Interoperability in Election Data and Devices

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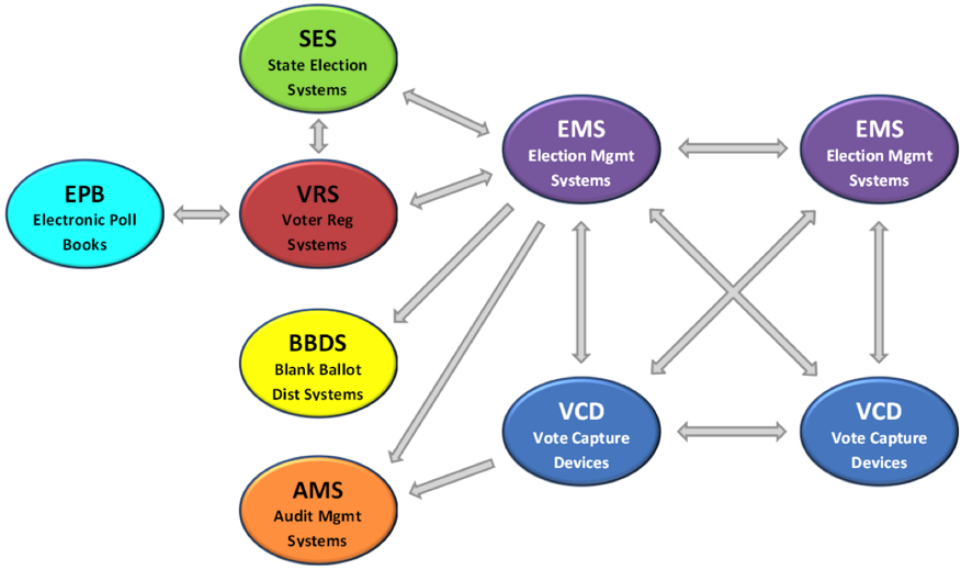


Outline

- Why Interoperability in voting equipment?
- NIST's strategy in interoperability
- IEEE work
- Next steps

Interoperability…

- Capability to mix and match devices from different vendors without major integration effort
- Makes devices more usable for EOs, easier to manage and operate, report on, and analyze
- Highly desirable, leads to
  - More choice in vender equipment
  - Cost savings in integration of new equipment
  - Greater efficiency in election operations and analysis
  - More flexibility with testing and certification, possibility of component certification

Interoperability in the VVSG

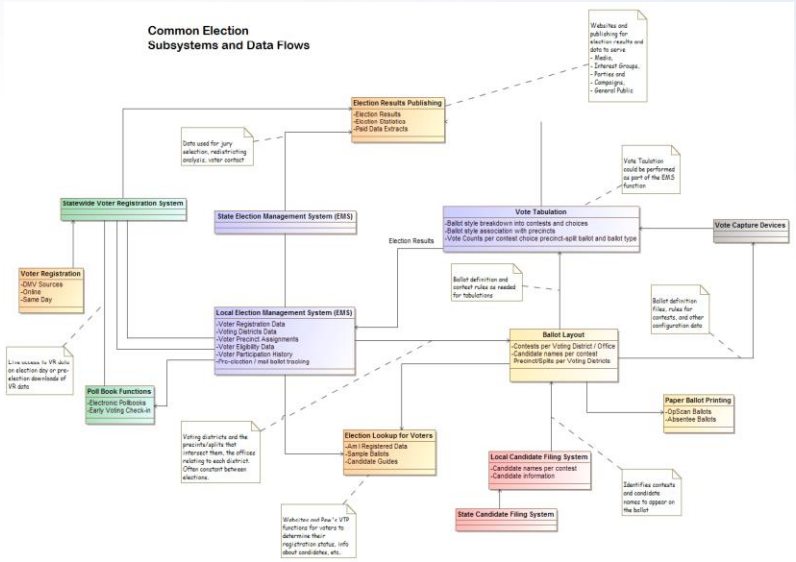
- Currently no requirements for interoperability
- Developing requirements for interoperability takes hard work that must involve EOs and vendors and labs
- 2007 TGDC Recs include “should” requirements for interoperability that could be basis for “shalls” in future VVSGs
- NIST is developing a comprehensive common data model/format (CDF) and related guidelines for equipment
  - Aim is CDF work will be included in future VVSGs

NIST CDF Development

- Goals:
  - Voting equipment to import/export in a CDF
  - CDF (e.g., XML) based on a comprehensive format-independent election data model (UML)
  - CDF standards are freely available to developers and vendors
- Strategy:
  - Working within IEEE since 2010 (while TGDC inactive)
  - Working especially with EOs, vendors/developers
  - Coordinating with other standards and commercial efforts, e.g., AP, Google, OASIS, Pew VIP

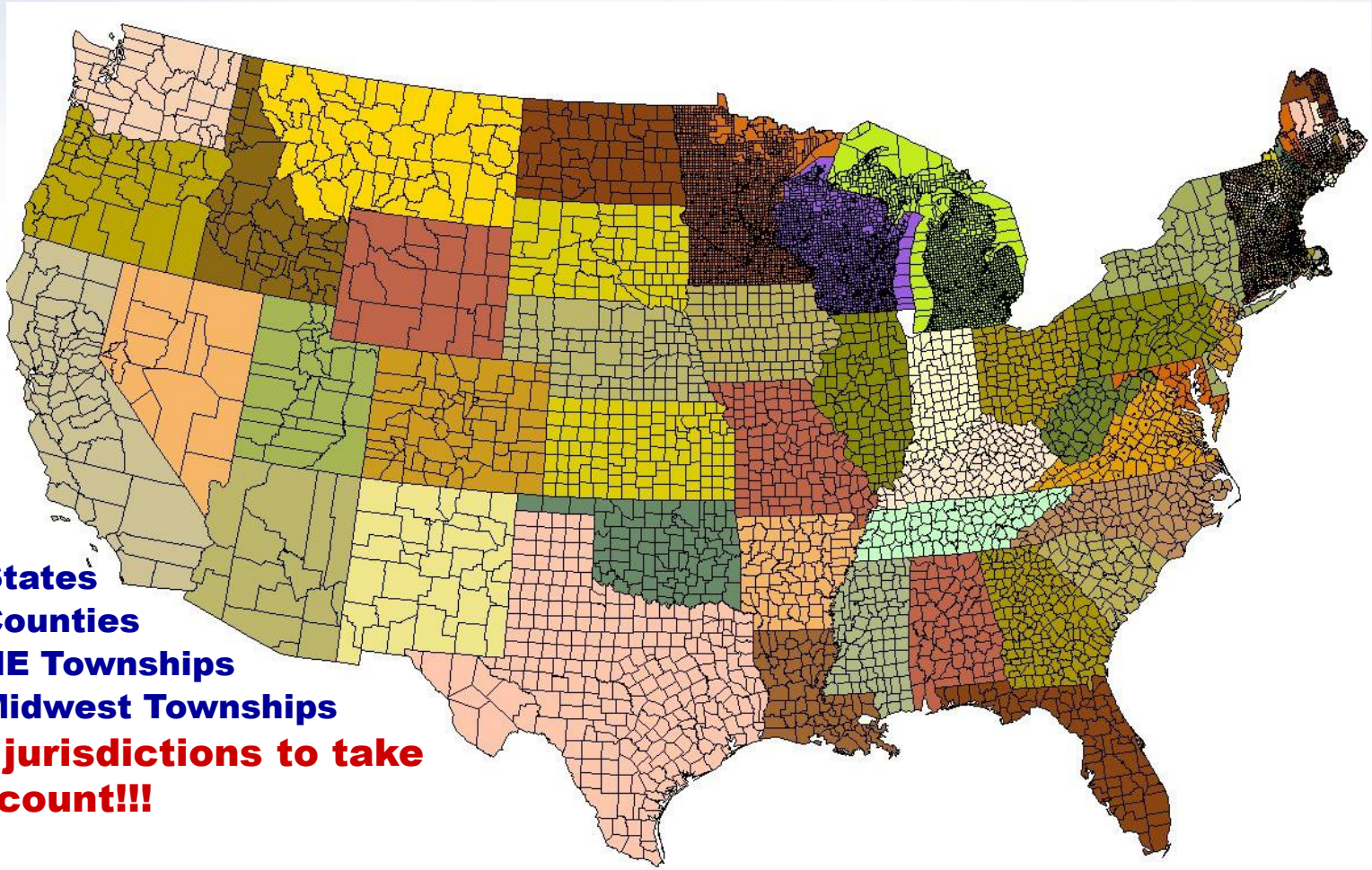
Election Data Modeling

- We create use cases for voting applications, followed by data models in UML(Unified Modeling Language)
- Use cases start with higher-level process models and devolve into requirements for the data model
- The data model shows the types of relationships between individual data elements in a data format-independent manner



- Specific XML schemas or other formats can easily be generated from the data models
- The models are useful for areas of voting technology that are evolving and for which specific schemas cannot be generated at this point, e.g., devices on the drawing board

Why Models Are Essential…

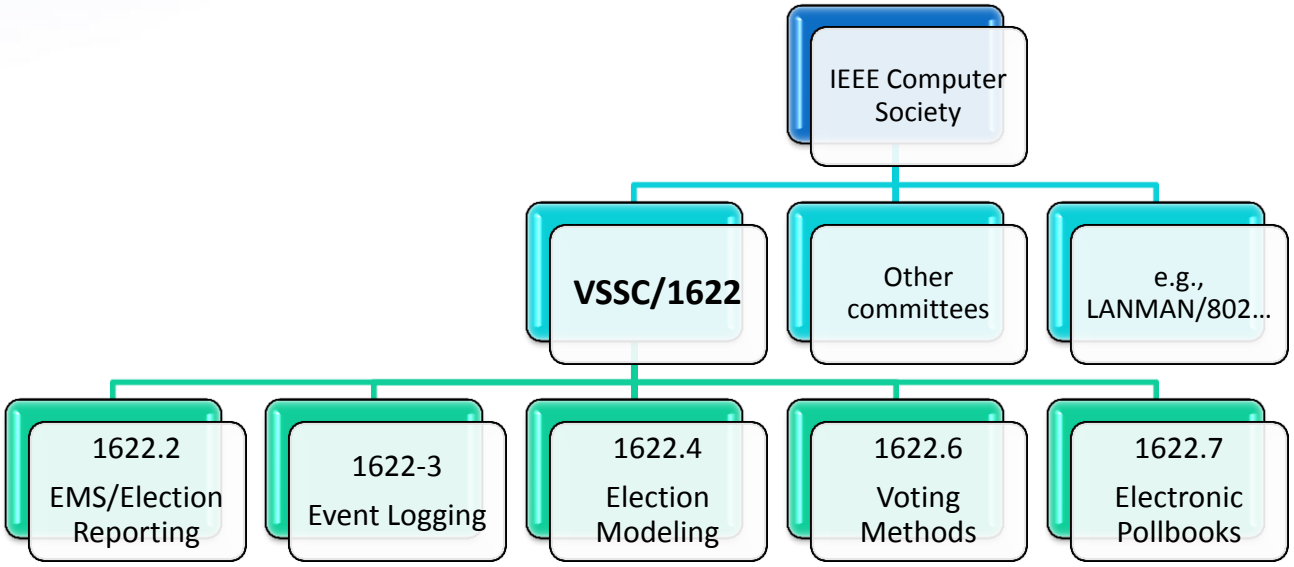


50 States
3,140 Counties
1,620 NE Townships
5,312 Midwest Townships
10,072 jurisdictions to take into account!!!

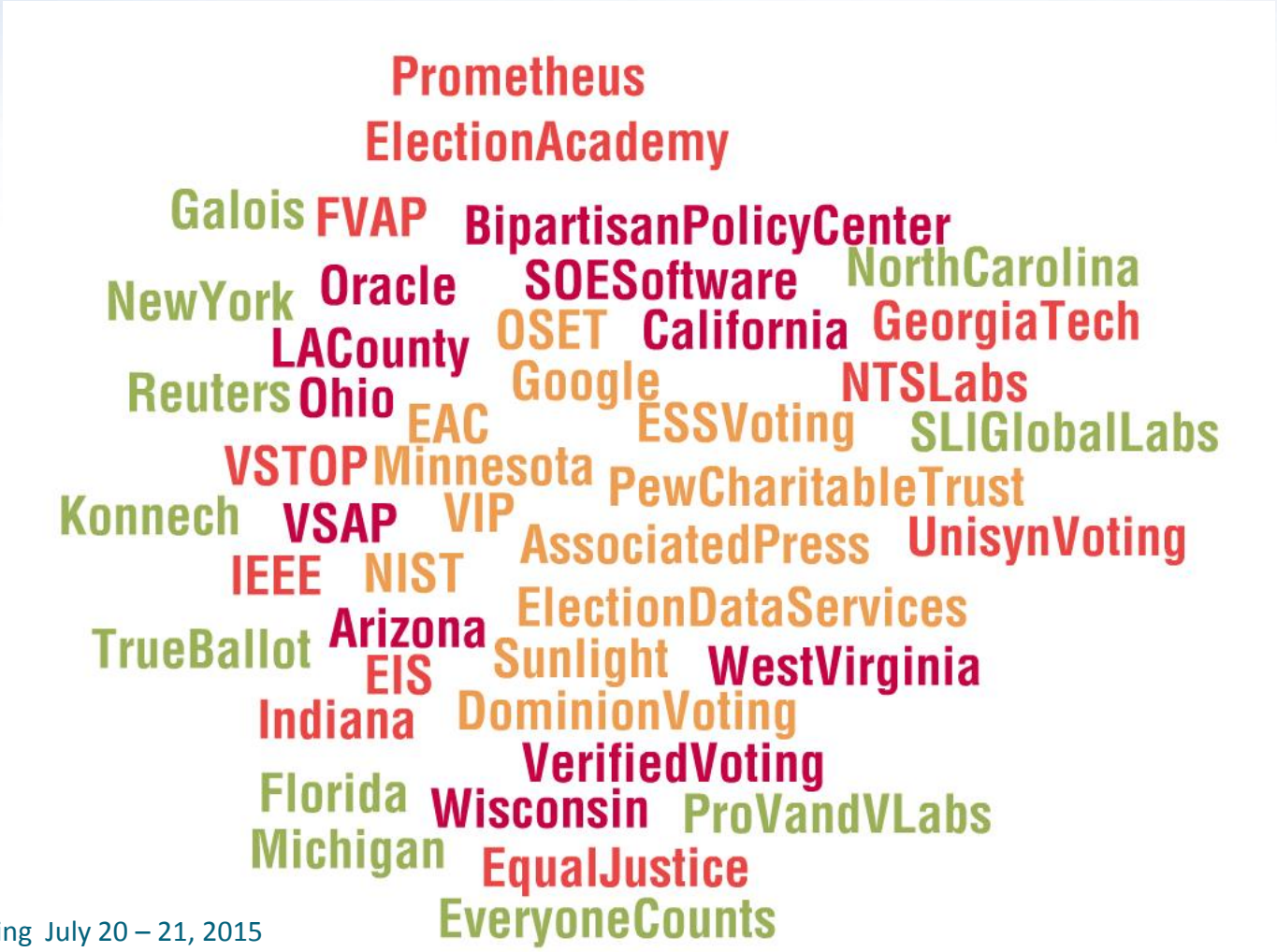
CDF Development Status

- IEEE Voting Systems Standards Committee (VSSC/1622) created
- NIST chairs and contributes the technical work (models, schemas)
- Initial standard produced in 2011 on blank ballot distribution format
- 2 standards near completion – Election Results Reporting, Election Event Logging
- Discussing with IEEE the free access and usage of VSSC standards

VSSC Committee Overview



Current Participants



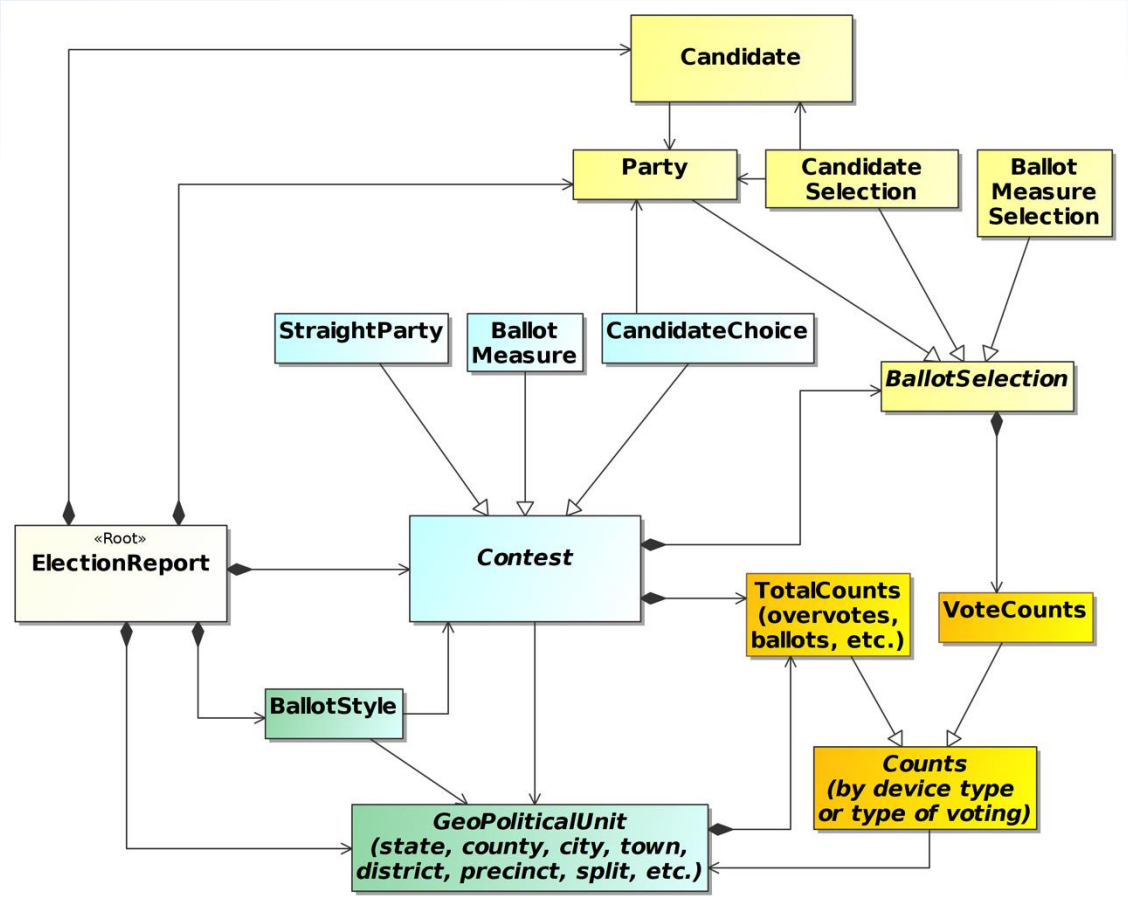
Working Groups & Efforts

- 1622.2 Election Results Reporting (Sarah Whitt/John Wack)
- 1622-3 Event Logging (John Wack)
- 1622.4 Election Modeling (Kenneth Bennett)
- 1622.6 Voting Methods Mathematical Models (Lauren Massa-Lochridge)
- 1622.7 Electronic Pollbooks (Jay Bagga/John Dziurlaj)
- Glossary (NIST)
  - Glossary tool for use across standards
  - Essential for future VVSG

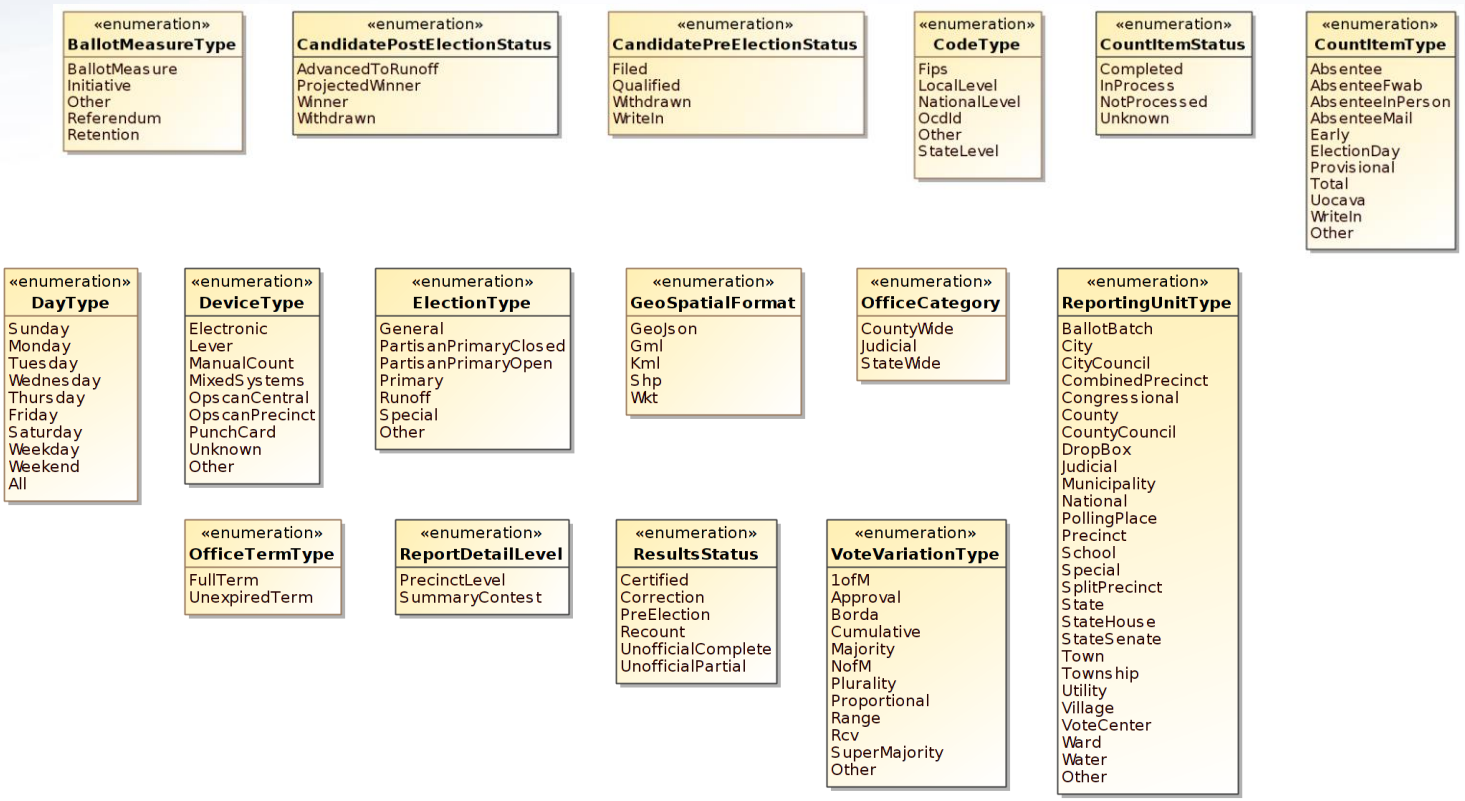
1622.2 Election Results Reporting

- Started effort in 2012 to provide ENR only; grew in scope to include
- Same XML schema used for 3 use cases
  - Pre-election data
  - Aggregated election night results
  - Highly detailed certified/archive results
- Used in OH with the AP for 2014 general election
- Working with a number of states on implementations

Simplified UML Model…

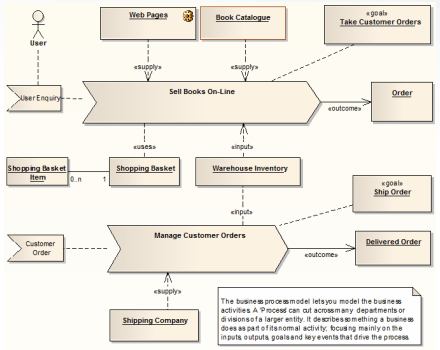


Data Values in the Model…



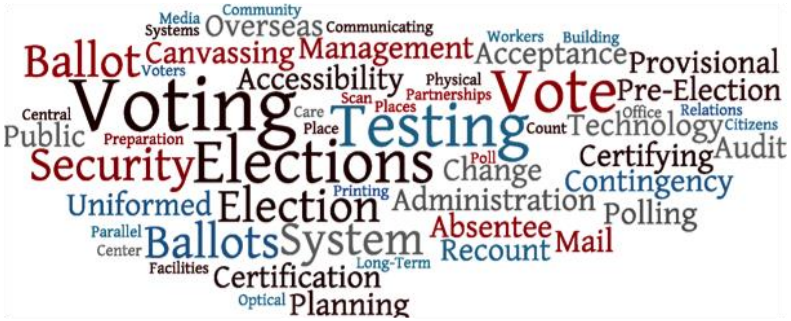
1622.4 Election Data Modeling

- Comprehensive, high level model of processes and data



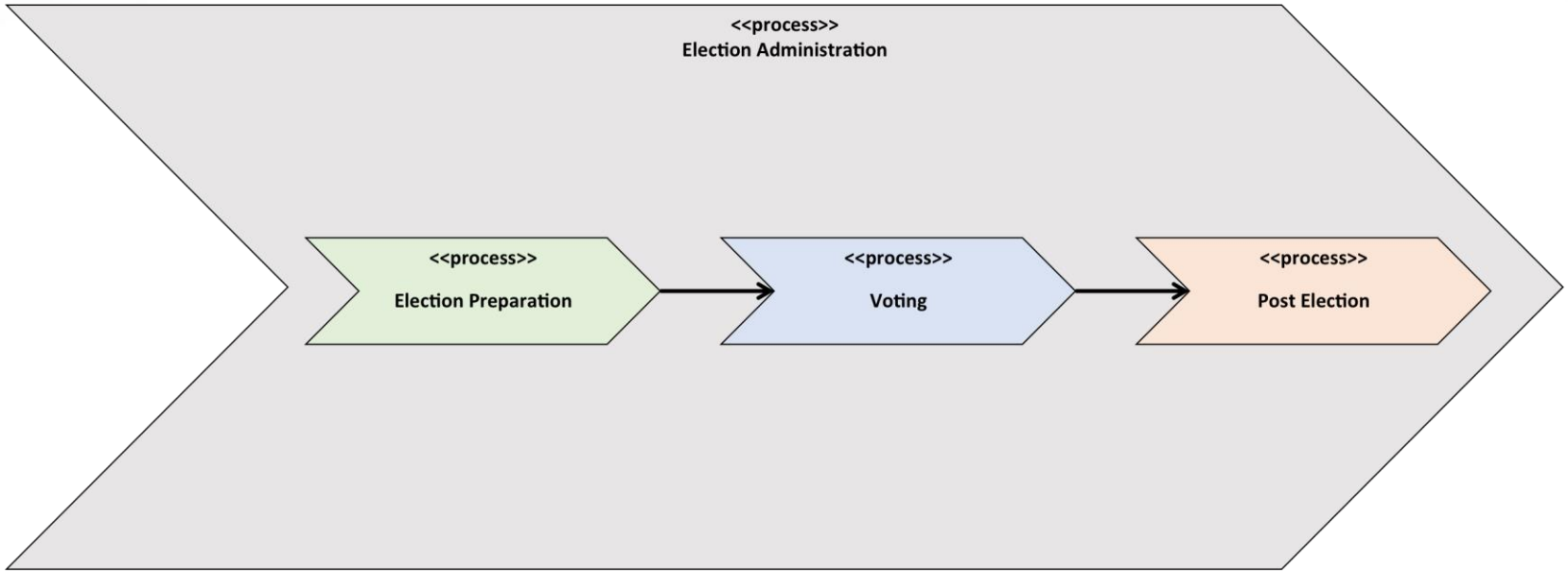
- Framework for more detailed interoperability standards

- Election glossary



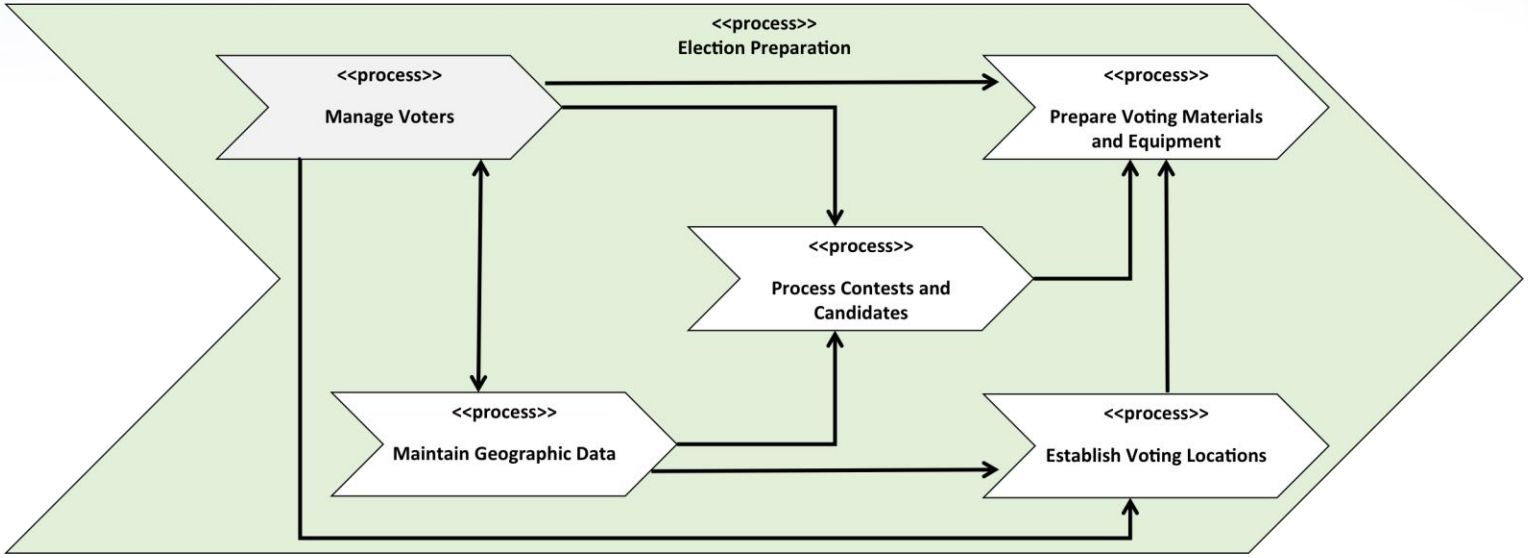
Business Process Models

A visual description of election business processes* showing how they are nested and inter-related.



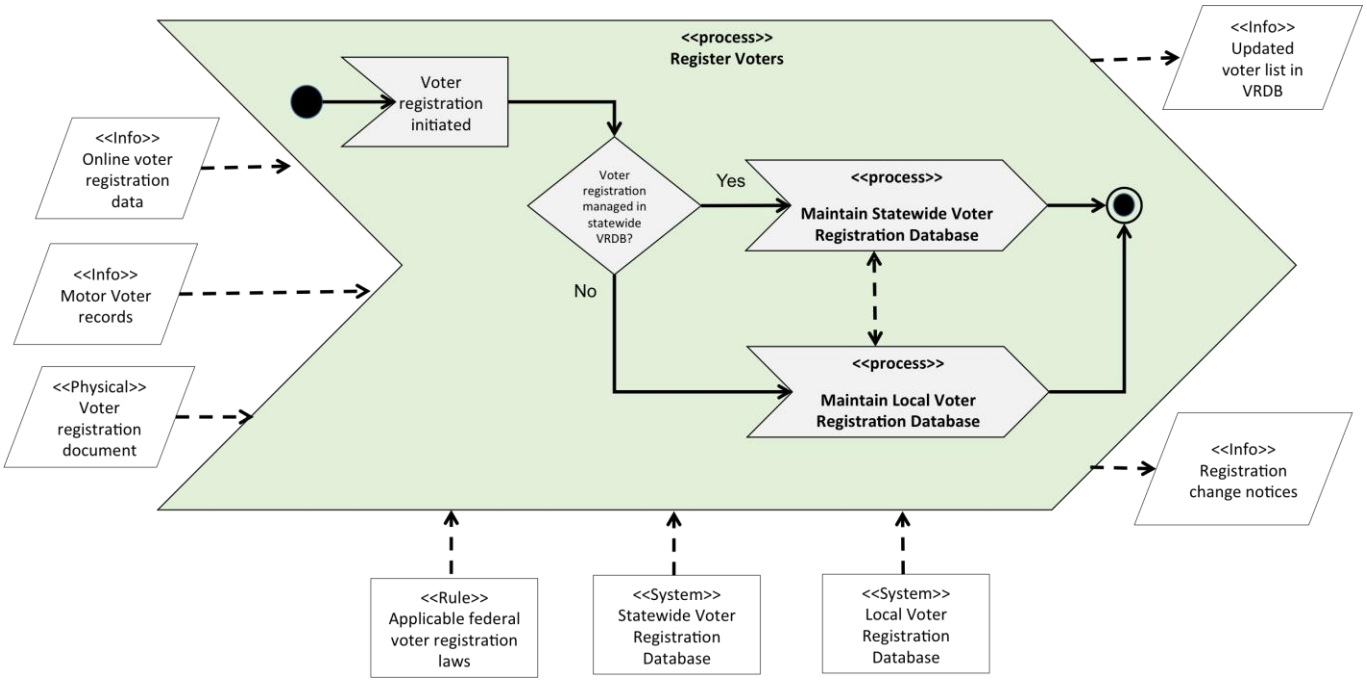
*Eriksson Penker Business Process UML Shapes

Breakdown of Election Preparation



Election Business Process Model Tasks and Activities

A visual description, at a high level, of the typical tasks and activities that take place within a process, the inputs and outputs of the process, and the rules and resources that support the process.



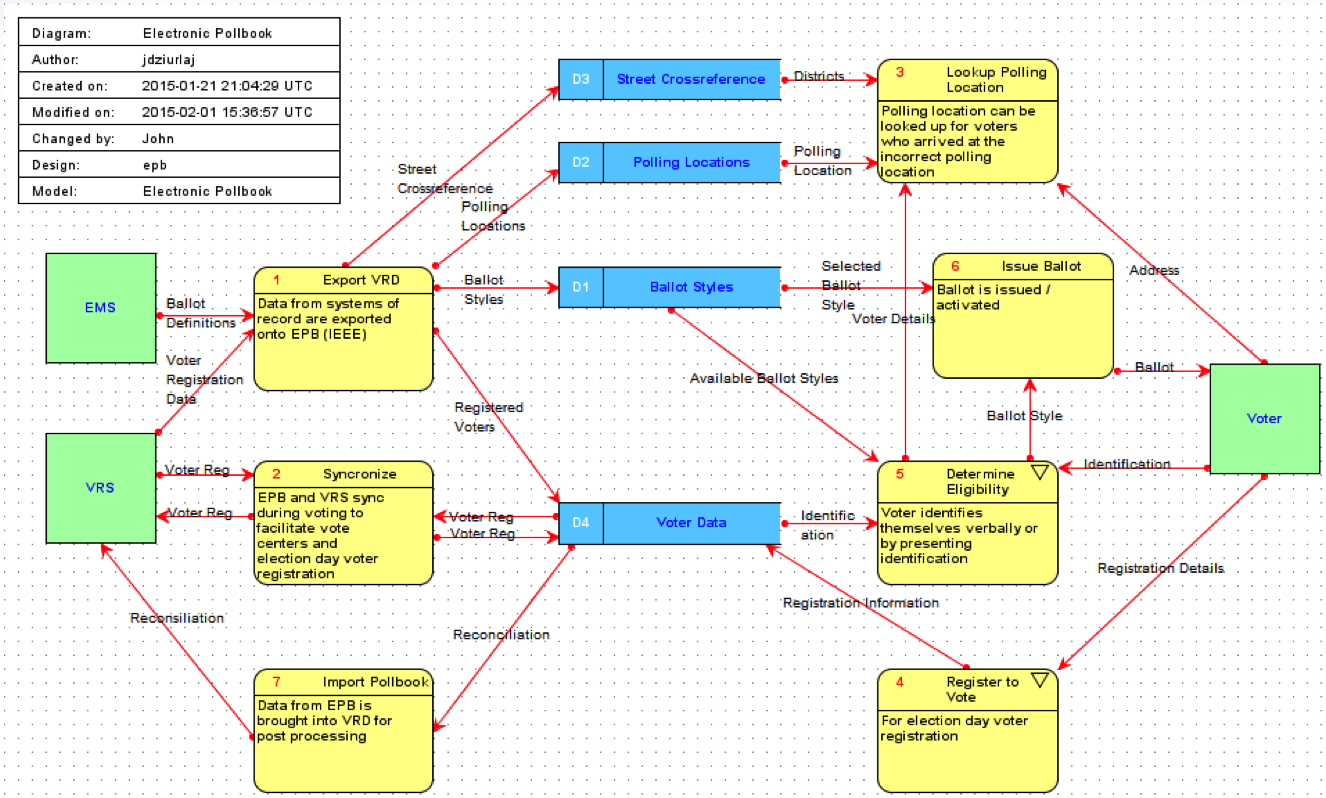
1622.6 Voting Methods Mathematical Models

- Guideline on formal mathematical definitions for voting methods (variations)
- Evolved from election modeling effort and need for formal definitions for voting variations
- New variations such as RCV-IRV done differently in different jurisdictions, a need for consistency
- Useful for vendors, labs, future VVSGs

1622.7 Electronic Pollbooks

- A CDF to address e-pollbook data imports and exports
- Covers exports from and updates to the VRDB
- Facilitates greater interoperability among vendors
- Working group currently creating use cases and data models
- Data models will re-use and expand upon data model created for 1622.2 Election Results Reporting

Initial Process and Data Model Development



CDF Effort Next Steps

- Continue coordination with AP, Google, Pew, others
- Develop more contacts within technical election staff
  - Invaluable for subject matter expertise
- Common ID activity for coding election objects*
  - Necessary across DBs to simply data management
  - Considering use of FIPs within Open Civic Data IDs
- Ballot marker and optical scan export CDF
- Ballot definition CDF*
- Cast vote records CDF*

* partially underway