Human Factors and Privacy: Progress Report

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At our last meeting you heard about the research underway to further address resolutions in future VVSG. This is a progress report.

- **Usability performance requirements**
  - **how to test and how to identify a benchmark**
- **Plain language guidance for ballots, instructions, error messages**
- Guidance for ballot design
- Guidance for interaction design
- Usability of standards
- Further refinement of accessibility guidelines
- Test methods [after VVSG 07]
- **[Specific issues that have arisen]**

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What would a usability conformance test that measures human performance on voting equipment entail?

- VSTL recruits “voters” according to specified demographics
- Voting equipment is set up according to test specs with test ballot
- Voters are brought into lab and given instructions on how to vote their ballot choices according to test script
- Voters cast their ballot and their errors and time recorded, (and possibly fill out a satisfaction questionnaire)
- Error rates and time are computed and compared against benchmark
- Voting equipment passes or fails the test.

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A usability test for conformance to a benchmark is different than typical usability testing

- Goal is NOT
  - to suggest user interface design improvements
  - to set a usability baseline to measure improvement in product development cycle
  - to observe problems in the field
- Goal is to measure usability in the lab with a test that is reliable and valid. This requires:
  - Representative ballot
  - Clearly defined set of voters, enough to show differences in usability
  - Completely scripted set of test instructions and voting tasks
  - But still feasible

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To develop the usability performance benchmarks and the associated test we need to:

- Develop a test protocol for testing voting system with users
- Create test reference ballot
- Run experiments with test voters
- Define metrics to measure usability on the data collected
- Validate the protocol
- Identify benchmarks
- Refine benchmarks and test data for conformance testing
- Give VSTLs complete test protocol and instructions to run tests and compute metrics to determine pass/fail

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Validating the test protocol is important for a conformance test

- The protocol is based on standard usability testing practice
- To be valid we expect the test to
  - Produce consistent results
  - Measure what it claims to measure
  - Appear to be valid to the casual observer as well as experts.
- We are getting ready to run **pilot tests** to
  - Determine validity
  - Verify feasibility

The pilot test – we are testing the protocol

- 30-50 participants from a narrowly-defined population
  - We need similar voters because we want to show test validity and reliability
  - We also want to detect and measure differences among equipment
  - If you can't do this with a similar population, you can't with a diverse sample.
- We will measure voting
  - Accuracy: was ballot cast as instructions directed?
  - Efficiency: time on task
  - Subjective satisfaction

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Next steps after test validity is proven are focused on preparing for handoff to the VSTLs

- Determine metrics for the conformance testing
- Choose suitable benchmarks (not too easy, not too hard)
- Produce detailed test scripts
- Determine number of voters and demographics for conformance testing
- Refine test reference ballot
- Investigate usability conformance testing for users with disabilities
  - Benchmarks will differ, equipment variations

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Clear, easy to understand ballot and interaction instructions are an important part of the voting process

- If voters cannot understand how to use their voting materials, they may not be successful in voting
- Everyone benefits from clear instructions
  - Cognitive skills of voters vary widely
  - Tired voters, aging voters, those with cognitive disabilities
- Poll workers also benefit from clear instructional material

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There has been little research, if any, on voting instructions so we looked at "plain language" guidelines in other fields

- Plain language
  - uses the simplest, most straightforward way of expressing an idea
  - is logically arranged and easy to follow
  - See, for example, www.plainlanguage.gov
- We looked at more than 100 paper ballot samples and sample ballots, instructions, and messages on 4 DREs
- We found serious gaps between typical instructions to voters and best practice in writing instructions

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Here are some of the gaps we identified

- Instructions on DREs sometimes
  - Are inconsistent
  - Do not consider voters' likely mistakes
  - Use words that many voters may not know
  - Warn voters when it may be too late to heed the warning
- Instructions on paper ballots sometimes
  - Are all in one place, not where they are needed
  - Are statements, not directions to voters
  - Threaten rather than help voters
  - Use double negatives rather than the positive

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An initial set of guidelines were written based on the gap analysis, for example:

- Put warnings about consequences before – not after – the voter is likely to act

- Note that this guideline is testable on voting equipment

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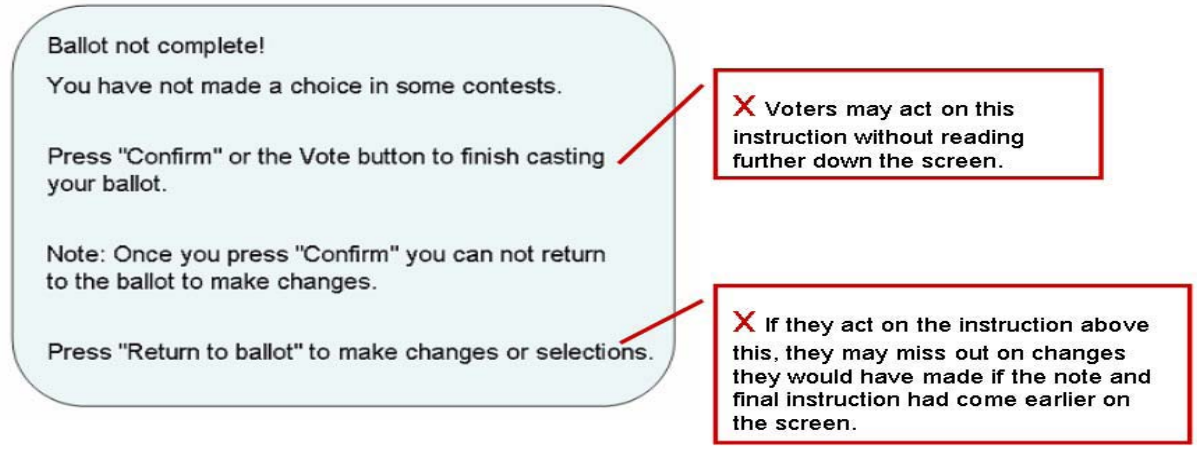

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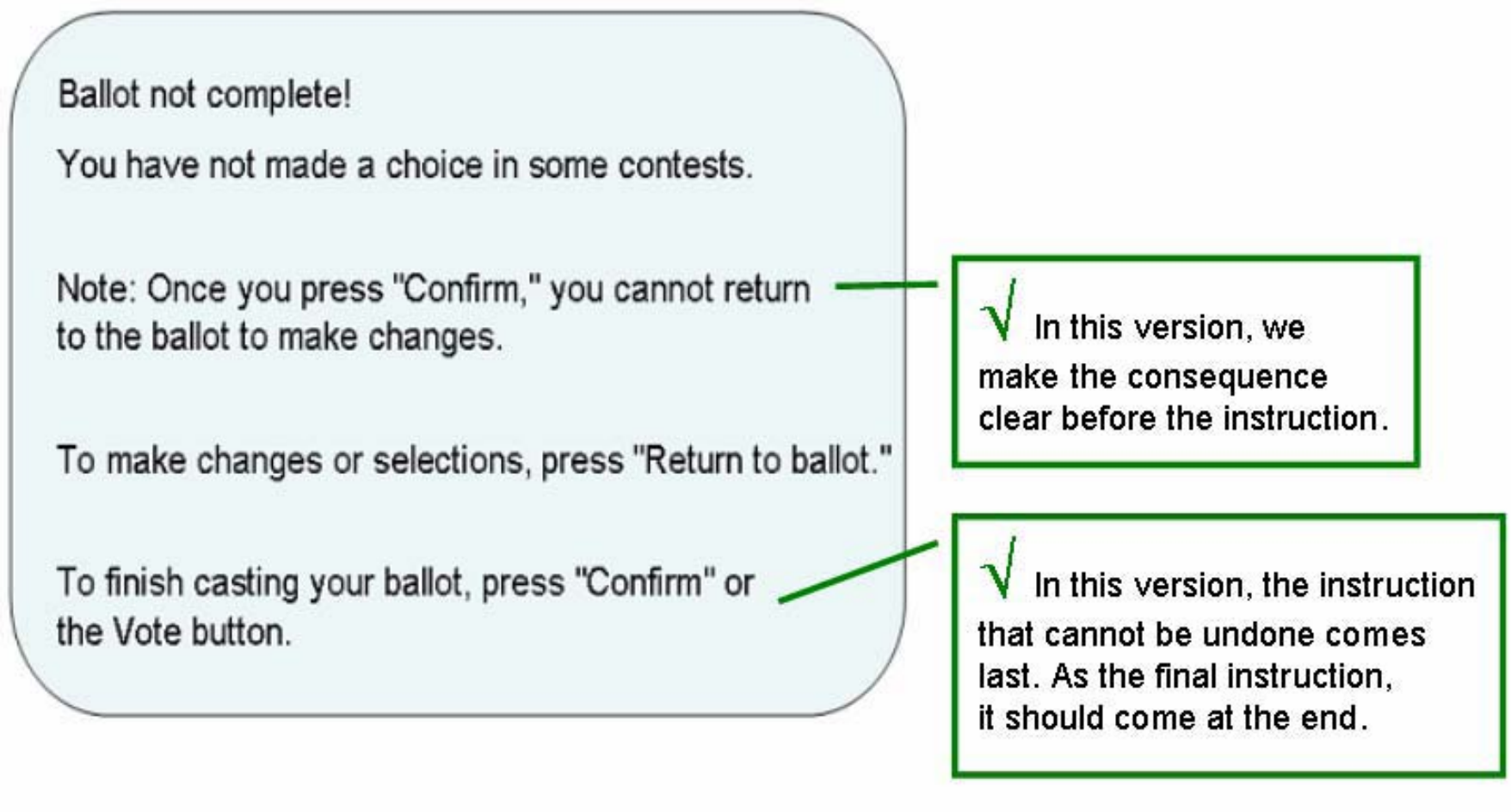

Another example

- Be consistent in the words you use
- On one DRE the card that voters use has 3 different names:
  - VOTER CARD
  - voter activate card
  - Vote Card
- The card itself says “VOTER CARD”
- The place to insert, says “Insert voter activate card here.”
- The message on the screen at the beginning of the process says: “To Begin Voting Insert Voter Card Into Slot Below.”
- The message at the end of voting calls the card: Vote Card
- Note that this guideline is also testable on voting equipment.

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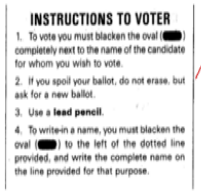
Example: paper ballot
Put instructions in logical order
First task, first; last task, last

X These instructions are not in logical order. Voters find out how to recover if they do it wrong before they find out how to do it right.



INSTRUCTIONS TO VOTER

1. To vote you must blacken the oval ( ) completely next to the name of the candidate for whom you wish to vote.
2. If you spoil your ballot, do not erase, but ask for a new ballot.
3. Use a **lead pencil**.
4. To write-in a name, you must blacken the oval ( ) to the left of the dotted line provided, and write the complete name on the line provided for that purpose.

√ In this version, voters first learn what to use – the pencil. Then they learn how to use the pencil.

The instructions on what to do if something goes wrong come after the instructions on how to do it right.

Instructions to voters

1. Use a lead pencil.
2. To vote, blacken the oval ( ) completely next to the name of the candidate for whom you wish to vote.
3. To write in a name, blacken the oval ( ) to the left of the dotted line and write the complete name on the dotted line.
4. If you spoil your ballot, do not erase; ask for a new ballot.

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Preliminary report on writing clear instructions is based only on best practice in other domains: Research for voting is still needed

- Guidelines need to be tested in the context of voters working with ballots and equipment.
  - Do voters read instructions on ballots?
  - How do organization and wording affect reading behavior?
- Research is needed to find out which words voters know and which they do not.
  - Cast a ballot
  - Contest/race
  - Partisan

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Research continues in support of VVSG 07

- Validation of usability test protocols and benchmark development
- Guidelines for clear instructions (plain language)
- Guidance for ballot design and interaction design
- Usability of standards (cross cutting)
- And, other specific issues as they arise: next slide

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The HFP subcommittee has identified some additional issues that merit further research

- Carryover items from public comments on VVSG 05
- Usability of security
- Vote-by-phone guidance
  - Audio interface: how to record, timing, etc.
  - Physical access: dexterity issues
  - Control of the interaction
- Dexterity issues, e.g., ballot submission, sip-n-puff
- Designing usability tests for classes of disabilities
- Universal usability – what can be moved from the accessible system to general requirements

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Questions and Discussion