Interoperability WG Update

John P. Wack, NIST
TGDC Meeting
September 15, 2016
PWG Interoperability Efforts

- Common Data Format (CDF) efforts
- Election Modeling
- Election Methods/Models
Process for CDF Development

1. Identification of modified or new processes
2. Use case development
3. Definition of the data
4. UML model generation
5. Generated XML, JSON formats
6. Election business process modeling
Feedback from the PWG

- Strong EO desire for interoperability in polling place devices.
  - More manufacturer-independent components.
  - At same time, still a need for unified-manufacturer voting system.
- Manufacturers should use CDFs in their product lines, especially to external interfaces.
- Real interoperability is difficult to achieve, chip away at interoperability by working inward into the voting system.
Progress Thus Far
Election Results CDF Specification

- For pre- and post-election data, reporting aggregated and detailed election results.
- Earlier version already in use in OH, now in NC, also in Pew/Google’s VIP 5.0.
- Produces an interoperable EMS import/export format.
Election Event Logging CDF Specification

- A simple format to hold election events, i.e., opening of polls, casting a ballot, etc.
- Manufacturers will log as they do currently but include capability to export or translate into this format.
- Some log items will be useful to EAC EAVS, e.g., electronic pollbook logs items.
- Current draft specification has approval from working group, ready for publication as a NIST SP.
Voter Registration CDF

- Deals with data elements from or implied from NVRA, FPCA, and state-specific variations.
- Involves request/response messages to register or modify or inquire about a voter.
- Will include DMV transactions.
- ERIC board is considering a member requirement to support the CDF.
- OH interested in implementing initial specification.
- Aiming to complete by spring, 2016.
Electronic Pollbooks CDF

- Deals with data involved in checking in voters at polls, activating the ballot, same-day registration.
- Builds off voter registration CDF and adds additional items for linking voters to polling places.
- Will be finalized after voter registration CDF is complete.
- May be easiest spot to achieve full device interoperability.
Auditing - Cast Vote Records CDF

- Deals with voted ballot information exported from voting devices and scanners.
- Would increase interoperability and make it easier for election officials to gather and combine these records during election day(s).
- Would serve as input to auditing devices.
- Aiming to complete specification by winter, 2016.
Common IDs

- IDs are now ambiguous across the state.
- More difficult to analyze results.
Common Identifiers

- Would likely work with the Open Civic Data-Identifier scheme (OCD-ID).
  - e.g.: *us:state:county:town*……
- For items such as districts, precincts, and other geographies, as well as contests and offices.
- Foundational work by Sunlight Foundation.
- May require a management effort to assist in creation and for serving as an authoritative reference.
Timeline for Completion

- What could be accomplished by next VVSG:
  - Completed VR system.
  - CVRs.
  - Electronic Pollbooks.
  - Candidate Filing.
  - Ballot Styles with additional formatting.
- Maybe - Common Identifiers for Political Geography and Contests.
CDF and Component Certification

- Component certification requires interoperability.
- CDF not sufficient for hardware-related interfaces or exchanges of highly-formatted data.
  - Ballot activation involving memory cards.
  - Ballot styles with state-specific formatting.
- Component certification possible for devices that primarily exchange unformatted data.
- Component certification may still require some re-engineering.
- Ultimately, election officials will ask for this or not.
Enabling Component Certification

- Election Definition
- Ballot Layout
- Tabulation
- Reporting

OR
PWG Interoperability Efforts

- Common Data Format (CDF) efforts
- Election Modeling
- Election Methods/Models
Election Business Process Models

- A visual description of election business processes showing how they are nested and inter-related.
- Major author Kenneth Bennett of LA County, with Election Modeling sub-group.
- Used as basis for CDF use cases.
- Could serve as major groupings of VVSG requirements.
- Can assist in identifying interoperability between major processes.
- Two examples follow:
Process: Process Voting History and List Maintenance Reports

Parent: Election Preparation/Manage Voters/Maintain Voter Roll
Editor: Kenneth Bennett
Date: 03/16/2016
Process: Prepare Poll Books

Parent: Election Preparation/Prepare Voting Materials and Equipment

Editor: Kenneth Bennett

Date: 03/16/2016

- Eligible voter & attributes including precincts
- Precincts linked to ballot styles
- Addresses linked to precincts

1. Extract eligible voter and other data from VRDB
2. Prepare database of eligible voters
3. Are poll books electronic?
   - Yes: Prepare database of eligible voters
   - No: Proceed to next step
4. Are e-poll books run offline?
   - Yes: Load e-poll books with voter names and addresses
   - No: Print poll books and indexes
5. Collate eligible voter data and address indexes
6. Print poll books and indexes
7. Proof poll book data
8. Load e-poll books with voter names and addresses

<<Physical>>
- Printed poll books
- Printed address indexes
- Electronic poll books with address indexes

<<System>>
- Voter registration database
- Electronic poll books
- Printers
Further Component Breakdown

- Contest, Candidate, jurisdictional association
  - Candidate Filing data
  - GIS data
- Ballot layout
- Ballot generation
- Blank ballot print
- Device programming
- Vote capture/marking
- Ballot duplication
- Intent, resolution, adjudication
- Paper-CVR/marked ballot print
- Ballot tally
- Reporting system

- Audit system
  - Rendering of individual cast vote records to show:
    - Content of the ballot image for recount/ballot audit (e.g. PDF, tif, etc.) and
    - In a format for reporting (e.g. xml, csv, xlsx, etc.)
  - Export of event logs.

- Voter lookup
- Ballot assignment/activation
- Voter history
  - Has voter voted/received ballot
  - Update voter as issued ballot/voted
- Voter verification
  - Sign in/signature capture
  - ID check/swipe)
PWG Interoperability Efforts

- Common Data Format (CDF) efforts
- Election Modeling
- Election Methods/Models
Voting Methods/Models

- Initial specification expected for next VVSG:
  - Primarily, formal definitions (mathematical models) of voting methods, i.e., algorithms
  - Models implemented as precise and validated mathematical logic
  - UML model of voting methods universe, mapped to the EA business process models framework
  - Set of use cases to aid understanding & application
  - Reference set of packaged tools and examples for validating executable models modules in particular configurations
Voting Methods/Models Uses

- Audits, evidence-based election procedures, validation approaches and tests for voting system modules.
- VVSG, legislators, elections officials can reference precise voting methods definitions in legislation, rules, guidelines.
- Elections officials and administrators can unambiguously and precisely specify commonly understood requirements for operations on vote data sets in RFPs.
- Elections systems manufacturers, software systems providers and elections analysts can characterize systems with confidence.
Discussion