

Hi Dariush, for the sake of readability, my 'page 1' is actually going to be spread out into a page per idea. When it comes to putting page one into our presentation we can consolidate ideas down into a single page. I wanted to do it this way for the moment for the sake of clarity, seeing as we're not in the same room together.

We have data that could be arranged a few ways:

- Yearly

State	population	internal in	internal out	external in	external out
state1	#	#	#	#	#
state2	#	#	#	#	#

- A time series by state

year	1990	1991	1992	1993	...
population	#	#	#	#	#
internal in	#	#	#	#	#
internal out	#	#	#	#	#
external in	#	#	#	#	#
external out	#	#	#	#	#

- With a lot of redundancy

State	population	internal in	internal out	external in	external out	Year
state1	#	#	#	#	#	1990
state1	#	#	#	#	#	1991
...
state2	#	#	#	#	#	1990
state2	#	#	#	#	#	1992
...

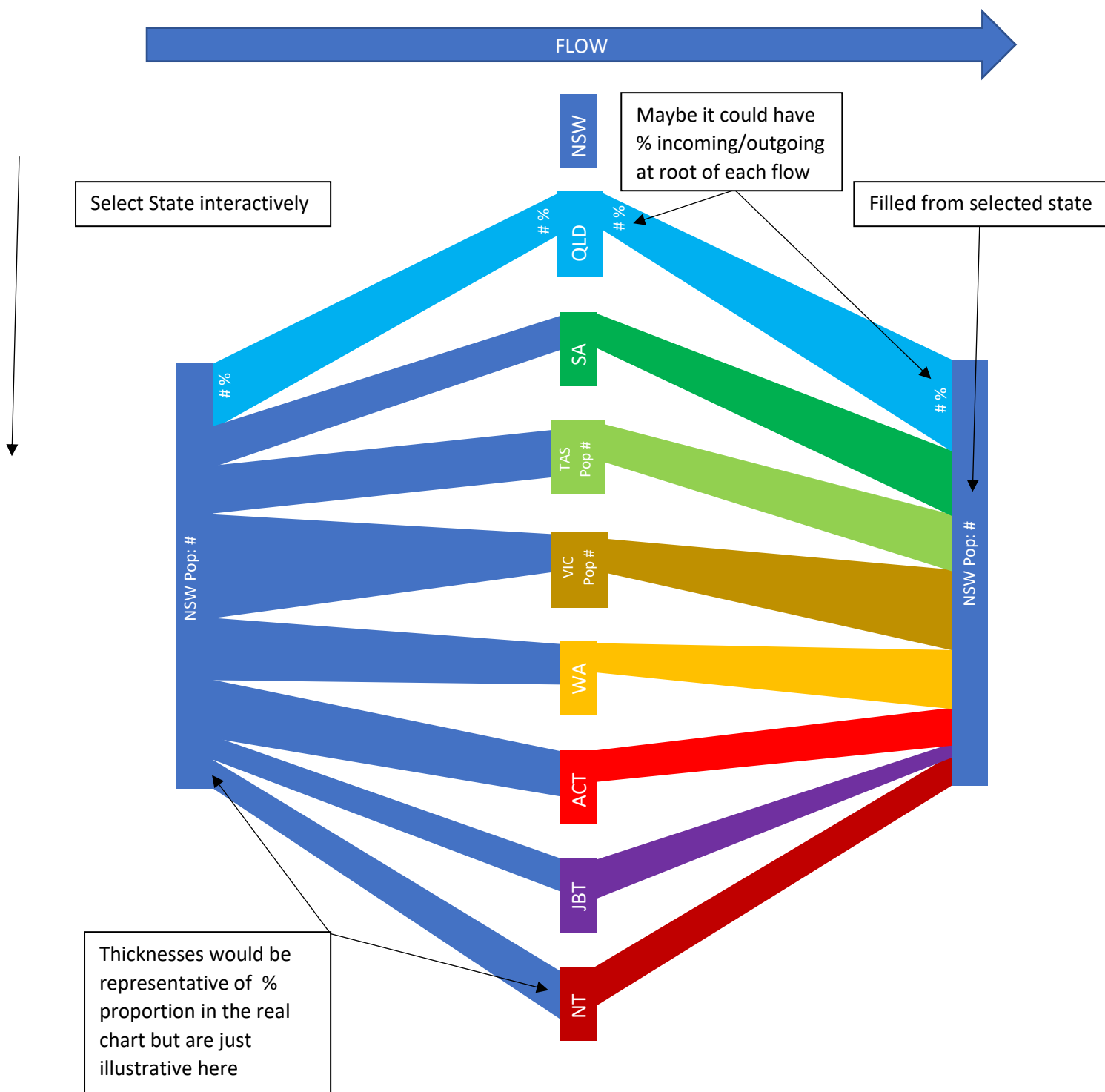
So I think some of the options are:

- Have charts for a particular year and the option to select year
- Have charts for a particular state over time and the option to select states
- Have charts where time is added as an animated dimension (or toggled with sliders?)
- Have multiple charts representing different dimensions on a dashboard.

By Year

Idea for visualisation of internal movement:

Usage is like: https://peoplemov.in/#c_AF_IR but you select a state on the left and it shows the migration flow from that state to every other state and then it shows the flow from every other state to that state on the right side



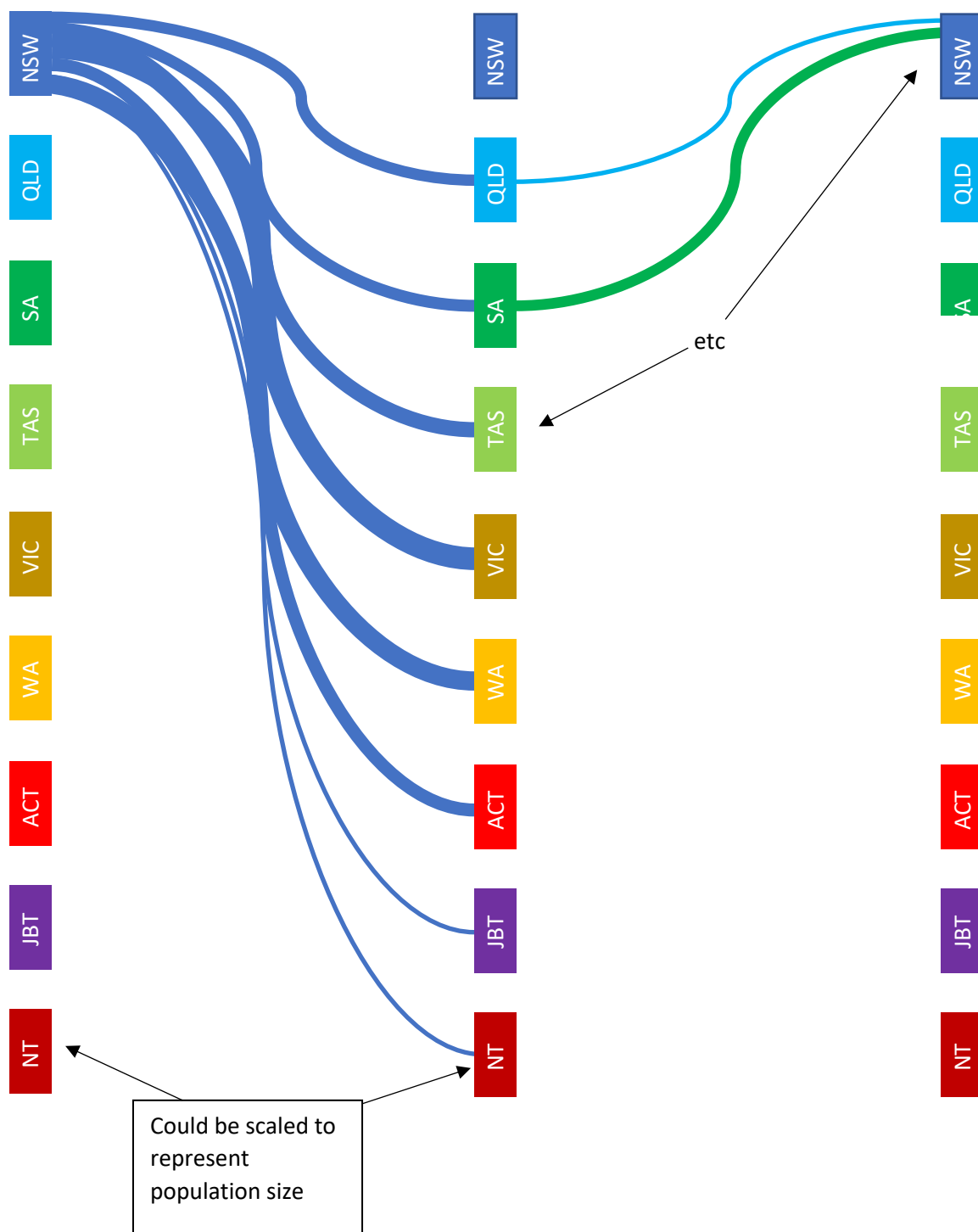
Critiques:

- Colour-blind issues, but colour is not essential for understanding
- Shows relative amounts instead of figures. Figures could be added to the flows but would be hard to scale for thin flows like JBT.

Similar principles but mirroring the style of https://peoplemov.in/#c_AF_IR more closely. I haven't fully implemented all of the lines, but you should get the idea I hope?

I don't think having all of the states laid out this way adds much (except making them directly clickable), unless you simultaneously show all of them together? I think that this approach could get very messy. Line thicknesses would

Maybe this kind of layout could be used for external migration in/out in conjunction with the above graph for internal in/out? In the original design it's used for international movement.



Another concept for showing internal movement could be the circular chart seen here (which is interactive as a nice bonus) http://download.gsb.bund.de/BIB/global_flow/

It looks messy at first, but hovering over a specific area shows only that flow. This could be better used for internal in/out flows because having over 100 countries on this would be chaotic and consolidating those countries into regions would be information loss.

One weakness is that it's not completely obvious at first glance which ways the flows go, so you might have to read a key/legend to understand that the distance from the edge of the circle represents in/out. Population could be displayed on each outer ring segment. This approach shows relative amounts rather than solid figures, so it might be necessary to add a chart with figures in/out as a legend?

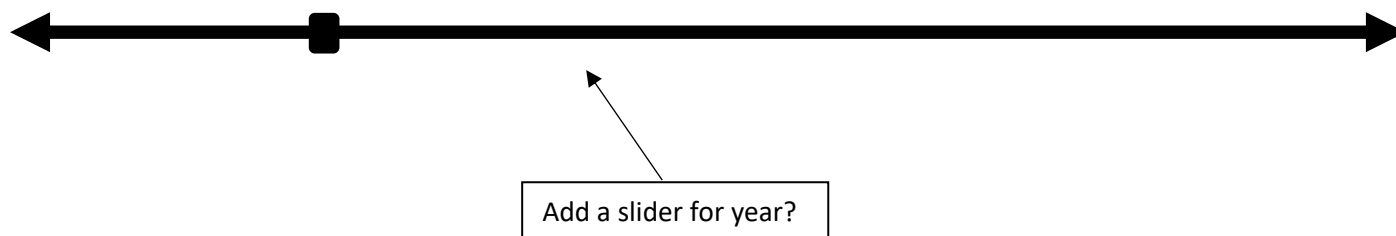


A really good option could be a chloropleth map. If you click on a state or territory you get a global map with country/state/territory numbers scaled appropriately (like the tableau chloropleth options or the john Hopkins covid map). As a bonus this type of map could be animated to show time, with each bubble growing or shrinking over time, perhaps by using a slider? This would be the first visualisation I've suggested which would incorporate time directly, the others above would have to be selected yearly. This option consolidates internal and external migration which is also good.

To show both inward and outward migration we could display two maps, one for inward, one for outward.

Values for population and migrant numbers could be displayed by hovering/clicking on country/state

e.g.,

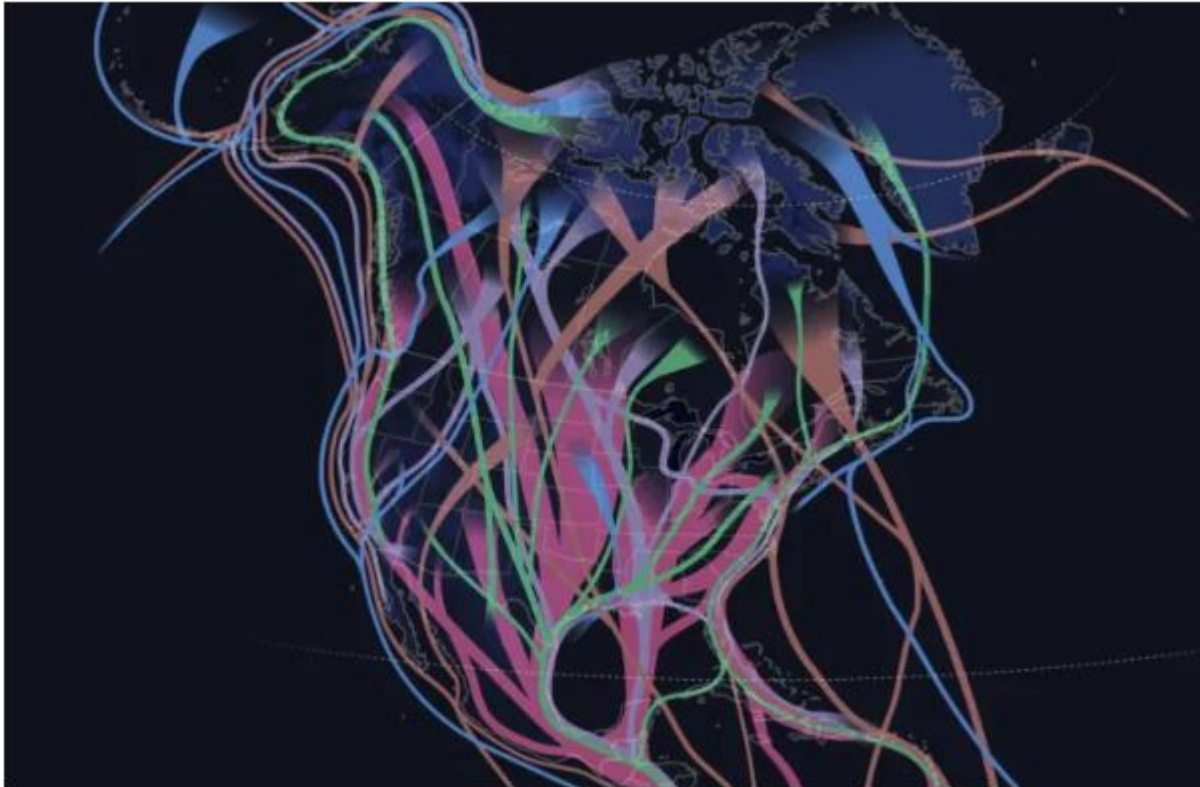


I've seen an animated version of this concept too: <http://metrocosm.com/global-migration-map.html>

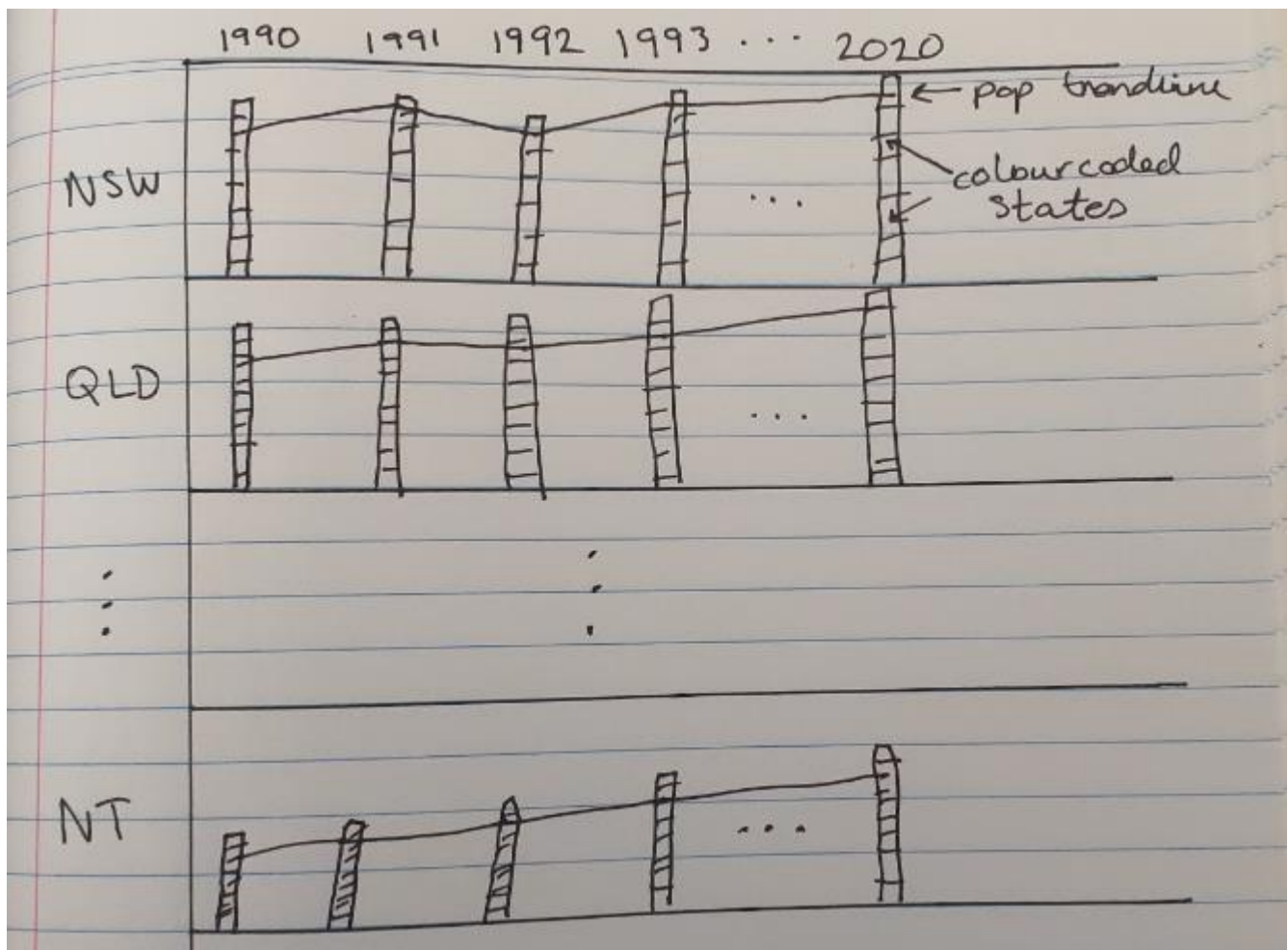
The animate show the rate visually by how many dots are moving and how quickly they're moving, but I'm not sure it adds that much information?

Getting into less fleshed out ideas:

Another option might be something like this bird migration chart (<https://flowingdata.com/2018/02/27/traveling-birds-on-a-thousand-mile-journey/>), but applied to whole countries terminating or beginning in a state/territory? It could be implemented like the choropleth option above, substituting the bubbles for migration flows. Again this map could have a slider for years and an option to toggle incoming/outgoing, so if you click on a state you can see people leaving or coming in.



Another simple option for internal migration could be a combination of stacked bar charts to represent each state/territory over time. It could have a population trendline overlaid. This would have to be toggleable for inwards/outwards migration but would show all states for all years.



Another option for external migration might be to use clustered bar charts per country and have all countries be scrollable. Again, inwards/outwards would have to be toggleable. Ignore the ratios in the drawing, I wasn't paying attention!

