role in assisting voters. This may be particularly true in primary elections (where traffic is reduced) compared with general elections, and in settings where voters and poll workers are familiar with one another.	

7.17	Nine research events	Events	Event two	

Full-face ballot summary

Topic	ID	Finding	Conclusion
Voter preparedness	1	New Jersey has historically required a full-face ballot, but the Sequoia AVC machine was introduced in Newark for the first time during this election. This gave the team the opportunity to observe new product introduction. The observers focused on voter interactions before and after their ballots were cast, paying special attention to questions directed to poll workers from behind the ballot booth curtains.	No specific issues were observed with the ballot; however, many voters were relieved to find the layout of the new machine familiar. Some expressed frustration at having to learn a new system but didn't mention specific issues.

Event three: National usability evaluations

Baltimore, MD; Grand Island, NE; Lincoln, NE; Los Angeles, CA;
Orange County, CA; Minneapolis, MN; Santa Fe, NM
June-July, 2006

Overview
Sixty-minute, one-on-one, task-based evaluations and think-aloud usability tests were conducted with 44 representative voters in seven U.S. locations. The contractor also interviewed election officials at each session.

Materials studied

Voter information	●
Optical scan ballots	●
Full-face DRE ballots	
Rolling DRE ballots	●

Research goals

Clarify user requirements	Usable	●
	Accessible	●
	Language	●
	Legible and readable	●
	Learnable	●
	Credible	●
Clarify production requirements	Scalable	
	Flexible	
	Reusable	
Clarify legislative requirements		
Clarify standards requirements (non-legislative)		
Clarify existing practices		●

Methodology overview

Expert interviews	●
Expert feedback on prototypes	
Usability evaluations	●
Observations	
Field interviews	
Reviews (non project materials)	●

Methodology

Each participant voted using an optical scan ballot prototype and a proposed DRE ballot prototype. The order of the ballot types alternated at each session, and research moderators played the role of poll workers, answering questions or guiding participants only at their request.

To help the research team test primary use cases, participants were given a simple ballot script to vote for or against retentions, memorandums, and ballot measures.

- Vote for a straight ticket (single party)
- Vote for a candidate in a winner-take-all contest
- Cast a write-in vote in a winner-take-all contest
- Skip a contest
- Vote for a slate of candidates in a multi member contest
- Change a selection in a multi member contest
- Vote to retain a candidate in a retention contest
- Vote for or against a ballot measure
- Review selections
- Complete a contest previously skipped
- Return to a contest and change a previously selected vote before casting the ballot
- Cast the ballot
- Select a language (DRE)

After voting with both ballot types and viewing posted voter information, participants were asked to provide feedback on their ability to complete tasks and to discuss challenges and opportunities they encountered.

The researchers probed design elements using visual aids such as ballot size, sequencing patterns, fonts, text size and alignment, contrast variations, language, instructional illustrations, navigational elements, white space, line weight, hierarchy, and color. The form and placement of voter selection marks was also reviewed.

Participants

The research team met with 44 English and bilingual English/Spanish speakers between the ages of 21 and 79 years. Participants were recruited through local election officials, online classified ads, and national recruiting firms.

Voter information summary

Topic	ID	Finding	Conclusion
General	1	Voter information was well accepted. Participants and election officials offered few suggestions for improvement.	
Multiple languages	2	Some participants requested that information be aggregated by language rather than by topic. For example, Chinese speakers would be able to read information in one place rather than across three signs.	As with ballots, the research team recommends single-language presentation with accurate and context-specific translations. Limit presentation to two languages per poster.
Color	3	The color system and clean design effectively directed attention and established voting as an important citizen's duty.	
	4	The color system was considered easy to read and engaging.	
Life expectancy/ durability	5	Election officials designated some postings as permanent and others as disposable and contest-based. Life expectancy helps determine recommended reproduction methods.	

Ballot summary

Topic	ID	Finding	Conclusion
Multiple languages	1	Although most participants supported the idea of multiple language options on ballots, a majority preferred single-language presentation because it allowed them to proceed more quickly and with greater clarity.	Recommend single-language presentation with top-quality, accurate, contextual translations. Limit presentation to two languages per ballot on printed materials.
	2	Security (particularly with optical scan ballots) and accuracy of translations was a concern, rather than usability, when discussing single-language presentation.	
	3	Some areas require more than one language to be presented on a ballot simultaneously. For example, Los Angeles County, CA, requires more than six languages on one ballot.	Use of multiple languages on ballots poses significant usability issues.
Readability	4	The length and language used in measures in the prototype proved problematic for many users. For example, there was concern about making accurate selections when double negatives were used in descriptive copy.	Simple language should be used for all ballot content. Text for amendments and referendums should be kept as short as possible. Use short sentences and paragraphs with direct structure.
	5	Ballot measure titles on the prototype used were not found to be descriptive of content.	Use titles that accurately introduce ballot content.
Navigation	6	Participants wanted a reference to their place in the ballot to help them manage their time and feel in control of their progress. Since participants could not scan the full contents of the ballot as they can with paper systems, this was particularly important while participants worked with the DRE prototype.	Page numbers should be used with all ballots to help users maintain their sense of control over the experience. Similar referencing should be applied to the DRE prototype; an overall table of contents should also be provided.

Ballot summary (continued)

Color	7	Users appreciated the use of color, preferring it to black-and-white versions.	Color can be an effective tool for differentiating information on ballots, but should be used to clarify rather than as mere decoration.
Accessibility	8	Some participants had difficulty using optical scan ballots, expressing discomfort with readability and control over handwriting. This could be related to the success in design rather than platform.	Users preferred the DRE prototype. Most felt that it was faster and easier to use than the optical scan prototype, although both featured the same content.
Learnability	9	Some participants were unfamiliar with computers and initially felt intimidated by the DRE prototype. These participants quickly learned how to use the prototype and moved easily through the ballot.	First-time or infrequent voters will need simple how-to-vote instructions before voting. Optimally, this will occur before Election Day. Simple opt-in tutorials are also recommended for DRE solutions.
Security	10	Security concerns were often voiced when discussing electronic formats and rarely were brought up with paper ballots.	Visual design can significantly increase the perception of credibility, but back-end programming must support promises made in the user interface.
Familiarity	11	Participants and election officials preferred familiar ballots and voter information materials, even when familiar materials were recognized as inferior.	The evolution of election design practices and materials should be gradual to accommodate user learning curves and comfort levels.
Readability	12	Referendums and measures were difficult to understand, as were instructions for straight-party voting. Simple language requirements should be implemented to create baselines for reading levels and paragraph lengths in ballots.	Use short sentences and paragraphs. Summarize lengthy information at the beginning of statements. Set minimum, measurable standards for writing such as California's requirement that referendums have 75 words or fewer or a Flesh-Kincaid Grade Level score or a Flesh Reading Ease score.
Navigation	13	Participants quickly fell into interaction patterns regardless of content variations.	There should be a clear system and placement for all ballot components such as contest titles, candidate choices, instructions, navigation, etc.
Instructions	14	Participants often failed to notice that voting instructions changed from contest to contest.	Call out changes in voting instructions with graphic techniques such as a countdown system, color, or graphic symbols.

Next steps

— Refine materials based on user feedback.

— Review feedback and subsequent refinements with low-literacy experts.

Event four: Literacy, international, and elections usability expert input

Washington, DC
August 7–8, 2006

Overview
The contractor reviewed the International Federation of Election Systems (IFES) ballot library, met with National Institute for Literacy reading experts, and reviewed NIST best practices for usability testing.

Materials studied

Voter information	●
Optical scan ballots	●
Full-face DRE ballots	
Rolling DRE ballots	●

Research goals

Clarify user requirements	Usable	
	Accessible	
	Language	●
	Legible and readable	●
	Learnable	
	Credible	
Clarify production requirements	Scalable	
	Flexible	
	Reusable	●
Clarify legislative requirements		
Clarify standards requirements (non-legislative)		●
Clarify existing practices		●

Methodology overview

Expert interviews	●
Expert feedback on prototypes	●
Usability evaluations	
Observations	
Field interviews	
Reviews (non project materials)	●

Participants

— Sharon Laskowski, Manager, Visualization and Usability Group, Information Technology Lab, NIST

— June Crawford, Senior Program Associate/Learning Disabilities and Adult Reading, National Institute for Literacy

— Terezia Matus, Librarian, International Federation of Election Systems

Best practices in election usability testing
Sharon Laskowski was interviewed about ballot design and voting technologies. She recommended contacting Michael Kerr of the Information Technology Association of America (ITAA) and John Borras of the Organization for the Advancement of Structured Information Standards (OASIS). Both organizations have ballot manufacturers as members.

Ms. Laskowski provided an update on usability, accessibility, and equipment standards to be included in 2007 VVSG updates. She also shared her expertise on usability testing, which informed subsequent phases of the research.

Best practices in international ballot design
IFES houses an extensive collection of international ballots. This collection was reviewed to identify international best design practices, particularly those that address the needs of less literate voters.

Topic	ID	Findings	Conclusion
Color	1	The collection used color extensively.	Use of color should be considered in U.S. ballots.
Photographs	2	Reproduction quality of candidate photographs was usually poor and the large amount of space used for candidate photographs was problematic.	Imagery may aid in candidate recognition if quality of photos and reproduction are both of high quality.
Party branding	3	Party branding was common, although political party icons used were not intuitive.	Political party icons were not intuitive, although they may be more relevant in a cultural context. Without clear meaning, icons added significant clutter to the ballots.
Language	4	Few of the ballots observed displayed more than one language.	
	5	Many countries have significantly less complicated ballots than the United States, sometimes consisting of a single race only. This difference makes it difficult to directly apply the same solutions.	Due to the complexity of U.S. ballots, adding icons and images to offer an image-based read of the ballot, as well as a text-based read, seems likely to only increase its length and complexity.

Best practices in design for low-literacy audiences

June Crawford of the National Institute for Literacy was interviewed about the use of graphics in ballots for low-literacy voters, and specifically the conventional uses of political party icons, a common communication device geared toward low-literacy populations. Ms. Crawford also maintained that citizens with reading levels below third or fourth grade would require audio support to effectively vote with ballots. Although the team was not delivering audio design solutions, reading tools providing audio support were also examined.

Topic	ID	Finding	Conclusion
Simple language	1	Clear, direct, and simple language will make ballots easier to read and use than legal jargon.	
Content distribution	2	An optimal print design would be a "booklet" depicting one contest per page with use of images, graphics, color, and large text.	As often as possible, isolate ideas to one per page. This can easily be applied to DRE solutions.
Comprehension	3	There are many successful interaction strategies used in software samples that could be leveraged to enhance the experience for those with minimal reading skills, for example, highlighted text to guide readers.	Test highlighting on DRE prototypes to improve reading comprehension.
Audio	4	Particularly when language is difficult, clear and consistent visual and interaction patterns and immediate confirmation of success or failure will reduce confusion.	Sound effects can reinforce interaction without adding visual overload. Work with manufacturers to understand and document realistic opportunities.
	5	Audio is a useful aspect of design for those with low-literacy skills, reinforcing words displayed and offering useful interaction feedback.	Audio controls should be offered throughout the experience.
Minimal reading levels	6	All print materials should be usable by those with a third- or fourth-grade reading level. Materials targeting this educational level should be reviewed.	Use large type, short sentences, and paragraphs to reach those with low-literacy.
Usability testing	7	Reading challenges do not vary by location. Testing in particular geographic areas of the U.S. will not be necessary, although some areas may benefit more than others from improved design.	

Next steps

Conduct research interviews with recommended experts:

— Linda Church, Peter Waite, and Marcia Tait at Pro Literacy America

— Janice Cuddahee and Kevin Smith at Literacy New York (one of the largest literacy programs in the United States)

— Queens Library Adult Services program (for insight into the diverse low-literacy community it serves)

Event five: Multiple language review

September 19–October 18, 2006

Overview

The contractor hired a professional partner to translate samples from the optical scan ballot, rolling DRE ballot, and voter information prototypes into various languages to test the cultural appropriateness, flexibility, and scalability of the design systems.

Materials studied

Voter information	●
Optical scan ballots	●
Full-face DRE ballots	
Rolling DRE ballots	●

Research goals

Clarify user requirements	Usable	●
	Accessible	●
	Language	●
	Legible and readable	●
	Learnable	
	Credible	●
Clarify production requirements	Scalable	●
	Flexible	●
	Reusable	
Clarify legislative requirements		
Clarify standards requirements (non-legislative)		
Clarify existing practices		

Methodology overview

Expert interviews	
Expert feedback on prototypes	●
Usability evaluations	
Observations	
Field interviews	
Reviews (non project materials)	

Methodology

The contractor solicited translation proposals from two recommended organizations: Compass Languages and CTS Language link. Compass Languages was selected (as many elections vendors are) on the basis of price.

The partnership and content delivery process offered insights into specific challenges facing officials with bilingual production requirements, such as file-sharing, formatting, font compatibility, stylistic consistency, delivery schedules, and turnaround times.

The templates and content delivery process provided insight into the production challenges experienced by election officials, including file formats, font compatibility, typographic treatment, and turnaround time.

Working with their current prototypes, the contractor translated several versions of one- and two-language optical scan ballots, nine rolling DRE ballot screens, and 12 voter information pieces into Arabic, Chinese, and Vietnamese samples. These languages were chosen for their variety to challenge the flexibility of the design system.

Participants

— Compass Languages, professional translation company

7.27	Nine research events	Events	Event five	

Next steps

Topic	ID	Finding	Conclusion
Context	1	Context is critical to the quality of a translation.	Translation companies need to see the materials in their designed form so that they can offer specific and accurate translations.
Original materials	2	Materials should be crafted in simple English before being translated into other languages as this helps to ensure that the desired literacy level is achieved, regardless of language.	The best practices document should offer planning tools that encourage election officials to edit materials for simple language before alternate language treatments.
Process and tools	3	The design templates provided were helpful despite compatibility issues when sharing files between Mac and Windows versions of the same software. PDF files were used to review and comment for each round of refinement.	To increase the likelihood of quality results, define a process and require tools with the translator that will allow rapid translations in the context of the ballot design and outside the heat of elections deadlines.
Typography	4	Recommended font families were not available in other languages. The translator needed to buy the fonts required for this project. Compass Languages worked with the contractor to identify and document appropriate font families, size, and weight requirements to ensure legibility across all languages.	
Font	5	Treatment of typography is important to accurate translations; how text wraps and lines break will vary from one language to another and influence the readability and meaning of content. During testing, it took at least two review cycles to produce adequate results.	It is essential that professional translators (preferably those with elections experience) are included in the process and given adequate time to translate. At least two rounds of refinement are likely to be necessary for quality translations.
Scalability and flexibility	6	Proposed single-language and dual-language ballots sufficiently accommodated the three languages and resulted in a relatively consistent design product.	

Next steps

— Offer materials to the EAC Language Working Group for review.

— Conduct additional Chinese translations with AIGA China.

Event six:
Studies with literacy experts

New York, NY
September 13 and 27, 2006
October 10, 2006

Overview
The research team interviewed and conducted a series of evaluations of the materials with low-literacy experts at the Queens Library Adult Learning Program.

Materials studied

Voter information	
Optical scan ballots	●
Full-face DRE ballots	
Rolling DRE ballots	●

Research goals

Clarify user requirements	Usable	●
	Accessible	●
	Language	●
	Legible and readable	●
	Learnable	
	Credible	
Clarify production requirements	Scalable	
	Flexible	
	Reusable	
Clarify legislative requirements		
Clarify standards requirements (non-legislative)		
Clarify existing practices		

Methodology overview

Expert interviews	
Expert feedback on prototypes	●
Usability evaluations	●
Observations	
Field interviews	
Reviews (non project materials)	

7.29	Nine research events	Events	Event six

Methodology
The contractor conducted three 60-minute usability sessions with three to four experts at a time to evaluate working prototypes against comparable materials. Feedback was captured in a standard format throughout all three sessions.

Participants examined core ballot prototypes and alternative studies to review issues of color use, icons, navigation, and treatment of long text in ballots for less literate voters.

Participants
The contractor met with 20 literacy instructors, each with an average teaching experience of 11 years.

General findings summary

Topic	ID	Finding	Conclusion
Simple language	1	Users preferred "Yes" and "No" to "Accept" and "Reject" and "Next" and "Back" over "Forward" and "Previous."	
	2	There is a need for simpler language on ballot measures.	Consider using shorter paragraphs. Consider adding extra space after commas or periods to provide visual break. Consider adding tick marks in left column or using line-numbering conventions. Consider adding extra space between every five lines of text.
	3	The language used on the ballots was considered the main usability obstacle. The literacy instructors initiated a list of words to be avoided and encouraged the development of a list of alternatives that would be included in the final document.	Offer final documents to simple language experts for review and input.
	4	Experts preferred the use of words in addition to icons to label buttons.	

Optical scan ballot summary

Topic	ID	Finding	Conclusion
Straight-party vote	1	Straight-party voting on the optical scan ballots was described as confusing even for experienced, engaged, and educated voters.	Remove straight-party voting from optical scan ballots.
Ballot instructions	2	Illustrations shown on the optical scan ballot were considered useful but inaccurate. For example, the write-in instructions show a name in script while the text asks voters to print.	Confirm consistency of all instructions in the ballot. In this case, revise illustration. Improve contrast in illustrations to accommodate low-vision issues.

7.30	Nine research events	Events	Event six	

Optical scan ballot summary (continued)

Ballot instructions	3	Instructions were considered useful but the literacy instructors questioned the placement of the instructions in the left column, stating that it would be confusing to know where to begin voting. The "Start Voting Here" message was considered helpful but likely to be an insufficient cue, particularly for those with beginning reading skills.	Show another version with instructions placed across the top of the ballot or on a cover sheet. Top-align contest titles (requested by voters in first round of usability testing) to increase readability, save space, and reduce costs.
Voting instructions	4	Literacy instructors preferred the use of minimal color applied to instructions in other versions presented, stating that it draws attention to consistent and critical content without detracting from the visibility of candidate selection.	Create two-color variations to further enhance clear instructions. Demonstrate a similar application of color on two-language ballots.
	5	The exclamation point intended to draw attention to instructions may be overused. Instructors thought it would lose impact if used on every contest.	Reserve exclamation point for unique or important instructions.
Selection data	6	Instructors felt there should be greater distinction between contests and/or columns.	Ideally, each contest would have a separate page with the title of each contest top-aligned to be most user friendly. Initial improvements should create greater clarity and visual hierarchy.
Navigation	7	Instructors anticipated that voters will have difficulty using the three-column format as currently designed. Early readers may attempt to read across the page rather than down columns unless there is greater distinction between columns.	Explore design options to improve readability: vertical lines, alternating background shading in columns, expanding the space between columns, or providing stronger line breaks.
Informational icons	8	Symbols used in the ballot instructions ( ,  , or) were considered useful only as a visual cue. The question mark and the information symbol ( and ) were not considered intuitive and were culturally irrelevant for some. The exclamation point used to draw attention to special instructions was considered a symbol of urgency or danger but was also considered appropriate if minimally used.	Explore alternate informational characters and/or a numbering system to draw attention and provide necessary order and direction.
Political party icons	9	According to instructors, it will be difficult to design intuitive, simple political party icons that are descriptive enough for people to understand without instruction.	Remove political party icons or devote an entire research study to their meaningful development.

Rolling DRE ballot summary

Topic	ID	Finding	Conclusion
Introduction	1	Introduction provided in the prototype was considered simple, straightforward, and appropriate. Instructors expected immediate action when selecting a language.	
Language selection	2	Instructors accurately assumed how the straight-party voting would function on the DRE prototype.	Eliminate Confirm Button. Selection of language should trigger an immediate reaction.
Straight-party vote	3	There was significant concern that this option would be difficult for those with minimal language skills to understand.	Build functionality into next prototype to garner participant reaction and feedback.

Rolling DRE ballot summary (continued)

Straight-party vote	4	The ballot instructions were considered a critical element in the voting experience. The prototype tested included only minimal instructions, which elicited few comments.	If possible, eliminate this option. If required, clarify and simplify instructions.
Ballot instructions	5	Voting instructions were easily visible.	The prototype refinement should incorporate ballot instructions, help, and the ability to change type, contrast, and language settings.
Voting instructions	6	Placement and contrast was considered to be satisfactory for current prototype.	Instructions should also be written with a patterned structure. "Vote for 1" and "Vote for up to 3" should follow similar sentence patterns.
Selection data	7	Instructors suggested adding a Skip button to provide confirmation when voters decide not to make a selection.	Prototypes were designed to encourage voters to participate in all contests and therefore tend toward a relatively linear experience. This also simplifies instructions and navigation for users.
	8	The current prototype does not allow users to skip a contest. Once they have made a selection, they are forced into a choice.	Ensure that all possible scenarios are noted and considered for documentation even though not all functionality will necessarily be included in a refined prototype.
	9	Instructors were confused by different instructions for "Select one" and "Select up to three" when trying to de-select a candidate because interaction patterns were different for each.	Consistently offer a tap on/tap off de-selection pattern. Toggle should also be active, offering two effective methods for changing a vote on single-selection contests.
	10	Instructors recommended a pattern of one idea/contest per page. It was assumed that this consistency would serve as a pattern that many early readers appreciate/require.	The literacy instructors preferred one contest per screen.
Navigation	11	Instructors thought the scroll bars, as currently designed, would be confusing for some.	Explore alternate pagination options. Add labels such as "See more" to scroll buttons.
	12	Interaction patterns provided guidance and increased confidence; however, instructors were concerned that navigation did not offer enough consistency.	Ensure that buttons are labeled, placed consistently, and behave consistently throughout the experience.
Help	13	Few noticed the question mark as currently designed, indicating the Help option in the lower left corner of the screen.	Label button "Help" and offer throughout the process. Determine if additional visual cues are helpful in drawing appropriate attention.
Accessibility	14	The literacy instructors anticipated that some students, especially new citizens, will want to vote in English but may want or need to confirm information in their native language.	Offer the ability to change languages, contrast, and font size throughout the process.
Review/summary	15	Some instructors requested immediate and more information telling them: (1) If they have skipped a contest; (2) If so, which one; (3) How to get back to areas of the ballot they may have missed; and (4) How much of the ballot and what type of contests are left. The literacy instructors said novice readers often feel rushed and skip to more easily understood items. Patterns are very important in providing guidance and increasing confidence.	Refine the review/summary pages. Offer access to review/summary pages throughout the voting experience. Consider allowing users to move through ballot sequentially and nonsequentially.
Write-in	16	Write-in candidate functionality was well received.	

Event seven: Expert reviews of optical scan ballots

December 1, 2006

Overview

Optical scan prototypes were offered to the team's panel of experts, election officials, and several major ballot manufacturers for evaluation and feedback.

Materials studied

Voter information	
Optical scan ballots	●
Full-face DRE ballots	
Rolling DRE ballots	

Research goals

Clarify user requirements	Usable	●
	Accessible	●
	Language	●
	Legible and readable	
	Learnable	●
	Credible	
Clarify production requirements	Scalable	●
	Flexible	●
	Reusable	
Clarify legislative requirements		●
Clarify standards requirements (non-legislative)		
Clarify existing practices		●

Methodology overview

Expert interviews	●
Expert feedback on prototypes	●
Usability evaluations	
Observations	
Field interviews	●
Reviews (non project materials)	

Participants

— The contractor's panel of experts
— Election officials
— Manufacturers

7.33	Nine research events	Events	Event seven

Research summary

Topic	ID	Finding	Conclusion
General ballot	1	Some State statutes prohibit the use of color. Color printing is also anticipated to be expensive for some jurisdictions.	The contractor recommends two colors for optimal readability and usability. The two-color solution can be translated to a one-color version.
	2	One expert questioned the technical feasibility of breaking long (ballot measure) text across two columns.	Studies showed that two-column display is optimal for voters and the contractor believes that existing vendor technology can accommodate this display.
	3	Some States, such as California, require vote marks to be displayed to the right of candidate names, not to the left.	Place vote marks to the left as per typical convention for form design.
	4	Will Western symbols, such as the exclamation point and question mark, be universally understood?	Symbols are not used without corresponding text explanation. Even if not understood, they serve as visual emphasis and help draw the voter's attention to important information.
	5	The exclamation point is considered a warning instead of a symbol to draw attention to positive information.	Based on feedback from low-literacy experts, the exclamation point should be used on a limited basis.
	6	Some state laws require the use of specific fonts.	The Univers font family was designed to be extremely flexible and legible—the usability studies have confirmed its readability. Very similar sans serif faces may be as effective.
	7	Use initial caps in "Vote for __" instructions. Can "all-caps" instructions be used?	Make change: Use initial caps consistently. All-caps treatments were not recommended in Design for Democracy's and NIST's "2005 Ballot Design Guidance" document. Numerous studies support the use of upper- and lowercase text settings over all capital settings.
	8	Some jurisdictions require tear-off stubs on ballots.	Ballot requirements vary greatly across the country. A general 80-20 majority favoring nonlinear formats was followed.
	9	Some areas require additional information about the candidate on the ballot—for example, three-word occupational descriptions.	Content on the ballot should be kept to a minimum, offering only critical information to support ballot clarity. Additional candidate data (occupation, address, etc.) should be separate from the ballot and available to voters in advance of Election Day.
Ballot instructions	10	Instructions should say, "Use only the pencil provided," or similar tone and content.	Make sure instructions are specific and keyed to ballot technology.
	11	Current write-in instructions state "Print name," but the illustration displays a name written in script.	Confirm consistency of all instructions in the ballot. In this case, revise illustration.
	12	According to one expert, including label "write-in" next to input fields causes overvoting, even when de-emphasized in gray text.	Clarify write-in as an option, not a requirement.
	13	Numbering instructions incorrectly implies a process although the "steps" are not actually sequential.	Keep instructions scannable; consider removing numbers for clarity.

Research summary (continued)

Ballot instructions (continued)	14	Users require persistent voting instructions, although they significantly lengthen the ballot.	Post instructions in voting booth, as well as on ballot.
	15	The message "You do not have to vote in every race" may cause undervoting.	Edit content to maintain clarity and accuracy while encouraging voters to participate fully.
	16	Some experts questioned the placement of instruction in the left column, suggesting it is atypical in the industry and that use of space may be better dedicated to contests.	Show variations on instructions, such as instructions on a cover page and at the top of the ballot, rather than the left column.
Voting instructions	17	When there are two-name tickets, such as "President and Vice President," instructions should read "Vote for 1 pair" rather than "Vote for 1."	Implement this change.
	18	Experts suggested using numerals rather than text in "Vote for ___" instructions.	Implement this change.
Selection data	19	Watch for spacing inconsistencies.	Edit ballot for proper letter, word, and line spacing.
	20	Watch for inconsistent line displays.	Disregard inconsistencies caused by third-party (manufactured) template.
	21	The line separating "Accept" and "Reject" may mistakenly indicate a write-in opportunity to voters.	Leave as is: This has not been a consistent response from voters, election officials, and experts.
	22	Party symbols are considered confusing and challenging.	The literacy and AARP communities interviewed do not support icon use. Where required, it is recommended that officials hire an icon design specialist to help ensure greatest usability.
	23	One expert questioned the position of the ovals on contests with pairs of candidates.	Leave as is: This did not pose usability issues in the studies.
	24	One election official suggested separating constitutional questions from contests when they appear on the same page.	Leave as is: Overall expert input favors pace and consistent placement of content over page breaks for differentiation. Strive to keep the number of pages to a minimum while not breaking a contest or question onto another page.
Navigation	25	One expert questioned the production and budget impact of an 18"-long ballot.	The contractor recognizes that most manufacturers offer different ballot lengths and that officials have budget restrictions. By prioritizing minimum VVSG-required text sizes and navigational cues, voter usability is emphasized.
	26	One expert questioned the production and budget costs and user impact of a five-page ballot format.	See above.
	27	Increased ballot pages will require ballot boxes to be emptied more frequently, which may increase error rates or the perception of increased errors.	Prioritize readability and usability of the ballot over election management issues.
	28	"Continue voting next side" should be more clearly distinguished from surrounding text.	Make text bolder or bigger.

7.35	Nine research events	Events	Event seven	

Research summary (continued)

Simple language	29	The term "Retain" may not be understood by all voters and should be simplified.	Consider using the term "Keep."
	30	Edit content throughout for simplicity and consistency.	While this simplifies the ballot, it also puts the onus on election officials and voters to have dialogs about this information before Election Day.
	31	California law limits measures to 75 words in the ballot.	Simple-language experts edited the NIST-based instructions and labeling. Variables such as constitutional questions were not reviewed but continue to pose a core usability problem for participants in the studies.
Multiple languages	32	There was some concern about the hierarchy implied by differentiating English and a second language in bold/plain text; it may actually be a legal requirement to present both languages in an identical manner.	Limit text to one language per ballot, when possible. When necessary, use the two-language template, developed with the support of literacy experts. This template uses bold text to distinguish one language from another when they share an alphabet (such as English and Spanish). No bold text is required, however, when alphabets differ (such as English and Chinese). English does not need to be the first language in the sequence.
	33	Political party names must be translated.	Implement this change.
	34	The samples sent to the Language Working Group Asian representative did not include an Asian-language translation.	Materials were sent to AIGA China for a review and a second pass at translations. These final materials are used in the best practices document.
	35	On two-language ballots, one expert suggested stacking languages horizontally rather than side-by-side.	This treatment was used successfully in the Colfax County, NE, pilot study, but testing with literacy experts indicated a preference for side-by-side display.

Next steps

— Refine designs to support final best practices.

— Begin documentation process.

Event eight: Rolling DRE usability evaluations

New York, NY
December 1, 8, 9, 2006

Overview
Usability sessions were held at AIGA offices in New York City. The contractor worked with representative voters to test refinements made to the interactive prototype based on feedback from the first round of evaluations.

Materials studied

Voter information	
Optical scan ballots	
Full-face DRE ballots	
Rolling DRE ballots	●

Research goals

Clarify user requirements	Usable	●
	Accessible	●
	Language	●
	Legible and readable	●
	Learnable	●
	Credible	●
Clarify production requirements	Scalable	
	Flexible	
	Reusable	
Clarify legislative requirements		
Clarify standards requirements (non-legislative)		
Clarify existing practices		

Methodology overview

Expert interviews	
Expert feedback on prototypes	
Usability evaluations	●
Observations	
Field interviews	
Reviews (non project materials)	

Participants
Fifteen representative voters between the ages of 22 and 64 years, both men and women, were studied. To achieve a random sampling, no special recruiting was done to limit language skills, education, income, or cultural identity.

7.37	Nine research events	Events	Event eight

Ballot summary

Topic	ID	Finding	Conclusion
Election information	1	Displaying the date on each page seemed repetitive for some participants. Some also noticed that the date was listed as dd/mm/year rather than typical U.S. standard mm/dd/year.	Remove date with the exception of introductory pages. Dates should be presented in standard U.S. format.
Contest information	2	Election banner is not considered a valuable use of space.	Remove "general election" label. Instead, display page-specific information such as "Contests," "Retentions," "Referendums," and add category information such as State, County, Local…
	3	"Retention" as a title is confusing.	Display name of judge and office as the title.
	4	Participants missed the countdown feature.	"More than three" and the tally that counts remaining options should be displayed together and emphasized with color, bold text, or a graphic treatment.
	5	Some participants did not notice the first "Vote for three" contest, even after prompting.	Atypical instructions should be bold or colored to draw attention, particularly when a user can vote for more than one candidate.
	6	Accept and Reject language is considered intimidating, if not confusing.	Instructions on ballot measure should say "choose yes or no."
	7	Instructions should be accurate, clear, and succinct.	Have simple-language experts review materials for final approval to ensure ease and accuracy in the final prototype.
	8	Participants were confused when content and format of instructions was inconsistent.	Create parallel sentence structure across all instructions.
	9	A number of participants felt the (!) was a sign of danger or error. It reminds them of a yellow warning triangle or computer error message.	Possibly change (!) to another symbol.
	10	Overall ballot felt "too gray" (not enough contrast).	Highlight instructions or voting instructions to improve contrast and hierarchy.
Contest/selection data	11	Most people were easily able to touch candidate name, but not the box in front of the name. Some felt that there should be more space between candidate names.	Confirm that touchscreen buttons meet industry standards in general, and best practices proposed in 2005 VVSG in particular.
	12	Many participants touch the empty box before the name. These squares are confusing when inactive.	Show box and check only when a selection is made, or make boxes and candidate names active.
	13	Some experts were confused when two candidates were listed on one button. They did not recognize the option as a ticket.	Explore design treatments to ensure that both names are easy to read.
	14	One person was confused when the Next button changed to "Skip." She indicated that "Skip" is a choice, not a navigational element. Note: No one demonstrated problems with this, but it was mentioned.	Reexamine the placement and functionality of "Skip" in the process. Voters will be allowed to skip votes, but the process needs to be clearer to them.

Ballot summary (continued)

Contest/selection data (continued)	15	Some experts wanted more control over the listing of candidates.	Add or recommend "Sort by name" button above candidate names, "Sort by party" button above party labels. Alternately, or in addition, recommend in best practices document that candidate names be programmed for random ordering.
	16	Make sure text on all buttons is the same size/treatment throughout the prototype and ensure that text size changes appropriately when adjusted by user.	Baseline button treatments in the next round of development or address in best practices document.
	17	The prototype, based on NIST's moderately complex ballot, has short enough contests that all candidates fit on one page. Longer lists of candidates, which will require a scrolling option on contest pages, as well as referendums must be considered.	Revise button length to accommodate for scroll bars on candidate lists. Demonstrate how scrolling (and scroll buttons) will function on contest pages.
	18	Current prototype is optimized for text that meets VVSG standards but not for large-text option.	Test contest pages for most complex scenarios, including largest text option selected and a large number of candidate names on a ticket race, to ensure fit.
Navigation	19	Participants got lost when moving between Selection, Review, and Help screens.	Consider offering only the contest selected from Review page and forcing voters back to Review screen. This has pros and cons. Make navigation within the prototype more intuitive. Improve the scrolling pace.
	20	Few (3 of 25) noticed the progress indicator in its current placement, but once it was brought to users' attention, they found it helpful.	Move the progress indicator so that Next and Back look more like an integrated unit. Label contest titles with screen number/count or provide more visual indicator of placement within ballot (i.e., an actual progress bar or thermometer-like visual). Also consider adding titles that reference contests, retentions, referendums at national, State, local levels.
	21	Participants were confused about where to touch on the Next/Previous buttons. A number suggested that the buttons should be shorter (arrow closer to label).	Adjust button length and typography to present as a more integrated unit and reduce unnecessary use of space.
	22	Six of the fifteen people tested were confused by the scroll bars. Either they didn't see them, didn't know how they worked, or the scroll bars did not function as they expected.	Reevaluate the functionality, placement, and visual appearance of scroll bars. Also consider pagination models as an alternative.
	23	Participants consistently requested better labeling to indicate that more text was available. Many did not notice incomplete text or scroll bars.	Add "UP" for more text, "DOWN" for more text with arrows, and change the appearance of the arrows to draw appropriate attention to them.
	24	The pace of the scrolling mechanism is inconsistent from one area of the ballot to the next. The review screen scrolling is very fast and considered disarming. It also stops without contest information fully visible.	Improve the scrolling pace. Referendums should scroll line by line, and one line should be highlighted to fully support low-literacy voters.
	25	All participants missed the green Confirm button on the language selection page.	Confirm button should gently pulse to teach voters where primary navigation is located.
	26	When leaving the Help area, people expected "Return to ballot" to take them to the contest they were previously viewing, either on the review screen or on selection screens.	Rethink ballot/help use cases throughout.

7.39	Nine research events	Events	Event eight

Ballot summary (continued)

Navigation (continued)	27	Missing "Cast" command in ballot prototype.	Add Cast Your Ballot button to final screen.
Write-in	28	Functionality of the Delete button is unclear.	Reevaluate user interface for simplicity. Consider removing Delete and Reset buttons.
	29	Some users had difficulty changing a misspelling on the write-in page because arrow buttons didn't behave as expected. People expect the Delete button to delete the letter just to the left of the cursor, but it currently deletes the letter to the right of the cursor.	Clarify/refine functionality.
	30	Participants often asked if they needed to add a first and last name—this could be because of the testing situation, but it came up often.	Provide caption under text field "Please enter a first and last name."
	31	One user expected to see a pop-up window with the contest still visible beneath it when adding a write-in candidate.	Consider pros and cons of an isolated screen and the introduction of pop-ups, which may be confusing to novice computer users and is less common in touchscreen samples.
	32	A number of participants said they didn't understand what would happen when they touched "Submit." After trying it, the action was clear. Some thought it should be more explicitly labeled.	Review instructions strategy with simple-language specialists.
	33	Some users to struggled to find the space bar.	Call more attention to the space bar.
	34	A number of participants pointed out that screen does not have characters needed for foreign names, such as accent marks, etc.	Include keyboard tip in language requirements in best practices.
Language selection	35	There was come confusion about the titles on the Language, Help, and Selection pages when instructions were in different places.	Titles and instructions should be presented similarly throughout.
	36	Vote graphic was considered appealing but function was unclear.	Move or eliminate the Vote graphic to avoid confusion. Consider eliminating the Confirm step when selecting a language. Users should be able to select language and move to next step in one touch.
	37	Some users noticed small inconsistencies in the prototype's interface: text, button placements, etc.	Text in language buttons should be flush left as on other buttons. All titles and buttons should adhere to a set grid system. Buttons on start pages should adhere to same grid system as used on selection pages.
	38	Some participants wanted a clearer indication that they had moved from introduction pages to the voting process.	Consider changing the background color to be consistent with help area and prep screens but different than the selection screens.
	39	Not in current prototype.	Add this page. Offer voters options such as "If you want to start voting now, touch Start," "If you want to change your settings or learn more about how to vote, touch Help."

Ballot summary (continued)

Straight party vote	40	Functionality is confusing for many participants, and instructions do not adequately clarify or inform users about this option.	Revise text as follows: "A straight-party vote means you vote for everyone on this ballot in that party. You can also choose a straight-party vote and then choose a person running in another party for one or more offices. Your vote for that person will be counted instead of your party vote in that office. To choose a straight-party vote, touch a party name. A checkmark will appear. You can undo your choice by touching the checkmark again. To change your vote, touch a different party. After you are done voting for party contests, remember to vote for judges and ballot measures beginning on screen 17."
	41	Some participants thought they would be done with the voting process if they used the straight-party option.	Draw attention to measures. Add an instructional paragraph that addresses this issue and place the Attention icon nearby to add emphasis.
	42	Some users wanted to change languages midstream but couldn't use the "Previous" button to do so.	Consider making settings adjustments available on each page.
Help	43	Instructions for how to change languages were not necessary—the touchscreen functionality should make the process obvious.	Remove term "Touch language below" and add English as an option.
	44	Participants were somewhat confused about their location in the experience. Some thought they were voting when they were in help mode, and some didn't notice when they moved from help back to the ballot.	Add title banner that says "Help." Change background color to be different than contest/ selection pages.
	45	The left navigation was confusing for some participants. Some users indicated that the labeling/organization of content could be simplified.	Restructure content hierarchy and revise button layout.
	46	Most participants thought three text sizes were unnecessary and recommended large and small.	Offer two text sizes that meet 2005 VVSG standards and address issues of low vision or tunnel vision.
Summary	47	Many users appreciated the idea of a review screen, but few felt it met their expectations of a summary view. A number of people commented on the poor use of space and stated that for a summary it didn't feel very summarized.	Selected candidate name and party should be displayed in the center column with the Change My Vote button to its right for a more concise use of space.
	48	Participants commonly requested easy access to the contest or screen they had previously visited.	Allow users to navigate back to previous contest or help screens.
	49	Participants had difficulty understanding their next step after moving from the summary screen to a contest screen—many wanted to return to a summary page to pick up where they left off.	Consider showing only the selected contest in isolation when coming from the summary page. On a selected contest, remove all bottom navigation except "Help" and "Return to Summary" when coming from summary page.
	50	Summary page is missing instructions.	Add instructions and summary at the top of the page and a contests completed counter to the left column following the pattern established on selection pages.

Ballot summary (continued)

Summary (continued)	51	Summary page is missing a title.	Add title to the top of the page following the pattern on selection pages and the help area.
	52	Some participants were confused about their place in the ballot. It was not understood whether they were voting or reviewing.	Add category titles as introduced on selection pages, such as Contests: National, State, Local; Retentions; and Referendums. Color change either in title or background to indicate review area to distinguish from the voting screens.
	53	Missing progress indicator after selecting cast ballot.	Add progress indicator review > print > cast ballot.
Printing	54	Deemed as necessary by participants and the team but not yet built into the prototype.	Define and demonstrate process. Suggest message while printing is in progress to the effect of "Your selections are printing. Please confirm accuracy of the print ballot against the choices you've made on the screen. If you are satisfied with your choices and the accuracy, touch Cast My Ballot. If you would like to make changes, return to the review screen. .... go back. If you feel the print receipt is inaccurate, contact a poll worker."
Confirmation	55	Deemed as necessary by participants and the team but not yet built into the prototype.	Add print/confirm cast functionality. Add message after the ballot has been cast to the effect of "Thank you for voting today. Your ballot has been successfully submitted and counted in this election."
Miscellaneous	56	Some participants seemed unimpressed with screen appearance. It was suggested by more than one participant that the presentation looked computer-generated and not designed. Note: These participants usually mentioned the font selection as part of the problem; and Univers (the recommended font) was not displayed as designed in all cases.	Refine design.
Simple language	57	"Vote for one" language sounds like a command and doesn't imply that users have the opportunity to skip. Instructions need to make this clear.	Have simple-language experts review materials for final approval to ensure ease and accuracy given final prototype.
	58	Referendums were stressful and difficult for everyone to read. "If we can't understand them, how can design help?" Ballot measures appeared "very gray" (not enough contrast).	Consider a white or lighter gray background to make text easier to read. Increase leading. Add note in instructions that type size can be increased for easier reading
	59	Many recommended summary sections at the beginning of the long ballot measure screens.	Consider adding a tab structure as a possible means of breaking text into smaller, predictable, organized content areas. Tabs could be Summary (default), Proposer, Financials, Schedule, and Detail.

Next steps

— Refine designs to support final best practices.

— Begin documentation process.

Event nine: Expert reviews of rolling DRE ballots

December 21, 2006

Overview

The contractor offered rolling DRE prototypes to the team's panel of experts, election officials, and most prevalent ballot manufacturers for evaluation and feedback.

Materials studied

Voter information	
Optical scan ballots	
Full-face DRE ballots	
Rolling DRE ballots	●

Research goals

Clarify user requirements	Usable	●
	Accessible	●
	Language	●
	Legible and readable	●
	Learnable	●
	Credible	●
Clarify production requirements	Scalable	●
	Flexible	●
	Reusable	●
Clarify legislative requirements		●
Clarify standards requirements (non-legislative)		●
Clarify existing practices		●

Methodology overview

Expert interviews	●
Expert feedback on prototypes	
Usability evaluations	●
Observations	
Field interviews	
Reviews (non project materials)	

Participants

— The contractor's panel of experts
— Elections officials
— Manufacturers

7.43	Nine research events	Events	Event nine

Rolling DRE ballot summary

Topic	ID	Finding	Conclusion
Overall	1	Overall design is clean and weighted with the right amount of color to support the interaction design.	Check for red and green to confirm choices meet color blindness requirements.
Overall	2	Sections within the ballot are unclear. Differences between partisan and nonpartisan contests may not be distinguishable.	Must help the voter understand transitions from one contest area to the next.
Overall	3	Greater variety in type size and weight will improve readability.	Titles should be larger.
Ballot instructions	4	There are no overall ballot instructions.	Suggest some A/B testing with voter instructions.
Language selection	5	Are different language selection buttons in English?	Confirm that all language buttons are presented in selected language, not in English.
Language selection	6	No need for the Begin button.	Remove Begin button.
Straight-party vote	7	Language for screen could be simplified.	"To vote, touch a name. A checkmark will appear. To undo your choice, touch the checkmark. It will disappear. To change your vote, touch a different name." "Remember to vote for judges and ballot measures beginning on screen 17."
Contest information	8	Titles should be larger for easy reading.	Increase title size.
Voting instructions	9	Instead of using "one," use "1."	Change throughout ballot.
Voting instructions	10	Expert quote: "For the write-in, I like the idea of having instructions on the button itself."	Confirm that this is applied throughout ballot.
Voting instructions	11	See conclusion (at left) for expert-recommended language for a "Vote for 1" (single candidate).	"To vote, touch a name. A checkmark will appear. To undo your choice, touch the checkmark. It will disappear. To change your vote, touch a different name." On the Write-in Button: "Touch here to write in another name."
Voting instructions	12	See conclusion (at left) for expert-recommended instructions language for "Vote for 1" (dual candidates).	"To vote, touch one set of names. A checkmark will appear. To undo your vote, touch the checkmark. It will disappear. To change your vote, touch another set." On the Write-in button: "Touch here to write in other names."

Rolling DRE ballot summary (continued)

Voting instructions	13	See conclusion (at left) for expert-recommended instructions language for "Vote up to X."	"To vote, touch a name. A checkmark will appear. To undo your vote, touch the checkmark. It will disappear." On the Write-in button: "Touch here to write in other names."
Voting instructions	14	See conclusion (at left) for expert-recommended instructions language for questions with two choices.	"To vote, touch a name. A checkmark will appear. To undo your vote, touch the checkmark. It will disappear." On the Write-in button: "Touch here to write in other names."
Ballot review	15	Expert quote: "It is unusual to see the pronoun 'you,' but testing may prove that this pronoun is motivating to voters. We do have doubts about the big red exclamation mark, and even the exclamation after the sentence. However, the consensus is that this should work well, and it sounds like you've done some testing, so I withdraw my recommendation."	"To change your choice, touch the other choice. To undo your choice, touch the checkmark. It will disappear."
Help	16	Expert quote: "I strongly recommend that the settings be separated from Help and provided in two places: before voting—on the 'Choose language' screen, perhaps—as well as its own button on every screen. I'm wondering if both Help and 'Settings' buttons should have a symbol (like a '?') on each button with the text."	Rethink cases involving help and settings to provide better support.
Help	17	Expert quote: "I support use of video or animated demonstration to support low literacy. Alternative audio is also likely to be needed."	Tutorials and demos should be engaging for voters. Based on standard practice in learning software, consider supplementing clear, concise instructions with animations and audio.
Miscellaneous	18	The control for audio might be more efficient and intuitive as a touch slider.	Hardware manufacturers should handle audio adjustments.

Next steps

— Refine designs to support final best practices.

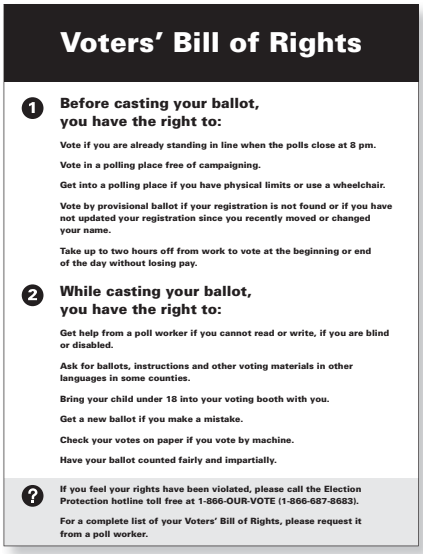
— Begin documentation process.

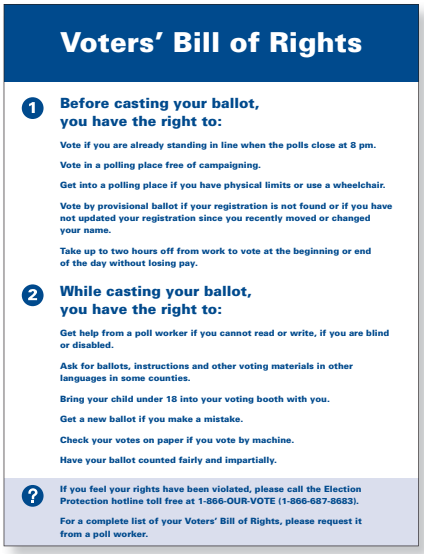
Design development

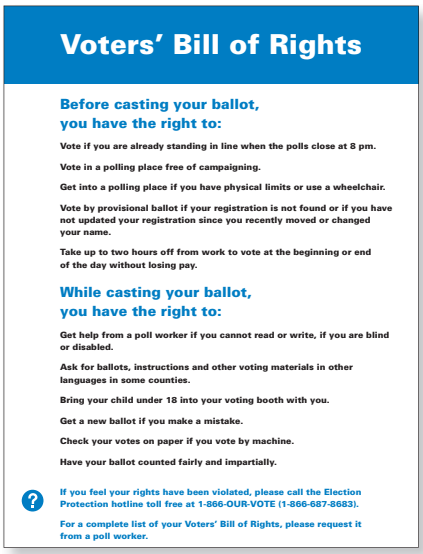
Samples of election designs, based on input from research findings, are illustrated on pages 7.45–7.54.

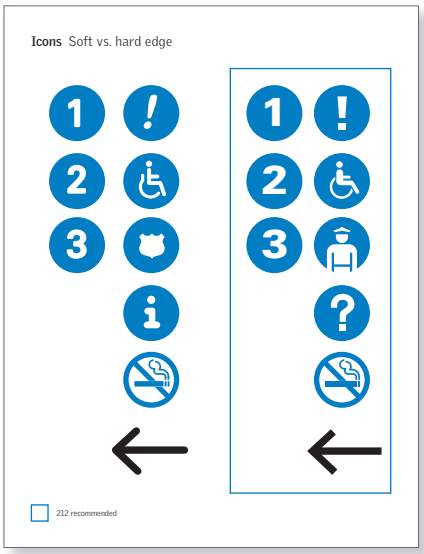
Voter information color and icon studies

To aid usability and readability, icons, functional typography, and ADA-compliant colors were consistently applied. Nebraska pilot test voter feedback further informed the design development.









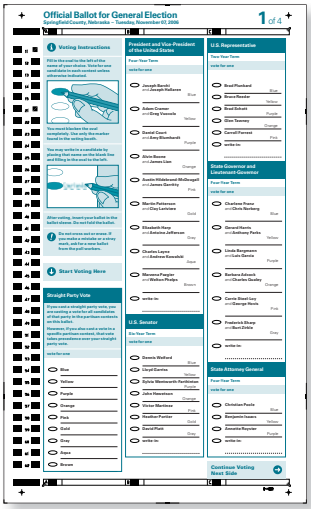
Optical scan ballots

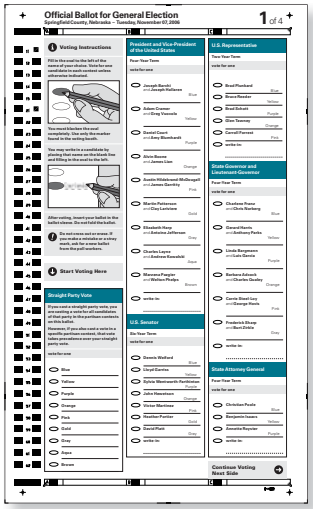
Possible solutions for improvement of optical scan ballots for low-literacy voters are shown on pages 7.46–7.50. The process was iterative, with each successive design revised based on user input. Techniques to aid low-literacy voters include:

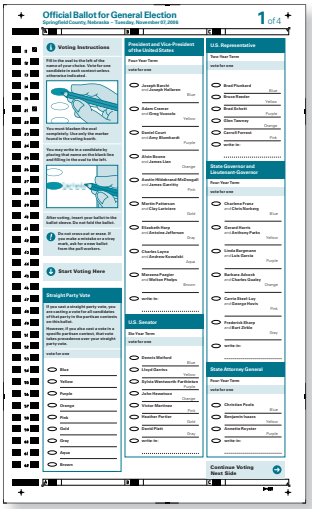
— Using color to support usability
— Using icons to support usability
— Displaying content (especially ballot measures) in two languages simultaneously
— Visually aligning contests and instructions.

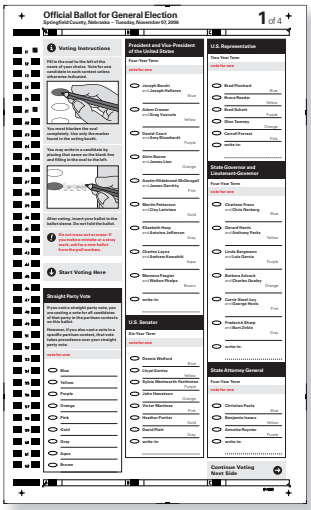
Color studies

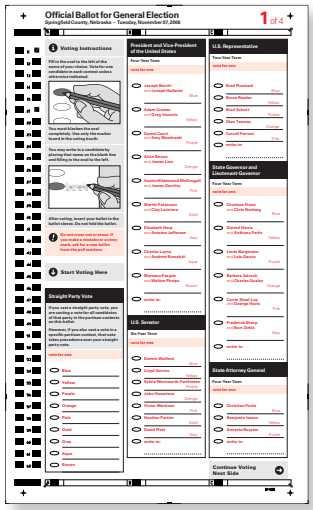
With domestic and international precedents for using color on ballots, options were tested that used color to improve usability—specifically, to emphasize and clarify ballot instructions. ADA-compliant colors were used.

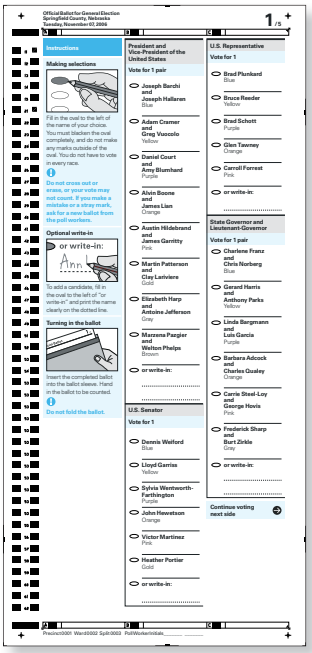






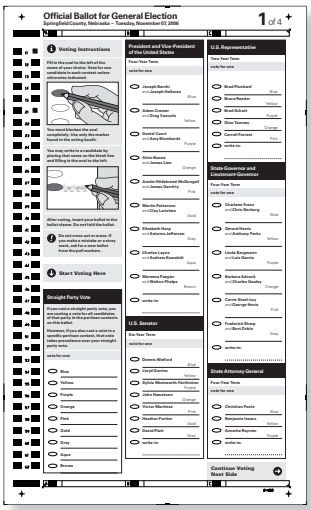


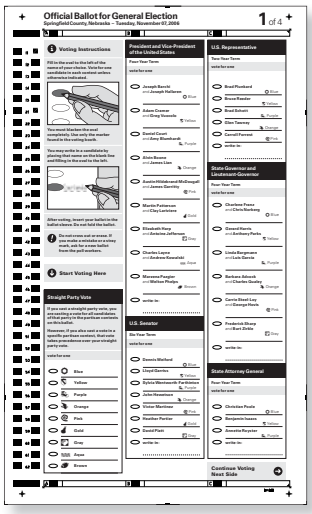


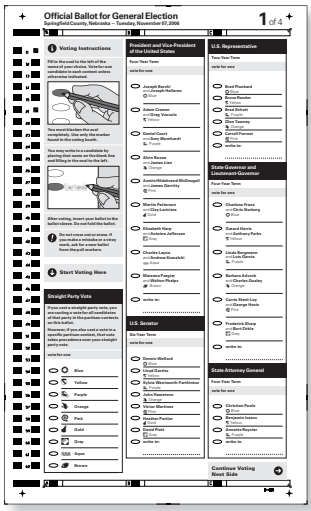


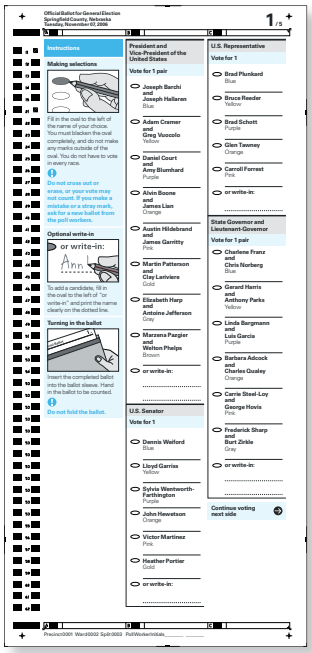
Icon studies

Due to the popularity of adding party icons to ballots in some U.S. jurisdictions, party icons were integrated into several samples and reviewed. Literacy and design experts agreed that the benefits of potentially identifiable party images (always coupled with party names) were outweighed by the extra visual, cognitive, and political information demands required for voter understanding.



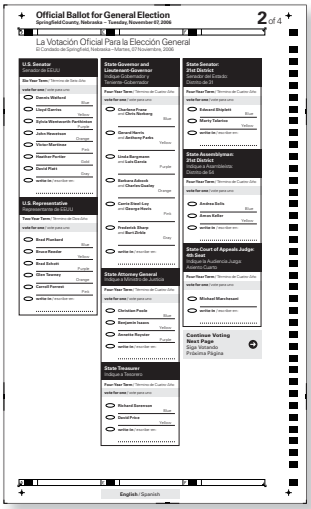


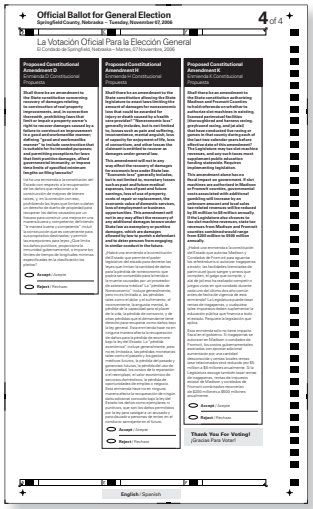


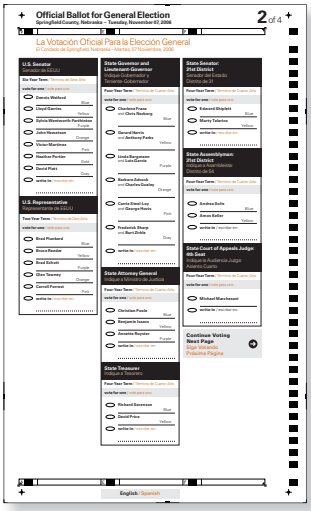


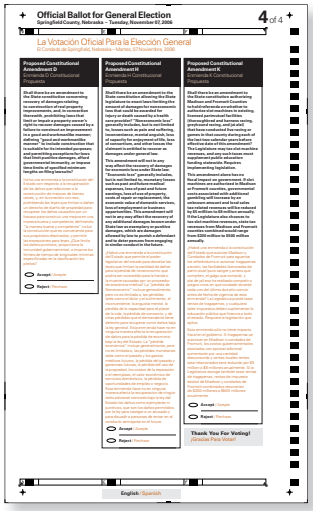
Ballot measures and multiple-language studies

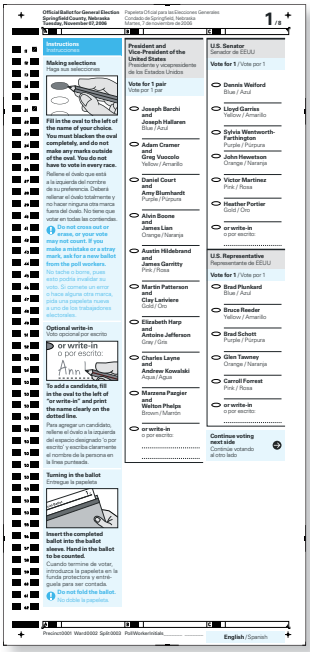
To clarify the usability of two-language ballots, especially in ballot measure content, the contractor examined variations in text layout, line length, text line spacing, and sequencing of content. Font weights and sizes were also studied to reinforce the readability of two languages and different alphabets.





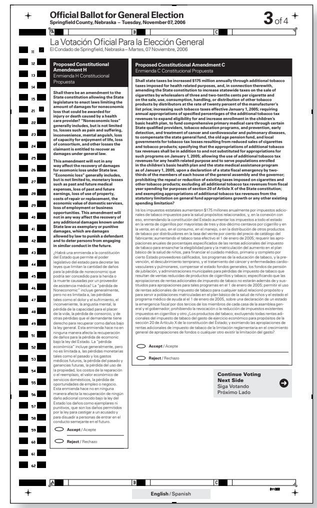







Official Ballot for General Election
3 of 4
La Votación Oficial Para la Elección General
English / Spanish


Official Ballot for General Election
3 of 4
La Votación Oficial Para la Elección General
English / Spanish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La Votación Oficial Para la Elección General
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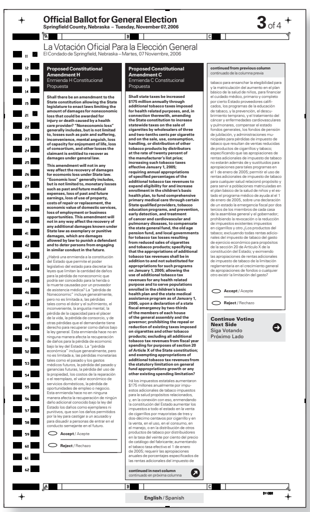
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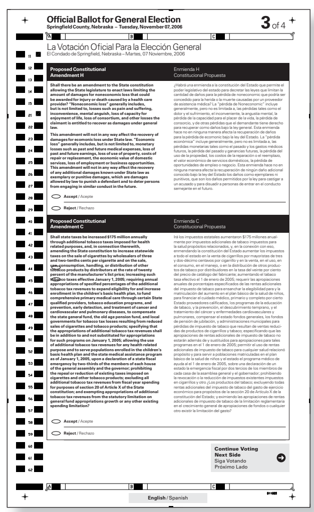
La Votación Oficial Para la Elección General
English / Spanish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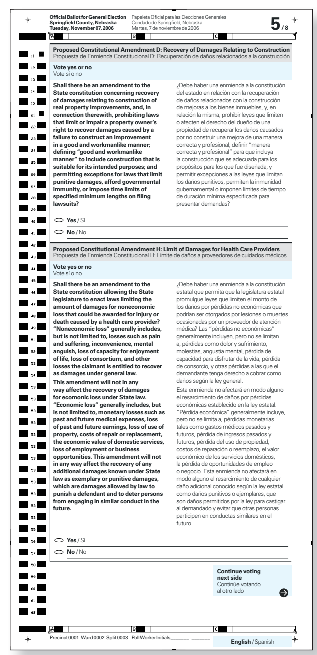
La Votación Oficial Para la Elección General
English / Spanish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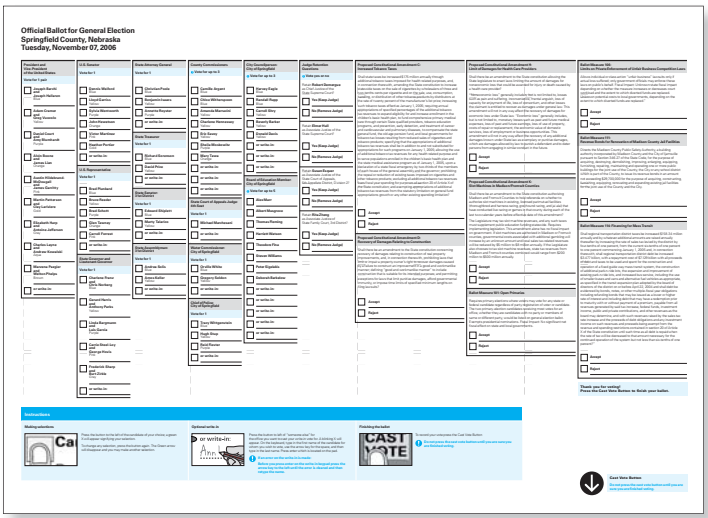
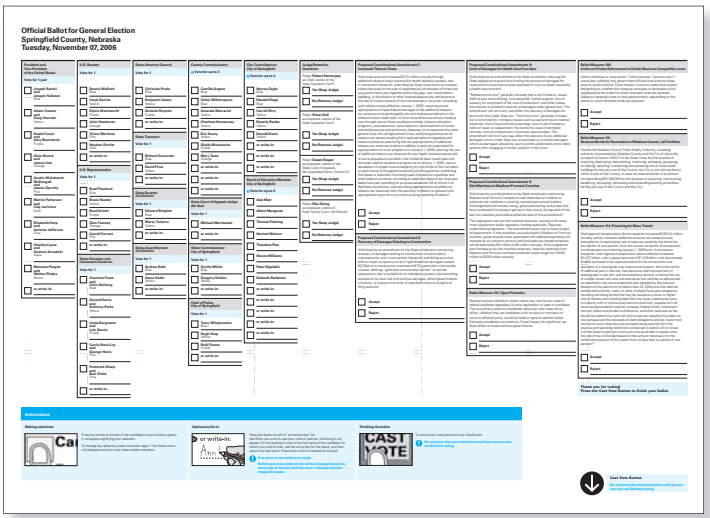
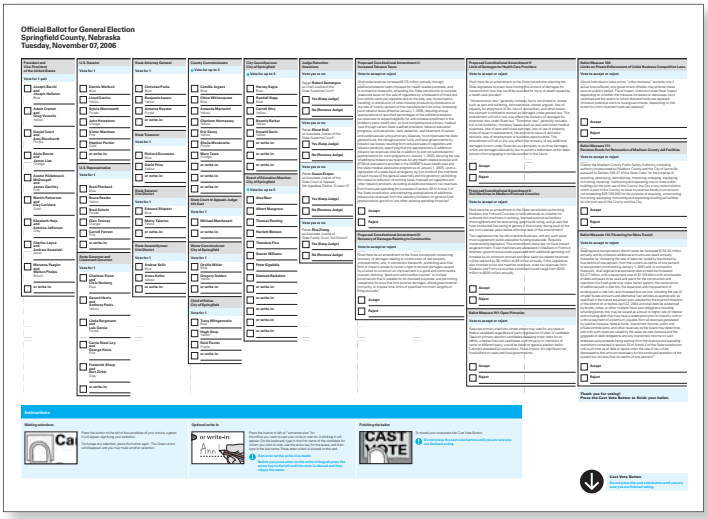
English / Spanish

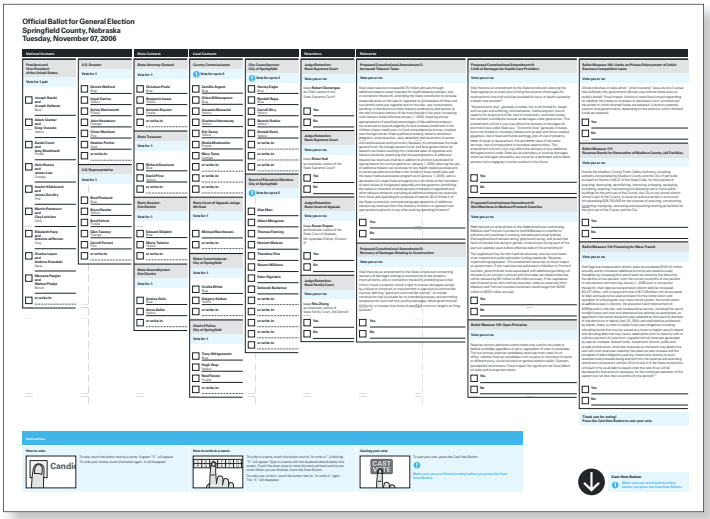
Full-face DRE ballots

Test participants preferred viewing contests aligned across the top for readability in optical scan findings. This alignment has been applied to the full-face ballot samples.









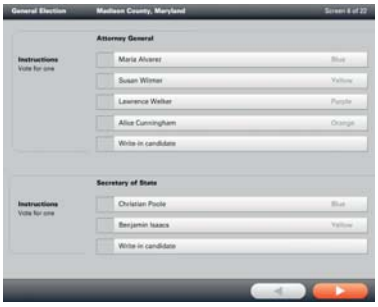
Rolling DRE ballot interface design

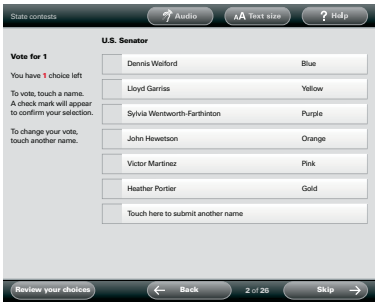
Studies of the components and interactions found most challenging by test participants are illustrated on pages 7.51–7.53. These include:

— Comprehending the total number of contests per screen
— Comprehending the differences between single candidates and two-name tickets
— Understanding the difference between "vote for 1" and "vote for x" contests
— Navigating through and voting on ballot measures
— Reviewing the ballot sufficiently before casting
— Understanding and accessing Help features
— Navigating through the ballot

Contests per screen

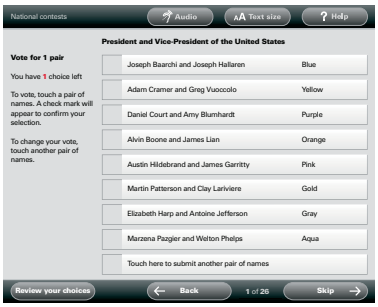
When space allowed, initial designs showed two contests per screen. The first interactive prototype developed for testing revealed undervoting on the second contest. Changing to one contest per screen, participants were observed to be more aware of each contest without feeling that the ballot was too lengthy.





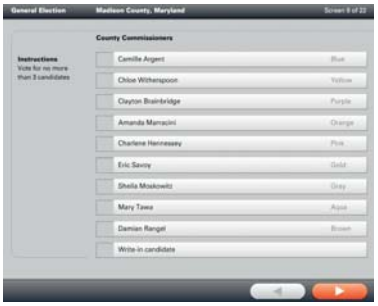
Contests with two names

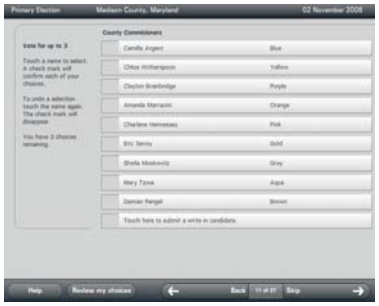
To underscore the difference between one-name and two-name contest options for voters, the team explored button treatments varying in font size and weight; placement of candidate and party names; button spacing and layout; and highlight states (when a selection has been made). Navigation varieties were also considered.

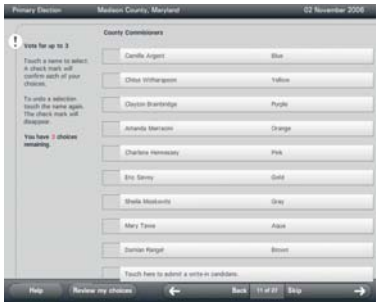


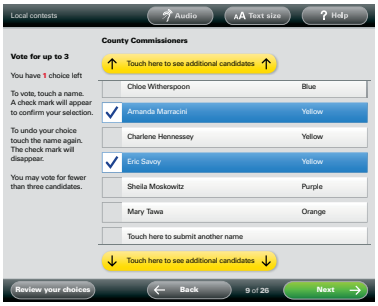
Voting for multiple candidates in one contest

To underscore the difference between single-candidate contests and multiple-candidate contests, focus was placed on the language of screen-level instructions, and a countdown indicator to communicate undervoting risks was added.



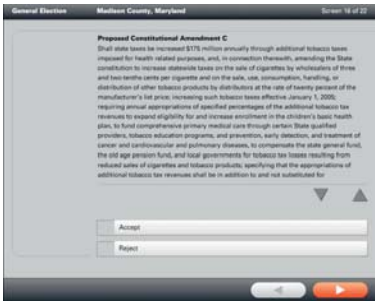


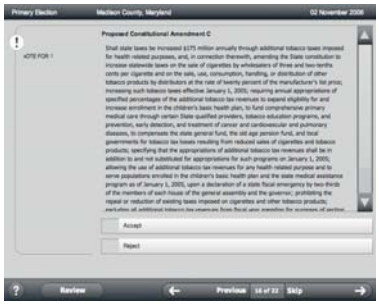


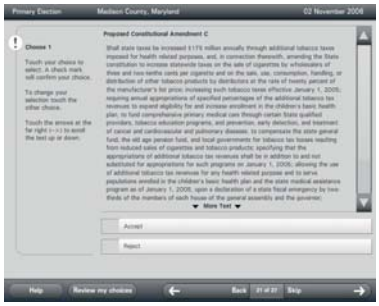


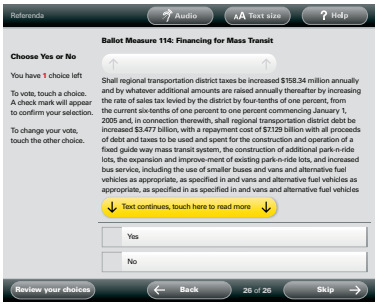
Reading ballot measures

To encourage users to successfully access and read lengthy ballot measure text, the contractor studied variations in titling, scrolling, breaks in the text, type treatment, type size, line spacing, and options for presenting and communicating ballot measure instructions.



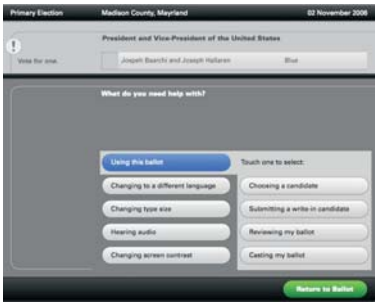


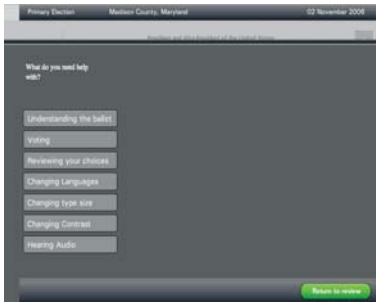




Receiving help

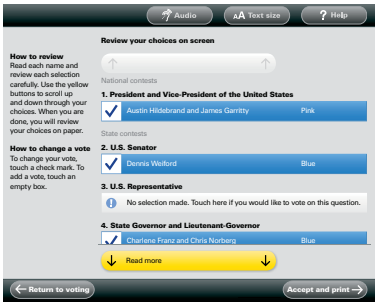
On the strength of recommendations by low-literacy advisers, the team explored options for integrating support content into the rolling DRE user experience.





Reviewing the ballot

Usability studies indicated that voters generally prefer to monitor their ballot completion progress while voting. Some participants requested the ability to (knowingly) skip ahead to decisions they deemed most important. Review screens should allow voters to accomplish both by offering an in-progress ballot summary and nonlinear access to contests and measures. Design iterations and usability testing explored navigational flows connecting voting, reviewing, and casting activities.



Navigating through the ballot

Language, graphics, layout, and symbols were investigated to help determine the best ballot navigation presentation.