

Notes on 2020 Connections

We had only three of us add connections. I think there's additional connections and measurements that each of us would want to add, and we would benefit from more people adding their thoughts about connections.

But there are some preliminary things that could be said.

Compatibility of Goals

Some goals are largely compatible with others, in that raising the levels of measures of objectives in one goal will tend to raise the levels of the other goal. With the connections we have established, we can make some approximate measures of compatibility.

By averaging out the values of connections between goals (with negative connections having a negative value), the following table was generated:

From/ To	1	2	3	4	5	6	7
1	2.50	5.50			4.00		8.00
2							
3	1.00	2.00	5.00		5.60		3.00
4	9.00		5.00				
5			7.00				2.33
6		8.50					-5.00
7						4.00	

The good news is that where there are connections, they are almost all positive. In other words, so far, our goals are generally compatible.

The blank spaces are where there are no direct connections between the objectives of those two goals, so we are clearly missing a lot of the detail that might be needed to make these measurements. For example, we have no impacts from Goal 2 ("Ensure Environmental Sustainability") TO any of the other goals: we only have impacts FROM other goals to Goal 2.

The only negative value is between goal 6 “Preserve and Enhance Town-owned Assets “ and goal 7 “Maintain and Improve Financial Well-being of the Town”. That makes some sense: major investments in hard assets reduces available financial resources. We’ll see this as a central constraint as we go forward to consider action ideas that cost a lot of money,

The chart above shows connections in each direction separately. If we combine them by adding the connection between goal A->goal B to the connection between B->A, we get the following combined chart:

From OR To	1	2	3	4	5	6	7
1	2.50						
2							
3	6.50	2.00	5.00				
4	9.00		5.00				
5	4.00		12.60				
6		8.50					
7	8.00		3.00		2.33	-1.00	

Goal 7 and Goal 6 are the still the only ones with a negative correlation, but it is smaller.

The largest compatibility is between Goal 3 (“Improve Connections”) and Goal 5 (“Support Inclusion and Diversity”), which makes sense since improving connections is helpful for all citizens, but particularly for those without as much access to cars: the elderly, the disabled, and youth.

I think we can look at this more deeply when we have more connection data.

Major Cycles:

Causal cycles, or loops, are of two types:

Reinforcing loops are loops where each trip around the loop continues to send each measurement in the same direction. Sometimes these are called *vicious cycles* or *virtuous cycles* or *positive feedback loops*. Every loop of this type has some limits on how far the

measurements can go. In our chart, these loops will either be all blue, or will have an even number of red arrows.

Control loops are loops where an increase in one measure eventually causes some decrease in that same measure. Sometimes these are called *negative feedback loops*. In our chart, these loops will have an odd number of red arrows. An important measure in these types of loops is how long the delay is. If the delay is rapid, the measurements quickly settle down. If there are long delays, the measurements can wobble up and down repeatedly, or overshoot and crash.

In a complex system such as we are looking at here, the multiple overlapping loops interact in ways that can't be predicted ahead of time. But it is still useful to look at the main loops.

But...we have very few complete loops listed yet, even the ones we have talked about at committee meetings. But there are a few in here:

There is a **reinforcing loop** between objective 1.2 ("Preserve historic buildings and landscapes") and 1.3 ("Foster an understanding and appreciation for what makes Acton unique, including its history."). The more people know, the more they do; and protecting these places means people learn more. As with other reinforcing loops, this can work either way: towards greater protection or greater disintegration, depending on current trends. The ultimate limit in one direction is the total loss of our historical places and our historical memories; in the other direction the limit is harder to see, but if we suppose that *everywhere* in Acton has *some* historical interest, we can see that the town has other needs and will reuse some of these places for other purposes.

There is a **control loop** that runs between these measurements: 6.2 -> Other 10 -> Other 11 -> Other 12 -> 6.2. Here's how that loop can be described in words:

The more we support excellence in schools, the higher the ration of school age children becomes, because families with kids will choose to move and stay in Acton more than other types of households. But that makes our tax burden go up, because providing school services to families is more expensive than providing services to child-free households. In turn, this reduces the town's ability to support major spending or borrowing, such as may be necessary to keep investing in the excellence of the schools.

That's a **control** loop because the increase in school excellence eventually causes a decrease in school excellence. In this loop, school excellence has a way of evening itself out around some sustainable level. But there is a lot of delay in that loop, so we might expect more of a wave: an overshoot followed by a partial collapse and then a recovery, and so on.

Other loops will need to wait for more discussion, research, and agreement.