

“The Wright System”

*Named after the late Jack Wright, author of the book “The Mirror of a Nations Mind” and
past President of the Proportional Representation Society of Australia*

Rules and procedures for a Reiterative Proportional Single Transferable Vote - Computerised Count

1. Definitions

Candidate means the name of a person or persons seeking election and listed on the ballot paper(s) to be counted

Continuing Candidate means a candidate that has not been excluded from or declared *not-elected* in the process of the count

Total Vote (Tv) is the total number of ballot papers that express a valid preference allocated to candidates remaining in the count

Quota (Q) means the number determined by dividing the *Total Vote* (Tv) by 1 more than the number of candidates required to be elected and by increasing the quotient (disregarding any remainder) by 1 ($Q = \text{integer}(Tv/(1+\text{No of Vacancies}))+1$)

Value of the Vote (Vv) means the value allocated to each ballot paper as it progresses through the count.

Candidate's Total Value of votes (Ctvv) means the aggregated sum of the value of each ballot paper allocated to the candidate.

Surplus Value (Sv) means the value calculated by subtracting the *Quota* (Q) from the *Candidates Total Value of votes* ($Sv = Ctvv - Q$)

Surplus Transfer Value (Stv) means the value calculated by the *Surplus value* (Sv) divided by the *Candidate's Total Value of votes* (Ctvv) and then multiplied by the *Value of vote* (Vv) allocated to each ballot paper ($Stv = Sv/Ctvv * Vv$)

Ballot Paper means a record of a voter's intention and allocation, in ascending order of preference, of support for a nominated candidate for election. It also refers to a vote which is a record in electronic format representing information and preference allocations of a ballot paper.

Vote means a mathematical representation and record of a ballot paper

Preference means the number in ascending order that represents the order of voter's preference attributed to a candidate for election as recorded on a ballot paper or data file.

Electronic preference data file means an electronic data file representing the allocation and record of preferences and all votes/ballot papers used in the calculation, distribution and determination of the results of the election.

Remainders represent the fractional part arising from a mathematical division recorded in double precision and are to be retained with and form part of the value of the vote and/or the total value attributed to a candidate

Exhausted Votes. mean the aggregated value attributed to any votes that do not express a valid preference for a candidate remaining within the count. The ballot paper and its attributed value are declared exhausted and a tally of all exhausted votes recorded.

2. Process of calculation of the results of the election

All ballot papers must be checked for formality and reconciled with the electoral roll and polling place returns following the completion of the data-entry process and prior to the commencement of the counting procedure outlined below. Any informal ballot papers to be set aside and recorded with no value.

Distribution of Preferences and calculation of Quota

2.1 Ballot Papers are distributed according to the first available preference in ascending order that corresponds to a *Continuing Candidate*.

(a) Any ballot paper that does not express a transferable preference for a continuing candidate is declared exhausted-without-any-value and recorded with a value of 0

2.2 Assign each ballot paper allocated to a *Continuing Candidate* a Vote value of one.

2.3 Ascertain and assign the *Candidate's Total Value of the Vote (Ctvv)* for each *Continuing Candidate* by aggregating the *value of the votes* allocated to each *Continuing Candidate*.

2.4 Ascertain and assign the *Total Vote (Tv)* value by aggregating the total *value of votes* allocated to each candidate outlined in 2.3 above

2.5 Calculate the *Quota* required to elect a candidate by dividing the *Total Vote (Tv)* by 1 more than the number of candidates required to be elected and by increasing the quotient (disregarding any remainder) by 1 ($Q = \text{integer}(Tv/(1+\text{No of Vacancies}))+1$)

Provisional declaration of elected candidates

2.6 Any candidate who has received a Total value of votes (Ctvv) equal to or greater than the *Quota (Q)* is to be provisionally declared elected.

Number of vacancies filled

2.7 If the number of candidates provisionally declared elected equals the number of vacancies to be filled then the count is concluded (Goto 2.18)

Number of elected candidates less than vacancies

2.8 If the number of candidates provisionally declared elected is less than the number of vacancies to be elected and the number of all other *Continuing Candidates* is greater than the number of vacancies still remaining then the procedure of the count is as follows:-

Calculation of the Candidate's Surplus Value

2.9 In descending order of the *Candidate's Total value of votes (Ctvv)* for each provisionally elected candidate, starting from the candidate with the highest total value of votes whose surplus is to be distributed, calculate the *Surplus value (Sv)* of the candidate by subtracting the *Quota* from the

Candidate's Total Value of the Vote and then determine, distribute and allocate the Candidates Surplus Transfer value according to the procedure outlined below (2.10 to 2.11 inclusive)

Calculation of the Surplus Transfer Value and value of the vote

2.10 The candidate's *Surplus Transfer Value* (Stv) is determined by calculating the quotient of the candidate's *Surplus value* (Sv) divided by the *Candidate's Total Value of the Vote* (Ctvv) and multiplying the result by the value of each ballot paper (Vv) allocated to the Candidate whose surplus is being considered. The resultant becomes the new *Value of the vote* allocated to each ballot paper the sum of which equals the *Surplus value* (Sv)

Distribution of Candidate's Surplus votes

2.11 All ballot papers allocated to the Candidate whose surplus is under consideration is to be redistributed according to the following procedure

2.11.1 All ballot papers that express a preference greater than the preference allocated to the candidate whose surplus is to be distributed shall be distributed and re-allocated to the candidate that remains in the count (excluding any candidate that has already been provisionally declared elected) according to the next available sequentially highest preference recorded on the ballot paper.

Exhausted Ballot papers to be set aside

2.11.2 Any ballot paper that does not express a valid preference for a continuing candidate greater than the preference allocated to the candidates whose surplus is to be distributed shall be set aside and declared *exhausted-with-value* and its value added to the total value of exhausted ballot papers recorded for the relevant transaction in the count. Exhausted votes that form part of a candidates surplus remain in the count and form part of the initial candidate's Total Vote and surplus.

Allocate value of quota to candidate whose surplus has been distributed

2.11.3 The Candidate whose *Surplus* has been distributed is allocated a *Candidate's Total Value of votes* equal to the *Quota*.

Ascertain if any Candidates are to be provisionally elected as a result of the surplus transfer distribution

2.11.4 Any *Continuing Candidate* who has received a *total value* of votes equal to or greater than the quota on the completion of the transfer and distribution of all ballot papers associated with the surplus distribution shall be provisionally declared elected.

Number of Candidates provisionally elected equal the number of vacancies

2.11.5 If as a result of the completed surplus transfer the number of candidates provisionally declared elected equals the number of vacancies to be filled then the count is concluded (Go to 2.18)

Distribution of additional surplus votes

2.12 If the number of candidates provisionally declared elected is less than the number of vacancies to be filled and there remain candidates who have a surplus value that has not been transferred and distributed then the votes allocated to the candidate with the next highest surplus value is to be transferred and redistributed according to the procedure outlined above (2.10 to 2.11 inclusive)

Exclusion of candidates

2.13 If the number of candidates provisionally declared elected is less than the number of vacancies to be filled and there are no further candidate surpluses to be distributed then the candidate with the lowest total value of votes is to be declared not-elected and excluded from the count

Bulk Exclusion (option)

(a) Two or more candidates may be excluded simultaneously if the aggregated value of all candidates to be excluded is less than the value of the next lowest candidate or the value required by a candidate to obtain a quota.

2.14 If there are two or more candidates of equal value with the lowest total value of the vote then the candidate to be excluded from the count shall be determined by lot and declared not-elected

Number of candidates declared elected and remaining in the count equal the number of vacancies

2.15 If as a result of any exclusion the number of candidates provisionally declared elected plus the number of remaining candidates equals the number of vacancies to be filled then the count is concluded and all candidates that remain in the count are all declared provisionally elected (Goto 2.18)

Reset and continuation of the count

2.16 If the number of *Continuing Candidates, including candidates that have been provisionally elected*, is greater than the number of vacancies plus one following the exclusion of any candidate, the ballot shall be reset and the distribution of preferences shall be restarted according to the procedures outlined above in sections 2.1 to 2.15 excluding all candidates that have been declared *not-elected* and excluded from the count

Reiteration of the count

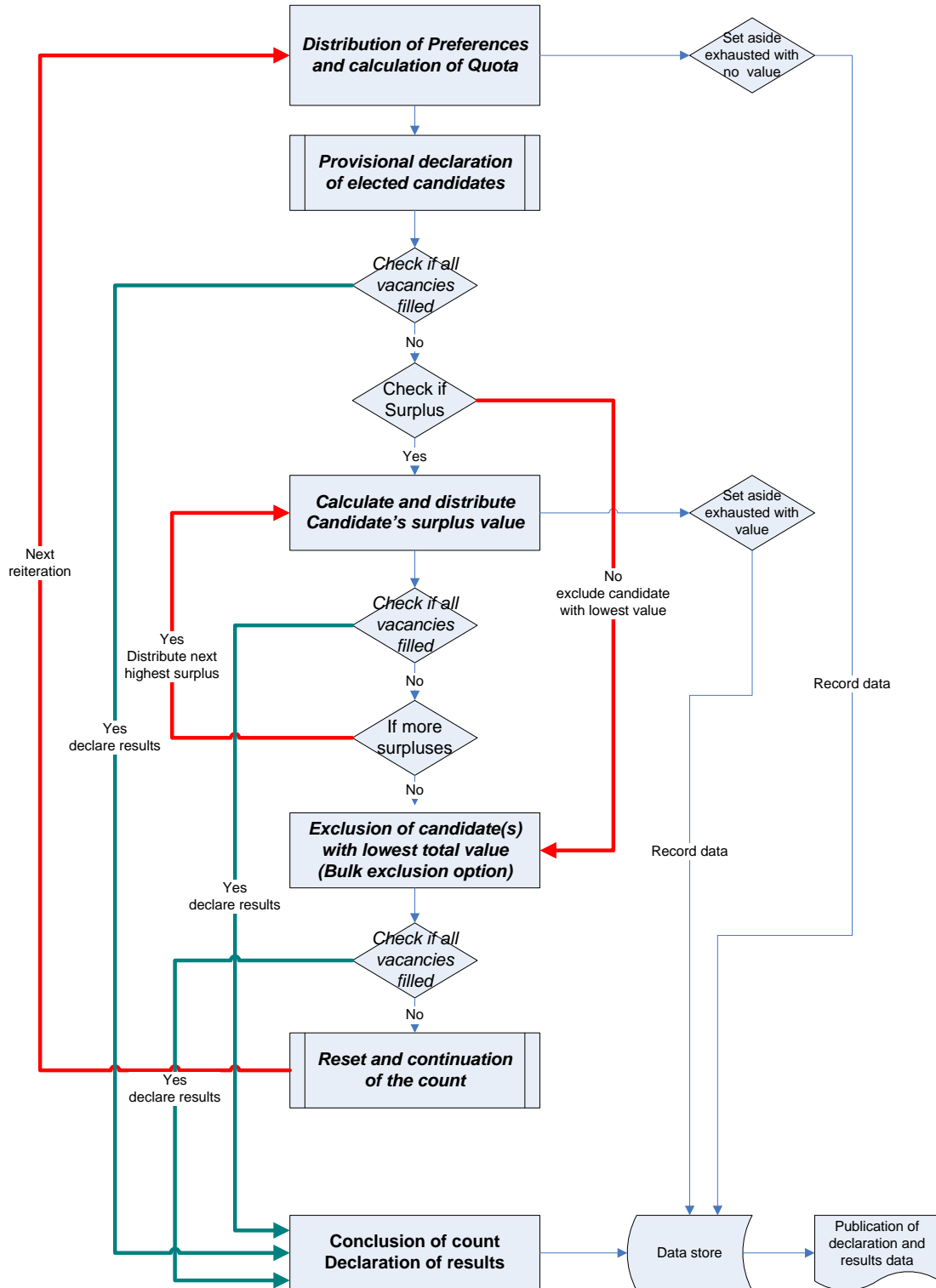
2.17 The count continues to proceed according to the procedures outlined above until either the number of provisionally declared elected candidates or the number of candidates remaining in the count equals the number of vacancies to be filled in which case all *Continuing Candidates* are declared provisionally elected.

Conclusion of the count

2.18 At the conclusion of the reiterative count all candidates that have been provisionally elected in the final count reiteration are declared elected following the publication of the election results and a certified copy of the detailed electronic preference data file used in tabulating the results of the election.

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Procedures for a Reiterative Proportional
Single Transferable Vote – Count Process flow chart



Count Statistics, principles and notes on the proposed reiterative proportional STV count system

- i. *Minimum number of reiterations = 1*
- ii. *Maximum number of reiterations = number of candidates minus (number of vacancies + 1)*
- iii. *No of distributions per reiteration = number of candidates requiring distribution of a surplus or number of vacancies minus one which ever is the less.*
- iv. *Number of transactions = one per distribution per reiteration.*
- v. *Results of the election is determined by the last reiteration required*
- vi. *Election results is based on the order of a candidates exclusion and/or the value of an elected candidates surplus*
- vii. *Maintains and supports the One vote one value principle*
- viii. *Calculation of a candidates Surplus Transfer Value is based on the value of the vote as opposed to the number of ballot papers*
- ix. *Elimination of the distortion in the value of the vote associated with the segmentation and distribution of preferences of excluded candidates.*
- x. *Use of double precision numbers limits depreciation of the vote by the removal of any remainders as currently applies to the Senate counting rules.*
- xi. *The proposed system automatically, by default, adjusts the quota for election and takes into consideration the value of exhausted ballot papers associated with optional preferential voting or errors in the allocation of preferences.*
- xii. *More precise and accurate proportional to the overall vote*
- xiii. *Ability to aggregate votes that have the same order and allocation of preferences, minimizing the number of vote allocation placements required per distribution and speeding up the calculation of the overall results*
- xiv. *Estimated processing time required to calculate the results based on the 2007 Victorian Senate Vote using a 1.7Ghz notebook = 5 minutes per reiteration required or an estimated overall-time of approx three hours. (The estimated time required can be reduced if a processes for bulk exclusion of non-elected candidates is adopted - IE where the aggregated value of votes allocated to lowest polling candidates to be excluded does not exceed the value of difference between the next lowest candidates remaining in the count or the additional value required for a candidate to obtain a quota.)*
- xv. *Allows for a more simplified process of conducting a count-back in order to fulfill and casual vacancies as the count is restarted excluding any candidates who have resigned or no longer available for election to be excluded first from the count prior to any distribution of preferences.*
- xvi. *Whilst the method of calculating the Surplus Transfer value is similar to that recently adopted by the West Australian Government in relation to its upper-house State elections the proposed system above advances the process of reform a few steps forward by recommending a reiterative count to replace the system of segmentation which remains in the WA count.*
- xvii. *The reiterative count system is simpler, cleaner and more accurate then the various systems of segmentation in use today.*
- xviii. *Recalculates the quota each time a candidate is eliminated and undertakes a complete recount from the start*
- xix. *More accurately reflects the distribution of preferences (i.e. a voter is currently effectively denied the choice of voting for an elected candidate if the voter's 2nd preference is only distributed after their 2nd choice has been declared elected!).*
- xx. *A first preference from an excluded candidate is fully transferred to a continuing candidate at its full value as though the subsequent preference was a primary vote.*
- xxi. *Minimises the problem in the NSW Upper House, Tasmania and the ACT where the last elected person(s) often is elected with an effective quota well below those elected earlier in the count.*