Stage 03: Attachment A: Additional Information

P251: Revision of the election process for BSC Panel Industry Members

Contents

About this document:

This is Attachment A to the Assessment Consultation. This attachment provides additional examples and Terms of References.

P251
Additional Information

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Version 1.0

Page 1 of 13

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1   Worked example of the current election process

i) First Round

Assume 6 candidates for 5 Industry Panel Member vacancies; candidates A, B, C, D, E and F. Assume 20 voting papers are received, with 1st, 2nd, and 3rd preference votes assigned as in the table below (Figure 1).

Preference	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Votes	A	C	B	A	C		D	C	B	E	B	
Votes	A	C	B	B	C	F	D	C	B	E		
Votes	A	C	B	B	C	F	D	C	B	E		
Votes	A	C	D	B	C	F	D	C	B	F	B	A
Votes	A	C		B			D	C	B	F	E	

Figure 1

The qualifying total required by candidates for election for the Panel is then:

(20/5) + 1 = 5

Where 20 is the total number of 1st preference votes in all papers and 5 is the number of Industry Panel Members to be elected.

So any candidate with 5 or more 1st preference votes is elected to the Panel. Thus, candidate A and candidate D are elected with 6 and 5 votes respectively.

ii) Second Round

Any candidates not elected in the first round proceed to the second round. Any voting papers with 1st preference votes for elected candidates are now discounted, as illustrated in the table below (Figure 2). The remaining 1st and 2nd preference votes are counted.

Preference	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Votes	A	C	B	A	C		D	C	B	E	B	
Votes	A	C	B	B	C	F	D	C	B	E		
Votes	A	C	B	B	C	F	D	C	B	E		
Votes	A	C	D	B	C	F	D	C	B	F	B	A
Votes	A	C		B			D	C	B	F	E	

Figure 2

The qualifying total is now:

(15/3) + 1 = 6

Where 15 is the total number of 1st and 2nd preference votes in all remaining papers and 3 is the number of Industry Panel Members remaining to be elected.

So any candidate with 6 or more 1st or 2nd preference votes is elected. Thus, candidate B is elected with 6 votes.

iii) Third Round

Any candidates not elected in the first or second round proceed to the third round. Any voting papers with 1st or 2nd preference votes for elected candidates are discounted, as illustrated in the table below (Figure 3). The remaining 1st, 2nd and 3rd preference votes are counted.

Preference	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Votes	A	C	B	A	C		D	C	B	E	B	
Votes	A	C	B	B	C	F	D	C	B	E		
Votes	A	C	B	B	C	F	D	C	B	E		
Votes	A	C	D	B	C	F	D	C	B	F	B	A
Votes	A	C		B			D	C	B	F	E	

Figure 3

The qualifying total is now:

(4/2) + 1 = 3

Where 4 is the total number of 1st, 2nd and 3rd preference votes in all remaining papers and 2 is the number of Industry Panel Members remaining to be elected.

So any candidate with 3 or more 1st, 2nd or 3rd preference votes is elected. Thus, candidate E is elected with 3 votes.

iv) Further Round

Candidates A, D, B and E have been elected; thus one Panel Member remains to be elected from among candidates C and F. Counting all voting papers (i.e. including all those discounted in all preceding rounds), the remaining candidates are ranked in order of the 1st preference votes allocated to them. The candidate with the greatest number of such votes is then elected. Candidate F has 2 votes and candidate C has none, so candidate F is elected to the Panel.

2   STV process and a worked example

Voting

In STV, each voter ranks the list of candidates in order of preference. In other words (under the most common ballot design), they place a '1' beside their most preferred candidate, a '2' beside their second most preferred, and so on. The ballot paper submitted by the voter therefore contains an ordinal (ranked) list of candidates.

Counting the votes

Setting the quota

In an STV election, a candidate requires a certain minimum number of votes – the quota (or threshold) – to be elected. A number of different quotas can be used:

- The one recommended by the **Electoral Reform Society** and P251 is the formula:

    Votes needed to win = valid votes cast / (seats to fill + 1)

- The most common is the **Droop quota**, given by the formula:

$$\text{votes needed to win} = \left(\frac{\text{valid votes cast}}{\text{seats to fill} + 1} \right) + 1$$

The Droop quota is an extension of requiring a 50% + 1 majority in single winner elections. For example, at most 3 people can have 25% + 1 in 3 winner elections, 9 can have 10% + 1 in 9 winner elections, and so on.

We therefore recommend the P251 Modification Group considers the different ways to calculate the qualifying quota and determine which is the most appropriate for Panel elections.

Finding the winners

An STV election proceeds according to the following steps:

1. Any candidate who has reached or exceeded the quota is declared elected.

2. If a candidate has more votes than the quota, that candidate's surplus votes are transferred to other candidates. Surplus votes that would have gone to the winner are instead apportioned between the next preferences listed on all the papers of those who voted for the candidate.

3. If no one else then meets the quota, the candidate with the fewest votes is eliminated and that candidate's votes are similarly transferred.

This process repeats until either a winner is found for every seat or there are as many seats as remaining candidates.

There are variations in applying these STV rules, such as in how to transfer surplus votes from winning candidates and whether to transfer votes to already elected candidates. When the number of votes to transfer from a losing candidate is too small to change the ordering of remaining candidates, more than one candidate can be eliminated simultaneously.

Because votes cast for losing candidates and excess votes cast for winning candidates are transferred to voters' next choice candidates, STV is said to minimize wasted votes.

Worked example[1]

For simplicity of calculation purpose, this example adopts the '**Droop quota**' as the quota to demonstrate the principle of STV during different stages of the election.

(You can find an example which uses a different quota suggested by the Electoral Reform Society here.)

Suppose an election is conducted to make 3 appointments. There are 5 candidates, 3 of which will be chosen. The following table shows the how the 20 votes were cast.

Number of voters	4	2	8	4	1	1
1st Preference	A	B	C	C	D	E
2nd Preference		A	D	E		

First, the quota is calculated. Using the Droop quota, with 20 voters and 3 winners to be found, the number of votes required to be elected is:

$$\left(\frac{20 \text{ votes cast}}{3 \text{ seats to fill} + 1} \right) + 1 = 6 \text{ votes required}$$

When ballots are counted the election proceeds as follows:

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[1] The example has been taken from http://en.wikipedia.org/wiki/Single_transferable_vote, a more involved example is available at http://www.electoral-reform.org.uk/oldsite20070123/votingsystems/stvrules.htm

Stage	Votes per Candidate					
	A	B	C	D	E	
1	4	2	12	1	1	• **C is declared elected**, since C has more 1st preference votes (12) than the quota (6).
2	4	2	6	5	3	• **C's surplus votes are calculated.** (12 votes – quota of 6 = 6 surplus votes) • **C's surplus votes are transferred** proportionately to D and E according to the C voters' second choice preferences. (D gets 6/12 * 8 = 4 votes, E gets 6/12 * 4 = 2 votes) • However, even with the transfer of this surplus **no candidate has reached the quota, therefore B, who has the fewest votes, is eliminated**.
3	6	0	6	5	3	• **B's votes transfer to their second preference.** (A gets 2/2 * 2 = 2votes) • With a total of 6 votes A reaches the quota. **A is elected.** • A meets the quota exactly, and therefore has no surplus to transfer.
4	6	0	6	5	3	• **Neither of the remaining candidates meets the quota, so E ,who has the fewest votes, is eliminated.** • **D is the only remaining candidate and so wins the final seat.**

Result: The winners are **C**, **A** and **D**.

P251
Additional Information

5 February 2010

Version 1.0

Page 5 of 13

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2008 Panel election results

Total voting papers				59					
Candidate				**A** **(elected)**	**B** **(elected)**	**C** **(elected)**	**D** **(elected)**	**E**	**F** **(elected)**
First preference votes				12	5	5	13	2	22
Second preference votes				11	5	1	3	12	17
Third preference votes				8	6	0	3	4	9
	Remaining number of Panel members to be elected	Remaining voting papers	Qualifying total: equal or greater than	**A**'s total preference votes	**B**'s total preference votes	**C**'s total preference votes	**D**'s total preference votes	**E**'s total preference votes	**F**'s total preference votes
1st Round	5	59	13	12	5	5	13	2	22
2nd Round	3	31	12	16	8	5		2	
3rd Round	2	1	2		1	0		0	
Further Round	2	59	N/A		5	5		2	

Proposer's analysis of the 2008 Panel election results

The Proposer believes that Parties may not realise the importance of expressing **second** and potentially **third** preference votes (notwithstanding the overlooking of the latter in any further round) under the current Panel election process. The Proposer considers that this was perhaps indicated by the 2008 Panel election.

On that occasion, 35 of 59 papers (containing 59 first, 49 second, and 30 third preference votes) led to the election of two candidates in the first round, leaving 24 papers for consideration in the second. However these contained only 31 first and second preferences, meaning that 17 of 24 had not indicated more than a first choice. One place was decided by this second round. If just 5 of these 17 had listed a second preference, a fourth candidate could also have been elected.

The election of the third Panel member in the second round, and the exclusion of the papers of all Parties who had first or second preference votes for any of these three elected members, meant that only one paper was eligible for the third round. One paper meant a further round would be needed since, whether this paper contained only a first or also second and third preference vote, the required quota could not be reached.

Luckily in this instance, there was no tie between the three remaining candidates. However, as further rounds overlook third preference votes (hence none of the third preference votes cast in 2008 were considered), a slight difference in the voting pattern could have led to 2 of the 5 industry Panel members being decided by chance.

Using STV – different results

Transferring the surplus of votes using eSTV, a software utility provided by the Electoral Reform Society (ERS) that models the STV mechanism, gives a different result for the 2008 election.

Qualifying total = 59/ (5+1) = 9.83

Candidates	Stage 1 — 1st Pref. Total Votes	Stage 2 — Transferal of Surplus of B	Stage 2 Total Votes	Stage 3 — Transferal of Surplus of D	Stage 3 Total Votes	Stage 4 — Transferal of Surplus of C	Stage 4 Total Votes	Results
A	5	0.71	5.71		5.71		5.71	
B	22	-12.16	9.84		9.84		9.84	ELECTED
C	2	7.1	9.1	3.12	12.22	-2.38	9.84	ELECTED
D	13		13	-3.16	9.84		9.84	ELECTED
E	5	4.26	9.26		9.26		9.26	ELECTED
F	12		12		12		12	ELECTED
Non-transferable Votes	0	0.09	0.09	0.04	0.13	2.38	2.51	
Totals	59		59		59		59	

4 Mock examples

The number of candidates in previous BSC Panel elections has varied between 6 and 10 and the number of votes received ranged from 60 to 85.

We have modelled the outcome of a hypothetical set of votes using both the current system and STV method.

Current election method (60 votes, 6 candidates)

Total voting papers				60					
Candidate				**A** **(elected)**	**B** **(elected)**	**C** **(elected)**	**D** **(elected)**	**E**	**F** **(elected)**
First preference votes				18	17	5	7	4	9
Second preference votes				6	8	14	10	9	4
Third preference votes				1	4	6	8	8	8
	Remaining number of Panel members to be elected	Remaining voting papers	Qualifying total: equal or greater than	**A**'s total preference votes	**B**'s total preference votes	**C**'s total preference votes	**D**'s total preference votes	**E**'s total preference votes	**F**'s total preference votes
1st Round	5	60	13	18	17	5	7	4	9
2nd Round	3	46	17			11	12	5	10
3rd Round	3	42	15			14	14	7	13
Further Round	3	60	N/A			5	7	4	9

Result: Candidate A, B, C, D and F are elected.

STV method (60 votes, 6 candidates)

Qualifying total = 60/ (5+1) = 10

Candidates	Stage 1 1st Pref.	Stage2 Surplus of A		Stage 3 Surplus of B		Results
A	18	-8	10		10	Elected
B	17		17	-7	10	Elected
C	5	2.12	7.12	3.48	10.6	Elected
D	7	3.18	10.18		10.18	Elected
E	4	1.06	5.06	3.48	8.54	
F	9	1.59	10.59		10.59	Elected
Non-transferable		0.05	0.05	0.04	0.09	
Totals	60		60		60	

Result: Candidate A, B, C, D and F are elected.

Current election method (90 votes, 10 candidates)

Total voting papers				90									
Candidate				**A** (elected)	**B** (elected)	**C**	**D** (elected)	**E**	**F**	**G**	**H** (elected)	**I**	**J** (elected)
First preference votes				23	10	5	10	7	7	8	9	3	8
Second preference votes				3	12	6	12	8	9	8	7	8	9
Third preference votes				6	2	4	8	5	5	8	3	8	9
	Remaining number of Panel members to be elected	Remaining voting papers	Qualifying total: equal or greater than	**A**'s total preference votes	**B**'s total preference votes	**C**'s total preference votes	**D**'s total preference votes	**E**'s total preference votes	**F**'s total preference votes	**G**'s total preference votes	**H**'s total preference votes	**I**'s total preference votes	**J**'s total preference votes
1st Round	5	90	19	23	10	5	10	7	7	8	9	3	8
2nd Round	4	128	33		17	10	20	12	16	14	12	11	13
3rd Round	4	165	43		18	13	24	14	19	19	15	18	19
Further Round	4	90	N/A		10	5	10	7	7	8	9	3	8

Result: Candidate A, B, D, H and J are elected.

NOTE: Candidates G and J are tied on 8 votes each in the first stage of the further round. Candidate J is elected rather than candidate G since candidate J has more second preference votes (9 votes for candidate J, 8 votes for candidate G).

STV method (90 votes, 10 candidates)

Qualifying total = 90/ (5+1) = 15

Candidates	Stage 1 1st Pref.	Stage2 Surplus of A		Stage 3 Exclusion of I		Stage 4 Exclusion of C		Stage 5 Exclusion of F		Stage 6 Exclusion of E		Results
A	23	-8	15		15		15		15		15	Elected
B	10	1.52	11.52		11.52	1	12.52	1	13.52		13.52	Elected
C	5	0.38	5.38		5.38	-5.38	-		-		-	
D	10	0.76	10.76		10.76	0.38	11.14	4	15.14		15.14	Elected
E	7	1.14	8.14		8.14	1	9.14		9.14	-8	1.14	
F	7		7	1	8	1	9	-9	-		-	
G	8	0.76	8.76	2	10.76	1	11.76		11.76	1	12.76	Elected
H	9	1.52	10.52		10.52	1	11.52	1	12.52		12.52	Elected
I	3	0.38	3.38	-3.38	-		-		-		-	
J	8	1.52	9.52	0.38	9.9		9.9		9.9	1	10.9	
Non-transferable		0.02	0.02		0.02		0.02	3	3.02	6	9.02	
Totals	90		90		90		90		90		90	

Result: Candidate A, B, D, G and H are elected.

5 Terms of Reference and MG membership

The P251 Modification Group consists of members of the Governance Standing Modification Group (GSMG).

The table below shows the areas which the Group has considered in accordance with its Terms of Reference, and where you can find its discussions of each area.

P251 Terms of Reference	
Ref	Area
1	Consider the defects of the current BSC Panel election process and determine the appropriateness of adopting the standard Single Transferable Voting system.
2	Consider arguments made by the members of related Modification Groups (e.g.P129 and P206) around the principles of BSC Panel elections.
3	Confirm that the agreed solution would ensure the Industry Panel membership more accurately reflects Trading Parties' views.
4	Consider which method for calculating the 'qualifying total' under STV is most appropriate for a Panel Election (noting that there are a number of different ways to count an STV election).[2]
5	Consider whether an Alternative Modification is required.
6	Consider the effect of P251 on Applicable BSC Objectives (c) and (d), and any other relevant BSC Objective(s).
7	Identify the most appropriate implementation approach for P251.

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[2] Click here for further information from the Electoral Reform Society.

P251
Additional Information

5 February 2010

Version 1.0

Page 12 of 13

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Member	Organisation	18/02/10
Adam Richardson	ELEXON (Chair)	Y
Bu-Ke Qian	ELEXON (Lead Analyst)	Y
Esther Sutton	E.ON UK (Proposer)	Y
Bob Brown	Cornwall Energy	Y
Gary Henderson	SAIC	Y
Steven Eyre	EDF	Y
Chris Stewart	Centrica	N
Attendee	Organisation	18/02/10
Laone Roscorla	ELEXON (Design Authority)	Y
Diane Mailer	ELEXON (Lawyer)	Y
Abid Sheikh	Ofgem	Tel.
Jacqueline McGuire	SAIC	Tel.