Voting Methods/Models Update

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- Lauren Massa-Lochridge, Working Group Co-Chair
- John Wack, NIST Co-Chair
- Co-Chair for Auditability and Risk Management: Philp B. Stark
- Members of the Voting Methods Working Group(VM-WG) [link]

Voting Methods/Models Update

- Voting Methods Working Group (VM-WG)
- meeting weekly
- 34 members, full spectrum of stakeholders
- subject or work product production subgroups form as needed
- link to twiki [link]
- link to new github for draft documents [link]
- contact: voting-methods <voting-methods@nist.gov>, voting-methods@list.nist.gov

Voting Methods/Models Update

NIST 1500-X, initial version expected for VVSG 2.0

- Set of mathematical models specifying voting methods in precise validated executable logic
- Models represent the universe of plain language algorithmic definitions from U.S. elections legislation, guidelines
- More precise specification, communication, validation for:

  Legislation,

  Election Officials (EOs) RFIs and RFPs

  Manufacturer's responses to RFIs & RFPs, documentation

Voting Methods/Models Update

- Adopts Cast Vote Record (CVR) CDF for tally/tabulation and Election Results CDF NIST.SP.1500.100 [links]

  Data Interoperability & Integrity

- Consistent with principles & requirements: NIST Voting Variations [link] and Cybersecurity [link]
- Enables Elections Administration systems counting, tabulation, mathematical evaluation, common operations on vote data sets, to be valid to a high degree of confidence, accurate, and cost effective
- **Can be used to validate that systems conform to statute/legislation/local rules contractually**

Voting Methods/Models Use Cases

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

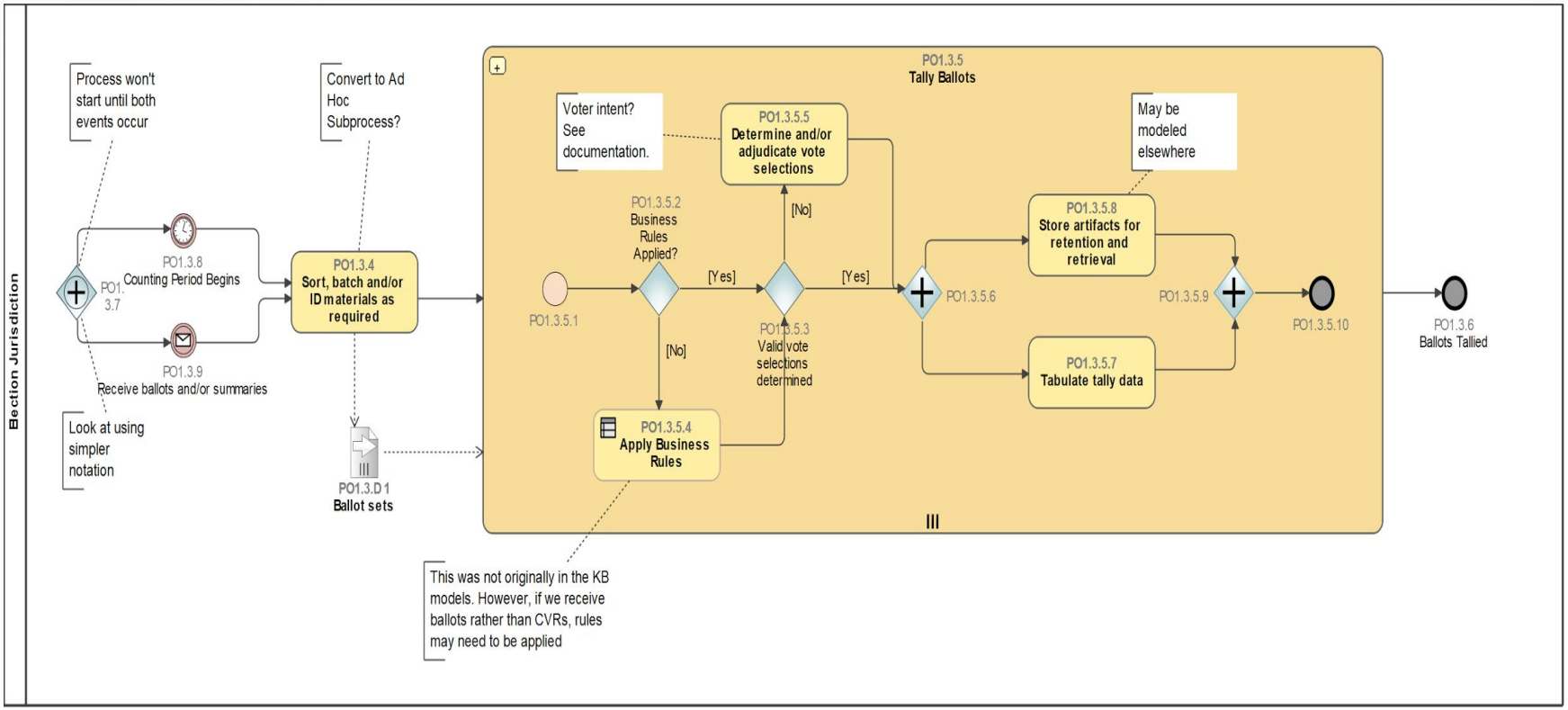
Voting Methods/Models Update

For each voting method/module in the specification:

- **Unique Identifier, Numeric with Text Label**
- **Text description of model element, concise pointers to references**
- **UML model index mapping module to EA Business Process**
- **The written mathematical model in human readable domain specification language (DSL)**
- **Set of test conditions and expected outcomes**
- **Index into an example ballot library illustrating use, including configuration, or testing**
- **Notes briefly describing information, if any, that would be crucial for an adopter of this standard or that may be exceptional, and a pointer to detailed information if necessary**

Voting Methods/Models Update

Consistent with Tally & Tabulation in Election Business Process Model[link]



Voting Methods: Work Product

Multi-round voting methods : RCV Draft Model [link]
Overview

This specification section of this standard describes models of the tabulation process for multi-round voting methods. Specifically, this section describes the variety of multi-round voting method where there is a set of candidates in competition to fill one or more seats in a given elected office and a full tabulation of votes may require more than one iteration of tallying to determine the outcome of the election contest.

This section of this standard specification provides a descriptive, rather than prescriptive, model of a tabulation process flow for multi-round voting methods in use in the United States where the voter ranks candidates in order of the voter's preference.

Voting Methods: Work Product

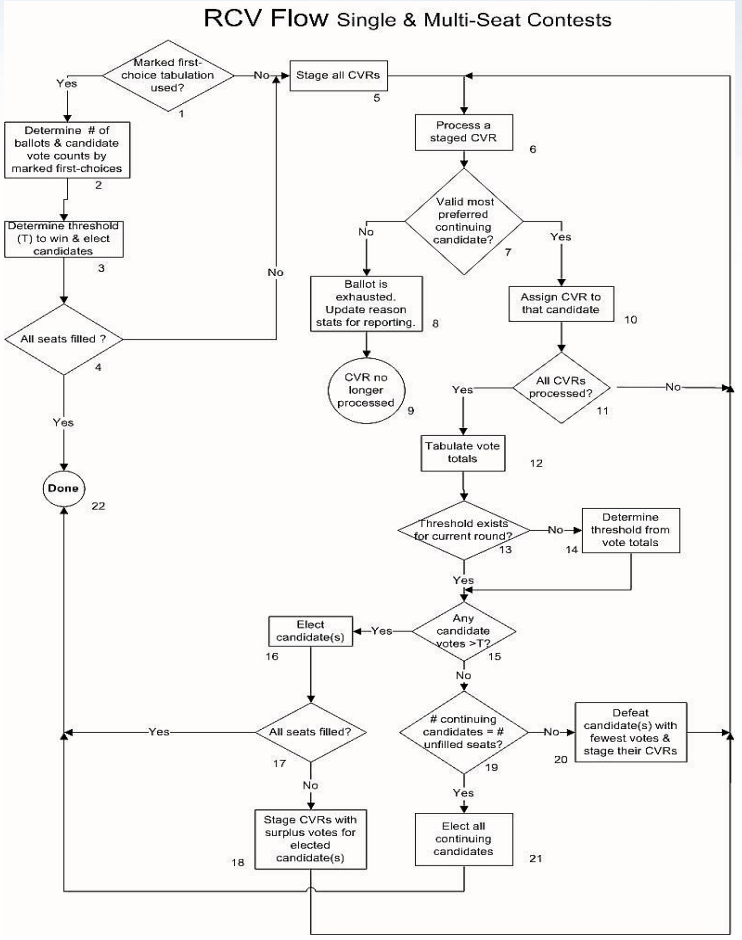
Ranked Choice Voting (RCV)

- Benefit to produce the more complex class of voting method first
  - Rigorous proof of methodology upfront
  - Provides specification for one of the Voting Variations previously unspecified, aide to Testing and Certification
- First Focus: Tabulation process flow for Ranked Choice Voting (RCV)
  - Type of multi-round voting method in use in the United States where the voter ranks candidates in order of the voter's preference
  - Handful of current uses in the U.S., inprogress expanded use
    - E.g. Maine (statewide)), new EMS/existing RCV use SF, CA
  - High utility for EOs due to complexity of method

Voting Methods: Work Product

DRAFT RCV tabulation process flow

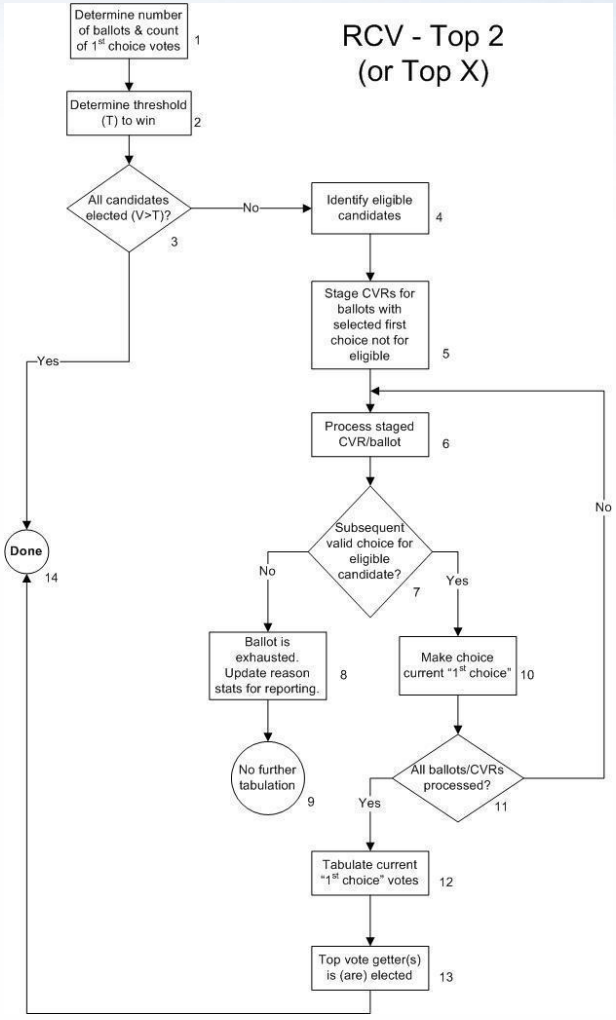
- provides for common U.S. single and multi-seat contests
- General and flexible representation of variants of RCV in use in the United States
- Scenarios: single or centralized RCV tabulation, aggregation (aka aggregation & rollup)
- Contest specifics, specialized local business rules may be configured



Voting Methods: Work Product

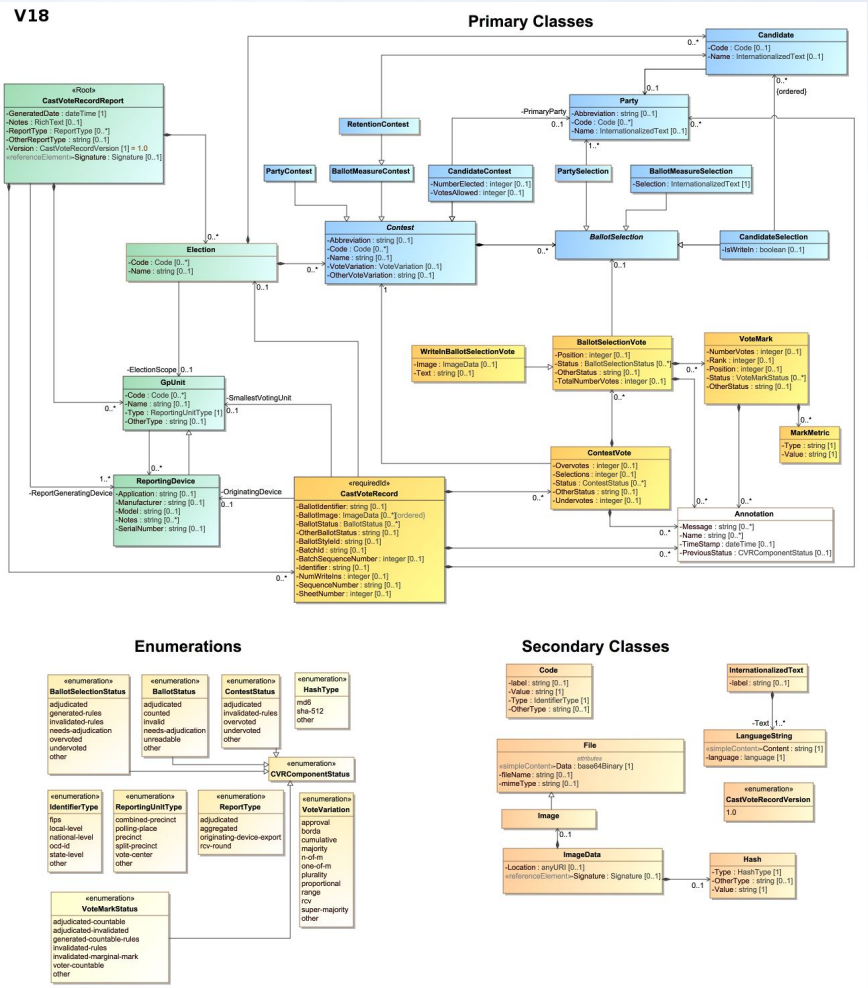
DRAFT Top Two/ Top N Process Flow

Example Use:Provides for the variant used by the State of North Carolina and required if the candidate or candidates do not receive sufficient votes to meet the requirement to get elected, attempts to emulate a separate runoff election by making only the top 2 (single seat contest) or top N (multi-seat contest) to be eligible to win.



Voting Methods: Work Product

- Supports RCV variants that require storing the state of the CVRR or CVR set,
- Output CVRR tally/tabulation with corresponding ‘snapshot’ sets of CVRs in sequential order per round
- CVR spec. XML & JSON formats support translation into the CVR CDF
- Flexible, accommodates internal equipment format of system produces vote selection data sets



Voting Methods/Models Update

Work Product

- Near ready to distribute current draft work product for comment
  - Detailed documentation corresponding to RCV process flow [link]
  - Detailed legislation sources (plain language algorithm) analysis has been performed [link to spreadsheet]
  - RCV voting method universe objects, rules etc. extracted
  - Expect to have same artifacts for initial plurality variant First-Past-The-Post, Top Two
  - Draft NIST 1500-10X update initial models in progress
  - Initial/Early Adopter outreach soon, in planning

Voting Methods/Models Update