Designing a Single-Transferable Vote System for Consideration

On Weekend 2 of the deliberation phase the Assembly designed a Mixed Member Proportional (MMP) system for consideration. You also decided to design a Single Transferable Vote (STV) system when we meet for Weekend 3 of the deliberation phase.

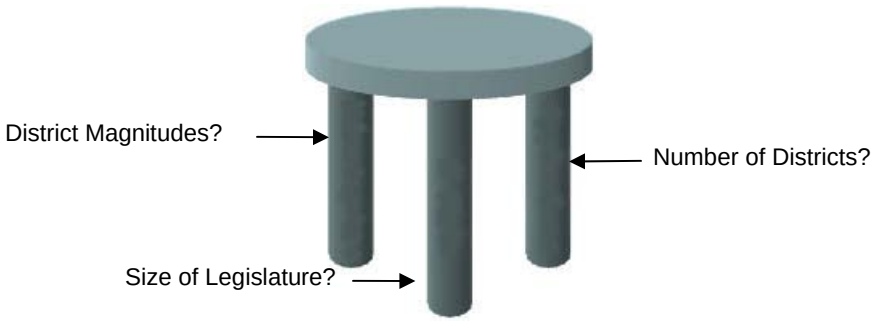
The process of designing an STV system will be similar to the process you went through as you designed an MMP system. Although the design decisions for STV are different, you will, as before, have to think about many things at once. You have to think about each feature of the system but you also have to think about what the system will be like when you put the pieces together. You have to make sure each component will work well with the others.

Remember, designing an electoral system is a bit like putting a piece of furniture together. Designing an MMP system was compared to building a wooden chair. Designing an STV system is more like building a three-legged footstool! When you put a footstool together you do not tighten the first screw as tight as it can go before you start working on the second. If you did that it would be impossible to fit all the pieces together. You have to put all the pieces together first, make adjustments, tighten the screws, make more adjustments and continue doing this until the footstool is sturdy and ready to use.

This is what we will be doing as we design an STV system to consider for Ontario. Next time we meet we will work through each design decision that has to be made. We'll put the basic features of the system together. Then we'll take a step back and look at what we've made. We'll think about how each design decision fits together with the others. We'll talk about some of the adjustments that might have to be made. At the end of the third weekend of the deliberation phase we will have a workable STV model that is as close to our collective ideal as possible.

What are the basic components of an STV system? There are three main design decisions that have to be made. Going back to the footstool analogy, you can think of these three components as the three legs of the footstool.

1. **District Magnitude.** What should the district magnitudes be?
2. **Size of Legislature.** How many seats should there be in the legislature?
3. **Number of Districts.** How many districts should there be?



Even though each of these three basic design decisions has to be made independently, none can be made in isolation of the others because they are all interrelated. For example, the number of districts you create will flow from the decisions you make regarding district magnitudes and the size of the legislature.

You have to think about the individual pieces of the system *and* about the system as a whole, *all at the same time*. We'll make decisions and adjustments, further decisions and additional adjustments until the basic structure of the STV system is in place.

Let's take a closer look at each of the three basic design decisions:

Main Design Decisions

District Magnitudes

Decision:

What should the district magnitudes be?

Context:

The district magnitude is the number of representatives per district. STV uses multi-member districts and this means that you will probably have to make all of the current single-member districts larger in order to make them into multi-member districts. If you maintained the same number of districts, the size of the legislature would probably be too large for you to accept. Experts say you need a district magnitude of at least 5 before good proportionality can be achieved.

You might decide that each electoral district should have 5 representatives or you might decide, instead, that the overall average district magnitude should be less than or, conversely, greater than 5. A higher average district magnitude will produce results that are more proportional but may result in districts that are geographically larger. A lower average district magnitude will produce results that are less proportional but it will be easier to construct electoral districts that are smaller geographically. It may be possible to achieve proportionality and effective local representation in districts that are not too large geographically if the size of the legislature is increased. Nonetheless, it is important to remember that it will still be necessary to make most if not all of the electoral districts larger even if the size of the legislature is increased.

This issue is also related to simplicity & practicality. As the district magnitude increases the number of names on the ballot will also increase. For example, Ireland uses 3, 4 and 5 member districts. In the 2002 Irish election, the average number of candidates in the 3 member districts was 8.25. The average number of candidates running in 4 member districts was 11.42 and the average in 5 member districts was 13.69. The longest ballot had 17 candidates listed—this was in a 5 member district. The shortest ballot had 6 names listed—this was in a 3 seat district.

The Australian state of New South Wales uses STV to elect members of the state legislative council. The state is one electoral district and the district magnitude is 21. In the last election there were 284 names on the ballot. Due to the large number of names, voters are given the option of voting for a ranking that has been pre-determined by the party of their choice. In the 2003 election more than 98 percent of the valid ballots cast were for this pre-determined "above the line" ranking. Despite the presence of the "above the line" option more than 5% of the ballots were spoiled. This suggests that as the number of candidates increases there is more strain placed on voters and the rate of spoiled ballots increases.

This is also an issue related to voter choice. A lengthier ballot will make it somewhat more difficult for voters to rank candidates but a ballot with the names of many candidates listed also provides voters with more choice.

Options:

1) Uniform District Magnitudes:

You will have to decide whether or not it is desirable to construct districts that all have the same number of representatives. The advantage of using uniform district magnitudes is that this treats all voters, parties and representatives the same. Like our present system, every district would have the same number of elected representatives and the results in each district would be proportional to approximately the same extent.

The disadvantage of using uniform district magnitudes is that in order to have representation by population, where the population of each district is the same, districts would vary enormously in geographic size. If you want to limit the geographic size of the districts in rural areas, you necessarily will be reducing the district magnitude in those districts. As a consequence, you would need to increase district magnitude in more populated areas. This kind of flexibility is not possible if you want to keep the district magnitudes uniform.

2) Variable District Magnitudes:

To gain more flexibility in both proportionality and the geographic size of electoral districts, you may want to vary the district magnitudes. The advantage of this is that you will be able to create districts with smaller district magnitudes in rural areas in order to favour geographic representation and you will be able to ensure greater proportionality by creating larger district magnitudes in more populated areas.

The disadvantage of this option is that, again, variable district magnitudes mean smaller political parties and independents will find it harder to gain seats in rural areas. This is because the district magnitude determines the effective threshold and it is much higher

in a 3 member district and lower in, for example, a 5 member district. When the district magnitude is 3 the effective threshold is 25 percent (plus one vote) but when a 5 member district is used the effective threshold is 16.5 percent (plus one vote). It can be very difficult for small parties or independents to be elected if, for example, the district magnitude is only 3—they would need to obtain 25 percent of the total vote.

If you decide to use variable district magnitudes you will have to identify a range and a preferred average district magnitude. A higher average district magnitude will produce a more proportional result even though some of the districts may have fewer than 5 representatives. In other words, if you decide to create districts with fewer representatives in rural areas in order to prevent the districts from becoming too large geographically, you will have to make some of the district magnitudes in the more populated areas larger in order to maintain your preferred average district magnitude.

Things to think about:

STV is a system that is designed to create proportionality at the local level but, as we saw with MMP, proportionality, local representation can be seen as two competing values— because the size of the legislature is not infinitely flexible. When thinking about proportionality, keep in mind that there are other decisions—such as the size of the legislature and geographic size of each district—that can enhance or reduce proportionality.

Do you prefer fewer members from smaller electoral districts? This would help you achieve better local representation and prevent districts from becoming too large.
Or would you rather have larger district magnitudes and more proportionality even if this means having electoral districts that are larger geographically?

How concerned are you about the length of the ballot?

Size of legislature

Decision:

How many seats should there be in the legislature?

Context:

The next decision you'll have to make has to do with the size of the legislature. When you are designing your STV system the current single-member districts will have to be made into multi-member districts. This means that the geographic size of all the districts will likely have to be made larger and in some cases these increases could be quite large. You will be able to achieve more proportionality with slightly smaller electoral districts if you decide to increase the size of the legislature. Thus, as before, the size of the legislature helps determine the degree of proportionality and the amount of local representation. It also relates to the legitimacy of the electoral system as a whole.

The legislature currently has 103 members. As of October 10, 2007 the size of the legislature will be increased to 107. In 1999 the legislature was decreased from 130 to 103 (the second time there has been a decrease in Ontario's history).

It is common for the size of the legislature to be periodically increased to account for population growth. Compared to other Canadian provinces the Ontario legislature is currently smaller than its population would suggest. Comparative data from all provinces in Canada is posted in the members' forum.

Options:

1) No Change:

If you want to maintain the size of the legislature you will have to increase the geographic size of all of the electoral districts and have fewer districts. This is because STV is a multi-member electoral system.

2) Increase:

You might want to increase to the size of the legislature in order to achieve some proportionality *and* maintain some local representation. By increasing the size of the legislature it will be possible to have larger district magnitudes in some districts that would otherwise need to be made much larger geographically. The more you increase the size of the legislature the easier it will become to have larger district magnitudes in smaller geographic districts. If you were to choose this option you would have to think about how you would justify the increase.

Things to think about:

How important is proportionality? Keep in mind that there are other decisions—such as the size of the legislature and local representation—that can enhance or reduce proportionality.

How important is local representation? How important is it to limit the geographic size of the electoral districts in rural and under populated areas.

How do you balance your decision about the size of the legislature with your other objectives of legitimacy, proportionality and local representation? How does the size of legislature relate to what you want the system to achieve: an appropriate balance between proportionality and local representation?

Number of Districts

Decision:

How many districts should there be?

Context:

The number of districts depends on the size of the legislature and district magnitude in each district. Once you've identified a preferred average district magnitude you can use this number to determine the approximate number of districts associated with a legislature of a particular size.

For example, if you want to maintain the current 107 seat legislature but you want an average district magnitude of 5, there will be 21 or 22 electoral districts. If you've decided to use variable district magnitudes you might decide to give some of the large geographic districts in rural areas only 3 representatives in order to limit their size. If you do this, you necessarily will have larger district magnitudes in urban areas if you want to maintain an average district magnitude of 5. If you want greater proportionality you may want a slightly higher average district magnitude. This will increase the size of some, or all, of the electoral districts and decrease their number. Remember, as the number of districts increases each one will be made smaller in geographic terms.

Example: Size of Legislature: 107 seats
Average District Magnitude: 5
Approximate Number of Electoral Districts: 21 or 22

Example: Size of Legislature: 107 seats
Average District Magnitude: 7
Approximate Number of Electoral Districts: 15 or 16

Example: Size of Legislature: 107 seats
Average District Magnitude: 4
Approximate Number of Electoral Districts: 26 or 27

Example: Size of Legislature: 133 seats
Average District Magnitude: 5
Approximate Number of Electoral Districts: 26 or 27

Example: Size of Legislature: 133 seats
Average District Magnitude: 7
Approximate Number of Electoral Districts: 19

Example: Size of Legislature: 133 seats
Average District Magnitude: 4
Approximate Number of Electoral Districts: 33 or 34

Example: Size of Legislature: 143 seats
Average District Magnitude: 5
Approximate Number of Electoral Districts: 28 or 29

Example: Size of Legislature: 143 seats
Average District Magnitude: 7
Approximate Number of Electoral Districts: 20 or 21

Example: Size of Legislature: 143 seats
Average District Magnitude: 4
Approximate Number of Electoral Districts: 35 or 36

This issue is primarily related to concerns about local representation and proportionality. Fewer, larger, districts will make it easier to achieve better proportionality because it will be possible to increase the district magnitude in some, or all, of the districts. But the degree of local representation is compromised as the geographic size of the districts is

increased. Nonetheless, it is worth remembering that even though the size of the districts and the district magnitudes are larger, a basic feature of STV is that it achieves proportionality through local representation. In other words, representatives are elected in clearly defined electoral districts and they must compete for support from individual voters.

Things to think about:

How proportional should the system be?

How big (geographically) should the districts be?

Are smaller geographic districts more important in some regions of the province than in other regions?

Are you willing to compromise some proportionality in order to keep some, or all, of the districts relatively small?

Are you willing to have better proportionality in some districts than in others?

Other Design Decisions

After working out the basic structure of an STV model we will have to think about other important features of the system. There are three other design decisions that have to be made: transfer method; seat vacancies; and ballot completion.

Transfer Method

Decision:

Which method should be used to transfer surplus ballots?

Context

This issue is primarily about fairness and simplicity & practicality.

In STV, a candidate is elected when he or she receives enough votes to meet the quota. Surplus votes are votes a candidate receives beyond the total necessary to win a seat. These are 'extra' votes that exceed the quota in an STV election. But how do you decide *which* ballots are surplus votes? How do you decide *which* votes to transfer? It is not adequate to simply select the votes that were counted last because this parcel of votes may not be a representative sample of the total collection of votes cast for a candidate. So how do you choose?

There are two general approaches to the issue of transferring surplus votes in an STV election: 1) randomized transfers; and 2) discounted transfers.

Options:

1) Randomized Transfers:

Under this approach the ballots that are counted as surplus votes are randomly selected from either the last parcel of votes to be transferred to a candidate or from the whole collection of votes cast for a candidate. The idea is that the randomization process will return a representative sample of ballots to be transferred. The STV system in Ireland uses a randomization method to transfer surplus votes.

This option is easy to use and explain but it is not always recognized as fair. There is some uncertainty introduced by the process of randomization. Most of the time the randomization process will produce a representative sample of ballots but it is impossible to know for sure. There is no guarantee that one random draw of ballots will produce the same election results as a subsequent random draw from the same collection of ballots.

2) Discounted Transfers:

Under this approach all of the votes for an elected candidate are transferred at a discounted value. This eliminates the need to choose and transfer some ballots and not others. The following is a simplified example to help you understand how votes might be transferred using a discounted transfers approach.

The first thing you have to do is calculate a 'transfer value'. This can be done by dividing the number of surplus votes by the total number of votes cast for the candidate. For example, if Candidate X obtains 120 votes but the quota to be elected is 100, there are 20 surplus votes. The transfer value is therefore equal to 20 ÷ 100 which is 0.2. After you have calculated the transfer value, *all* of Candidate X's ballots are re-examined and transferred according to next preferences but each vote is *discounted* and transferred at a value of 0.2 or, in this case, 20 percent of the value of a full vote.

This method is generally recognized as being fair because it is more reliable compared to the randomized approach which might yield different results depending on which ballot papers are counted. In other words, when surplus votes are transferred at a discounted value the results of an election should be the same in multiple recounts. In contrast, when surplus votes are transferred by way of a randomized process the results of an election could vary in multiple recounts even if the probability of significant variation is relatively small.

Transferring surplus votes at a discounted value is often difficult to understand and it can be even more difficult to explain. If you are concerned about simplicity & practicality you might be more inclined to favour a randomization approach. If you believe it is more important to make sure all ballots are counted in reliable way you will be more inclined to favor a method that transfers votes at a discounted value. The British Columbia Citizens' Assembly recommended using a discounted transfer method to distribute surplus votes. In all STV systems the votes of eliminated candidates are transferred at full value.

You might want to increase to the size of the legislature in order to achieve some proportionality *and* more effective local representation. With a moderate increase it will be possible to adopt larger district magnitudes in some districts that would otherwise need to be made much larger geographically. The more you increase the size of the legislature the easier it will become to have larger district magnitudes in smaller

geographic districts. If you were to choose this option you would have to think about how you would justify the increase.

It is important to think about the method used to transfer votes but it is also important to remember that both approaches are legitimate and are used in existing STV models.

Vacancies

Decision:

How should seat vacancies be filled?

Context:

This issue has to do with cost and simplicity & practicality. It is also about fairness and proportionality.

The question of how to fill seat vacancies in an STV system can be a difficult one because the electoral success of one candidate is very much related to the fortunes of other candidates running in the same electoral district. When one candidate is removed from the race the dynamics of the election will change and it is not possible to simply run the race over again if only one seat is vacant in a multi-member district. There are several different options for filling seat vacancies in an STV system but each is associated with trade-offs and none is a perfect solution.

Options:

1) Recount:

When a seat becomes vacant it is possible to go back to the original ballots and recount them by transferring votes originally allocated to the successful (now departed) candidate to the unsuccessful candidates in the race. Votes are transferred and the candidate with the most votes wins. This method is used in Malta and in several Australian states.

This method helps preserve proportionality because the results of the recount represent, as closely as possible, the original wishes of the voters. This method also eliminates the need to hold by-elections. In addition, it is inexpensive and seat vacancies can be filled quickly.

One of the drawbacks of this method is that it only considers the preferences of voters as they where when the original election was held. If voters' preferences have changed, this will not be reflected in the results when vacant seats are filled using the recount method.

2) Replacement List:

This option requires each candidate to draw-up a list of potential replacement candidates. Each candidate would be required to submit a list of replacements prior to an election. If a seat becomes vacant it is simply filled by the next eligible replacement candidate on the list. The Republic of Ireland and Northern Ireland use this method to fill seat vacancies in the European Parliament.

Replacement lists ensures proportionality will be preserved: this method guarantees that a replacement member will be elected from the party of his or her predecessor. It is an inexpensive way to quickly fill seat vacancies without disrupting party standings and proportionality.

One of the drawbacks of this method is that replacement members are not directly elected by the voters and this raises potential concerns about legitimacy.

3) Appointment:

It is also possible to fill vacancies by appointment. Where these methods are used the nominations are commonly subject to approval by the rest of the elected council or legislature but the nomination of a replacement candidate is made by the party of the outgoing member. This method is used by the Australian Senate and by some local authorities in Australia and Ireland.

Appointments help ensure that proportionality will be preserved because the replacement candidate will be, in most cases, a member of the party of the outgoing candidate. This option is less expensive than holding a by-election and replacements can be made quickly.

One of the drawbacks of this method is that the vacant seats are not filled democratically: the voters do not have direct influence over who is awarded the vacant seat. Nonetheless, it is worth remembering that the appointments are made by representatives who have been elected by voters and the appointments, in most cases, are subject to approval by the legislative body.

4) By-Election:

It is also possible to hold a by-election to replace outgoing members of the legislature. By-elections in STV systems are commonly contested using Alternative Vote. This method is used in Northern Ireland to fill vacancies in their national legislature. It allows voters to rank their preferences as they would in an STV election even though only one seat is open to be filled.

This method gives voters direct influence over who is elected to fill a seat vacancy. If voters' preferences have changed since the original election, this will be reflected in the results of the by-election.

One of the difficulties with this method is that a by-election using AV to elect a single member has a very different dynamic than a general election using STV to elect multiple members. Most importantly, it is much more difficult for small parties and independents to win an AV election. This means that the outcome of the by-election is heavily weighted in favour of the larger parties and this could distort the proportionality of the original election results.

Holding by-elections is comparatively expensive, and is especially so when AV is used because candidates must campaign to obtain a majority of the votes in an electoral district that normally elects multiple other members. The costs associate with a potential by-election therefore increase as district magnitudes increase.

Ballot Completion

Decision:

Should ballot completion be optional, partial or mandatory?

Context:

When using a preferential ballot it is necessary to stipulate whether or not voters should be required to rank all the candidates listed on the ballot. Mandatory ballot completion ensures that a preferential system functions according to design: all the votes that should be transferred can be and the number of exhausted ballots is reduced to an absolute minimum. Nonetheless, mandatory completion can be a demanding task for the voter because it is difficult to make meaningful distinctions between all of the candidates on what can be a relatively long list. It also means voters have to vote for candidates that they would never want under any circumstances.

This issue has to do with voter choice and legitimacy. It is also about party influence, proportionality and the fortunes of smaller parties and independent candidates.

Options:

1) Mandatory Ballot Completion

Mandatory ballot completion reduces the number of exhausted votes and helps ensure the electoral system functions according to design.

This option is relatively demanding because voters are ideally expected to be familiar with all of the candidates on the ballot. If the district magnitude is large the list of names on the ballot will be long. Voters may question the legitimacy of being forced to express preferences for candidates that they may or may not know anything about. Although this option will reduce the number of exhausted ballots it could increase the number of spoiled ballots because it is easier to make a mistake when ranking a greater number of candidates.

This has also been interpreted as an issue about party control over voters' preferences: where voters are required to complete a lengthy ballot they are more likely to rely on the ranking recommended by their most preferred party.

2) Partial Ranking Ballot Completion

Another option is to have a minimum number of candidates the voter must rank. You can specify that in order for a ballot to be counted as valid the voter must express a certain, set number of preferences. It is quite common for second preferences to be used, it is a little less common for third preferences to be transferred and it becomes less and less common for subsequent preferences to be needed as you move down the ranking. Partial mandatory completion helps make the system function according to design but it is less demanding on voters than full mandatory ballot completion.

If you decide to adopt partial mandatory completion rules you will have to decide how many preferences each voter should be required to indicate. In Malta voters are required to rank as many candidates as there are seats to be filled.

3) Optional Ballot Completion

If you choose voluntary ballot completion, you are saying that any number of preferences is valid. The primary advantage of voluntary ballot completion is that it gives the voter maximum choice to state his or her preferences. Voters are not required to make distinctions between candidates that they may not know anything about. Most voters have a preferred candidate and a least preferred candidate. Many can make distinctions between their first choice and their second but it is, inevitably, more difficult to make a distinction between the 8th and 9th candidate on a ballot that lists, for example, 12 or 13 names.

Voluntary ballot completion can be harder on smaller or medium sized parties and independents candidates. Smaller parties and independent candidates are typically less likely to meet the quota and be elected early in the counting process. This means that these candidates relay more heavily on transferred ballots than do those who are elected on the first or second count. Smaller parties and independents are therefore disadvantaged by voluntary ballot completion because the transferred votes they rely on to get elected may not be forthcoming if voters are not required to fully express their preferences.

Voluntary ballot completion can adversely affect the proportionality of the election results. Proportionality in STV elections is achieved through the transfer of votes that would otherwise have no direct impact on the election of a candidate. Voluntary ballot completion increases the number of exhausted ballots and therefore reduces the overall proportionality of the final result. It is important to point out, however, that the number of exhausted ballots is small whether ballot completion is voluntary or mandatory.

PR Formula

We do not have to make a decision on the PR formula in STV because all existing STV systems use the modified Droop formula to calculate the quota. With the modified Droop formula the quota is equal to:

$$\left(\frac{\text{votes}}{\text{seats}+1}\right)+1$$

Imagine a hypothetical election in which 100 votes are cast. If there are 3 seats to be filled (i.e. district magnitude is equal to 3) the quota would be equal to 100/(3+1) plus 1. This is equal to 26. This means that a candidate needs 26 of 100 votes to be elected.

The reason all existing STV systems use the modified Droop formula is that it is the only PR formula that guarantees the right number of candidates will be elected in each electoral district. In other words, the modified Droop formula returns the smallest whole number that ensures each seat in the district will be filled and only the right number of candidates obtains enough votes to meet the quota.