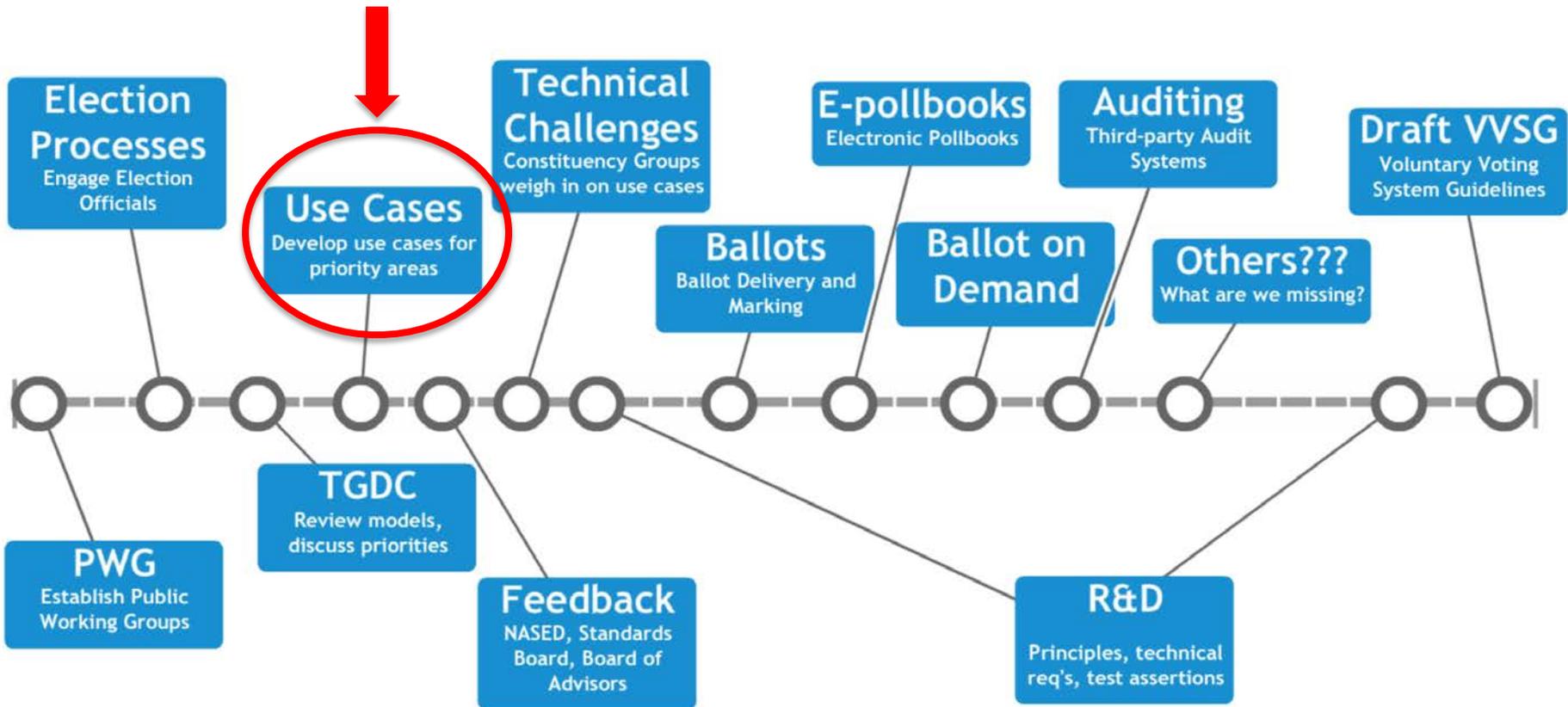


Update: Revising the VVSG Structure

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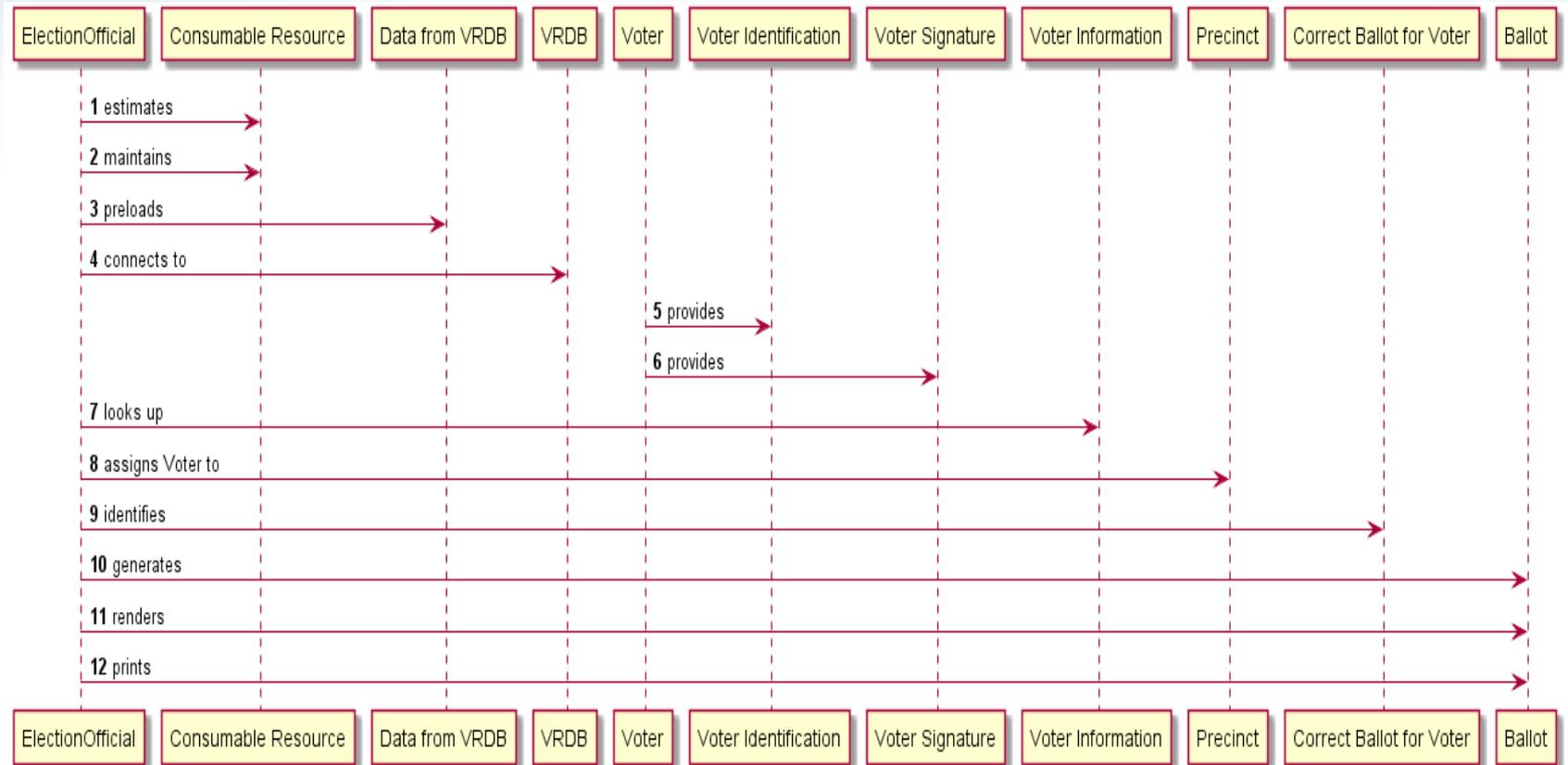
Timeline: Late 2017/Early 2018



Scenarios (Use Cases)

- Electronic Pollbooks
- Ballot Marking
- Ballot Delivery
- Ballot-on-Demand
- Auditing

Ballot-on-Demand Diagram



Revising the VVSG Structure

- New, more usable, flexible structure
 - Based on high level principles (NASED, NIST)
 - EAC future VVSG goals
 - Level of detail depending on the audience
- Initial focus on Usability and Accessibility (U&A)
 - Five principles
 - Each principle has a set of goals called “guidelines” which are tied to requirements
 - Created format and initial baseline content based on human factors analysis

Proposed Structure

- Principles
 - High level system design goals
- Guidelines
 - Broad system design details for election officials
- Requirements
 - Technical details for design and development by vendors
- Test Assertions
 - Technical specification for testing by test labs

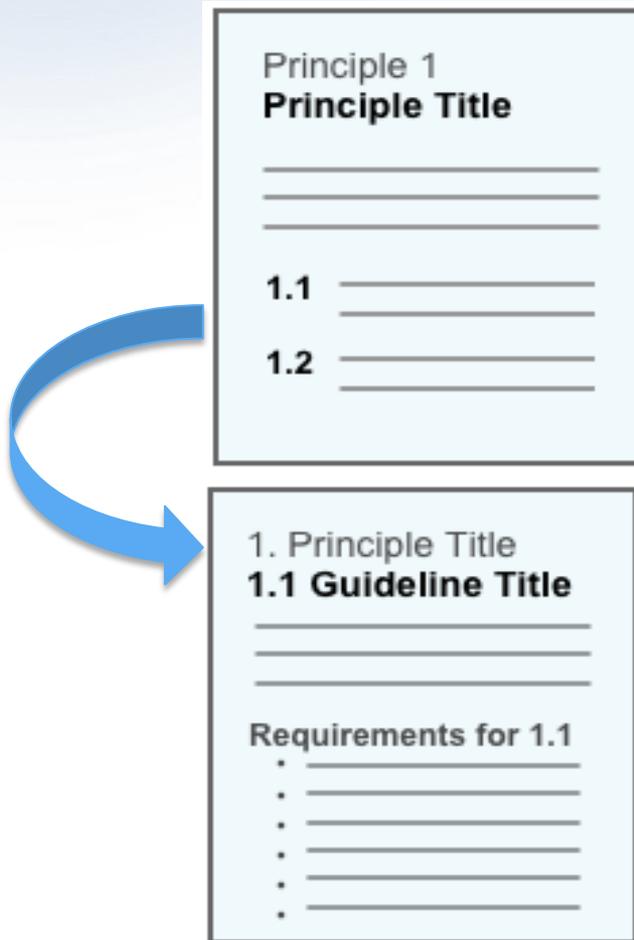
Chapter Overview & Principles

| Chapter Title |
|---------------|
| _____ |
| _____ |
| _____ |
| _____ |
| _____ |
| _____ |
| _____ |

| Principles |
|------------|
| 1 _____ |
| 1.1 _____ |
| 1.2 _____ |
| 2 _____ |
| 2.1 _____ |
| 2.2 _____ |
| 3 _____ |

- Each chapter opens with introductory text to explain the scope, topics, and legal context.
- All of the principles are also listed at the beginning of the chapter. All voting systems must meet these.
- This information is an overview for everyone.

Expanding Each Principle



- Click on a guideline and you see a list of all of the requirements that systems must meet. They are summarized in an easy-to-read list.
- This page is helpful for those already familiar with the VVSG.
- For some roles, you will not need to read any further.

Detailed Requirements

Requirements for 1.1

1.1-A Requirement Title

 — Test assertions

Requirements for 1.1

1.1-B Requirement Title

 — Test assertions

- Dive down one more level, and you get to the detailed test-able requirements. These pages are the largest group in each section.
- Each requirement has:
 - Number
 - Short title
 - Requirement text
 - Accessibility link
 - Test assertion links
 - Discussion notes

Human Factors Analysis: Emerging Technologies

- Core U&A requirements still relevant (e.g., color, contrast, audio, tactile controls), but:
 - New devices, beyond kiosks
 - E.g., tablets, remote ballot marking systems
 - New interfaces
 - E.g., small form factor (screen size, ballot layout, page orientation), representing ballot selections (QR codes)
 - New interactions
 - E.g., touchscreen gestures, personal assistive technology, eye-tracking

Human Factors Analysis: Incorporating Research and Other Standards

- EAC Accessible Voting Technology Initiative (AVTI)
- Web Content Accessibility Guidelines (WCAG 2.0)
 - Legal implications
- Integrate U&A requirements with
 - Security
 - Software/hardware
 - Interoperability
 - System-specific guidelines (by election or device)

U&A Principles & Guidelines

Principle 1: Equivalent and consistent

All voters have access to mark and cast their ballot as intended, regardless of their abilities, without discrimination.

- 1.1 Provide voters with a consistent experience of the voting process in all modes of voting.
- 1.2 Provide voters with equivalent information and options in all modes of voting.

U&A Principles & Guidelines

Principle 2: Cast as marked

Ballots are cast as marked, both secretly and privately.

- 2.1 The voting process shall preserve the secrecy of the ballot.
- 2.2 The voting system must ensure that ballot selections, interface options, voter identity and information about voters are kept private.
- 2.3 The voting system supports the voter in marking the ballot accurately
- 2.4 The voting process helps voters avoid errors that invalidate their ballot, including blank ballots, undervotes, overvotes, and marginal marks.

U&A Principles & Guidelines

Principle 3: Marked as intended

Ballots are presented in a clear, understandable way, and is operable by all voters.

- **3.1 Perceivable** - The default system settings for displaying the ballot work for the widest range of voters, and voters can adjust settings and preferences to meet their needs.
- **3.2 Operable** - Voters and poll workers must be able to use all controls accurately, and all ballot changes are made with the direct control of the voter.
- **3.3 Understandable** - Voters can understand all information as it is presented.
- **3.4 Robust** - The voting system's hardware and accessories support usability and accessibility requirements while protecting voters from harmful conditions.

U&A Principles & Guidelines

Principle 4: Tested for usability

Meets performance standards for usability and accessibility.

- 4.1 Summative usability tests are conducted using a wide range of voters and poll workers, including those with and without disabilities.

Principle 5: Meets web accessibility standards

Browser-based systems meet web accessibility standards in addition to voting standards.

- 5.1 When a voting system uses standard web software platforms (HTML or native apps), the voting system meets all requirements in WCAG 2.0 Level AA any applicable requirements in the VVSG.

U&A Baseline

- Created U&A structure based on our principles and guidelines
- Used the emerging technologies and standards analysis to identify:
 - Core U&A requirements
 - Requirements for removal
 - Gaps that can be addressed with existing research and standards
 - Gaps that require research
 - Test assertions that still are valid

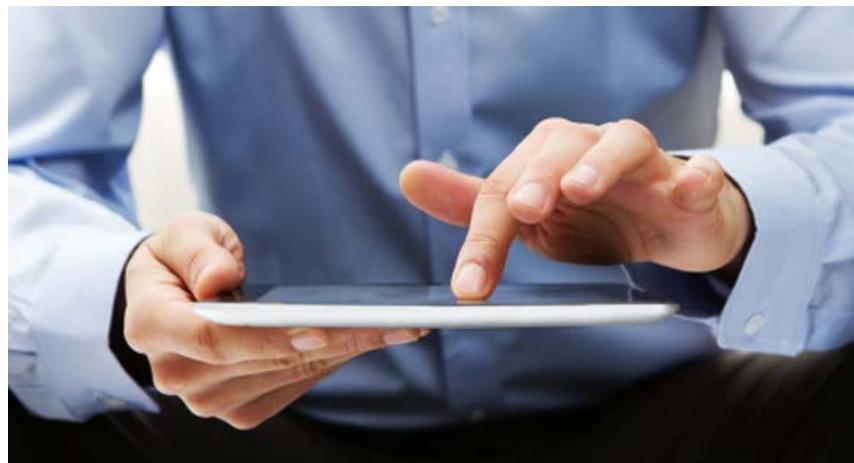
Next Steps: Input on scope and content

Example: Ballot Marking System



Scenario: The Election official would like to procure new ballot marking system. He will use the new voting systems standard to guide his analysis.

- Commercial tablet
- System needs to be usable and accessible by all voters
- Check each principle, drilling down as needed



3.4 Robust

What personal assistive technology does the tablet support?

What can be adjusted in the tablet display?

Look at font, color, & contrast requirements

3.1 Perceivable

Is there an audio interface?

3.3 Understandable

Are there clear instructions on using the tablet?

**EO Walkthrough of Human Factors Principle 3:
Example subset for EBM tablet**

Can low vision voters find tablet controls?

Can voters access all information on the ballot without swiping or scrolling?

Can voters use visual and audio controls?

3.2 Operable

If tablet is mounted, are controls within voters' reach?

Use Case-Specific Requirements: Tablet Implementation

- The tablet must also meet other requirements
 - Hardware
 - Software
 - Interoperability
- Tablets for other election applications
 - E.g., e-pollbooks
 - Core (not ballot specific) U&A requirements for voters and pollworkers also apply

Related NIST Work

- “Roadmap for improving usability and accessibility guidance for next generation elections”
 - Draft <http://civicdesign.org/projects/roadmap/>
- “Organizing Requirements by Principles: Exploring a revised structure for usability and accessibility in the VVSG:
 - Draft <http://civicdesign.org/projects/roadmap/>
- “Principles for remote ballot marking systems”
 - Draft <http://civicdesign.org/projects/remote-ballot-marking/>

We need your expertise

- Join the NIST/EAC public working groups and Twiki
 - <http://vote.nist.gov>
 - Provide feedback.
 - Contribute to white papers.

