



2016

**Interactive web data/stats charts & graphs:
Another form of data visualisation**

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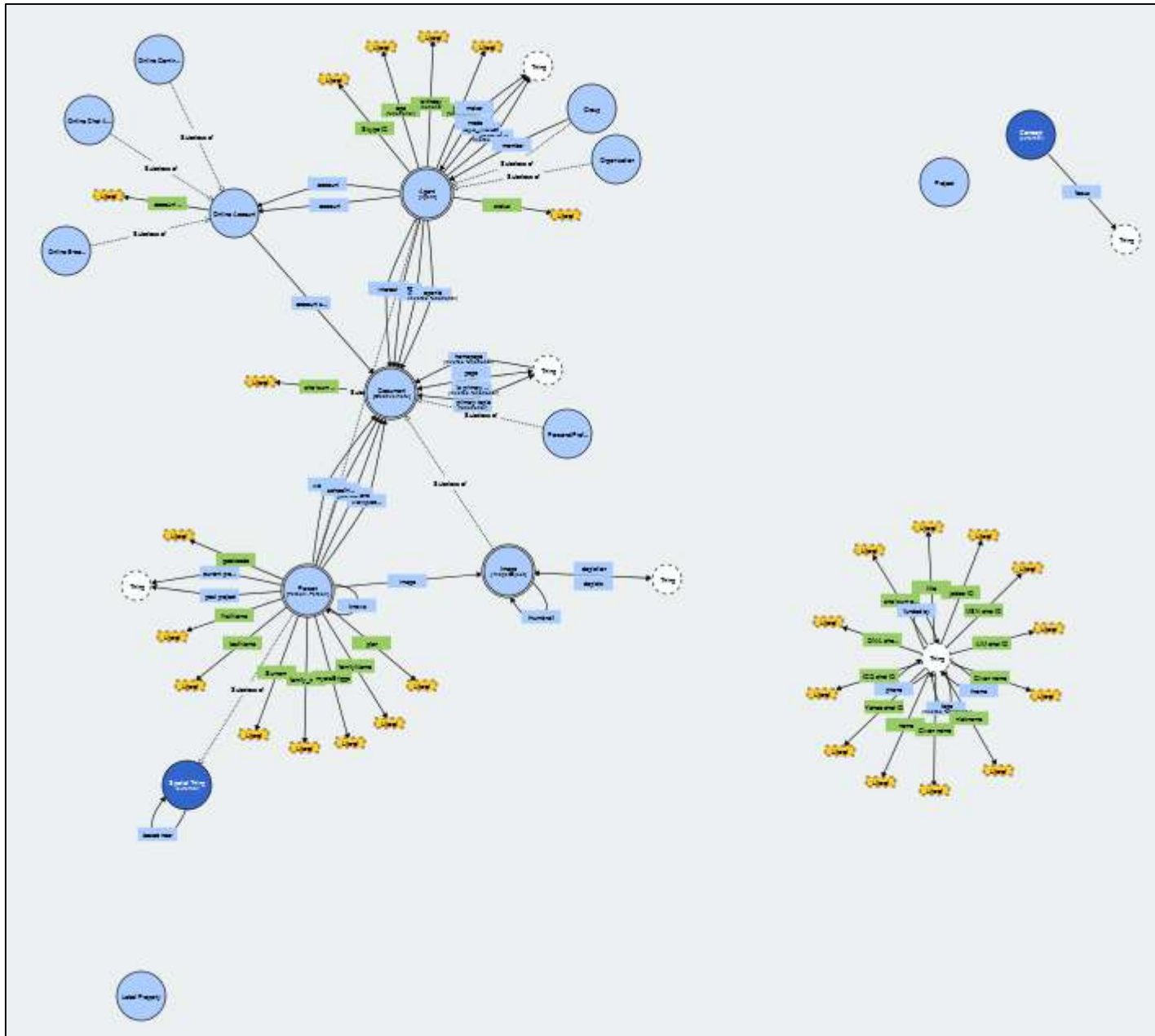
University
of Victoria

Libraries

Outline

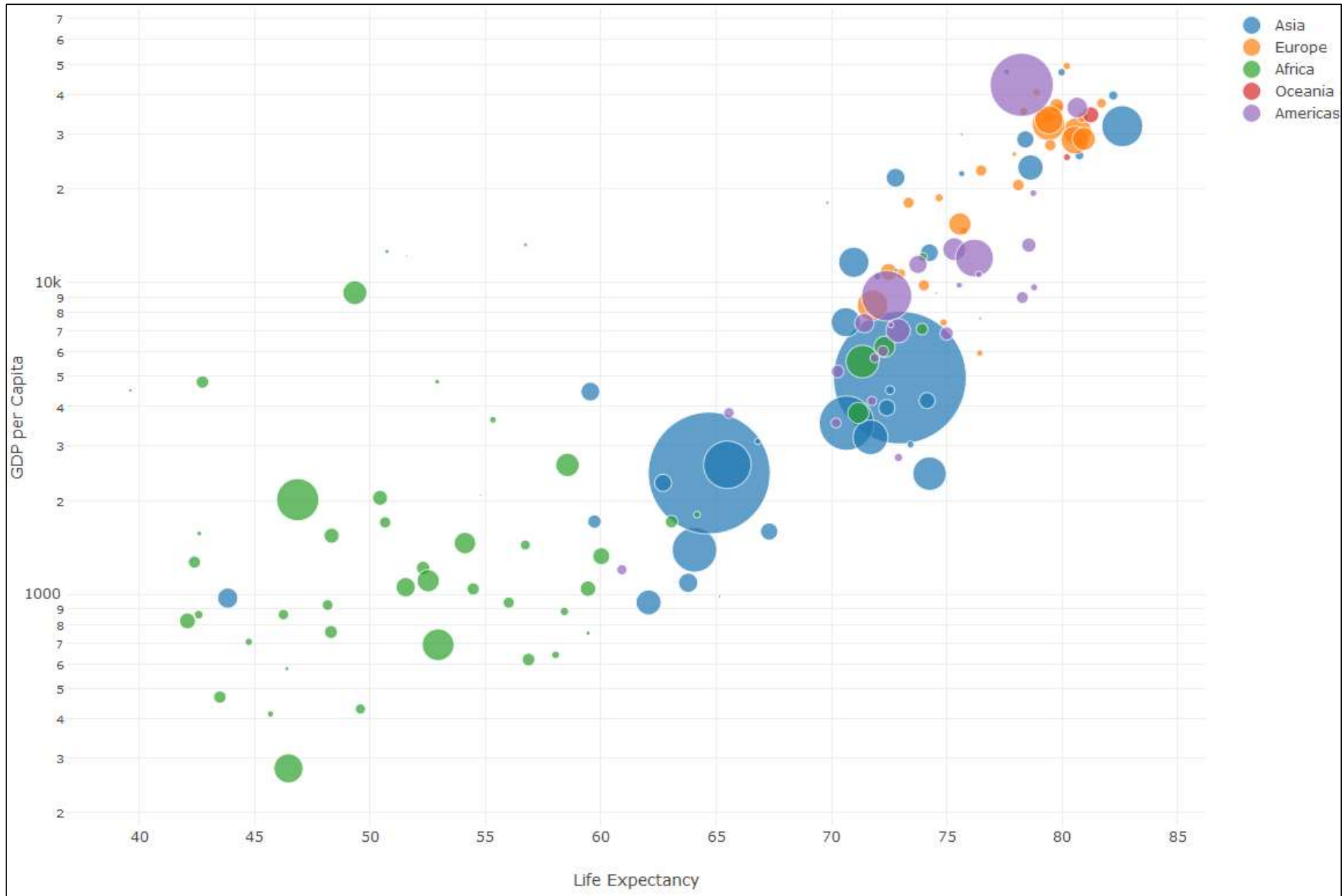
- **example of interactive chart/graph**
- **Why interactive charts?**
- **Static versus Interactive**
- **some code**
- **some examples**

example Interactive chart/graph using D3



cool...
but...
useful?

example (useful x/y data) Interactive chart/graph



Why interactive charts?

- **Data visualisation**
 - **Requests from users?**
 - **Requests from other units in (my/your) library?**
 - **Required by library administrators?**

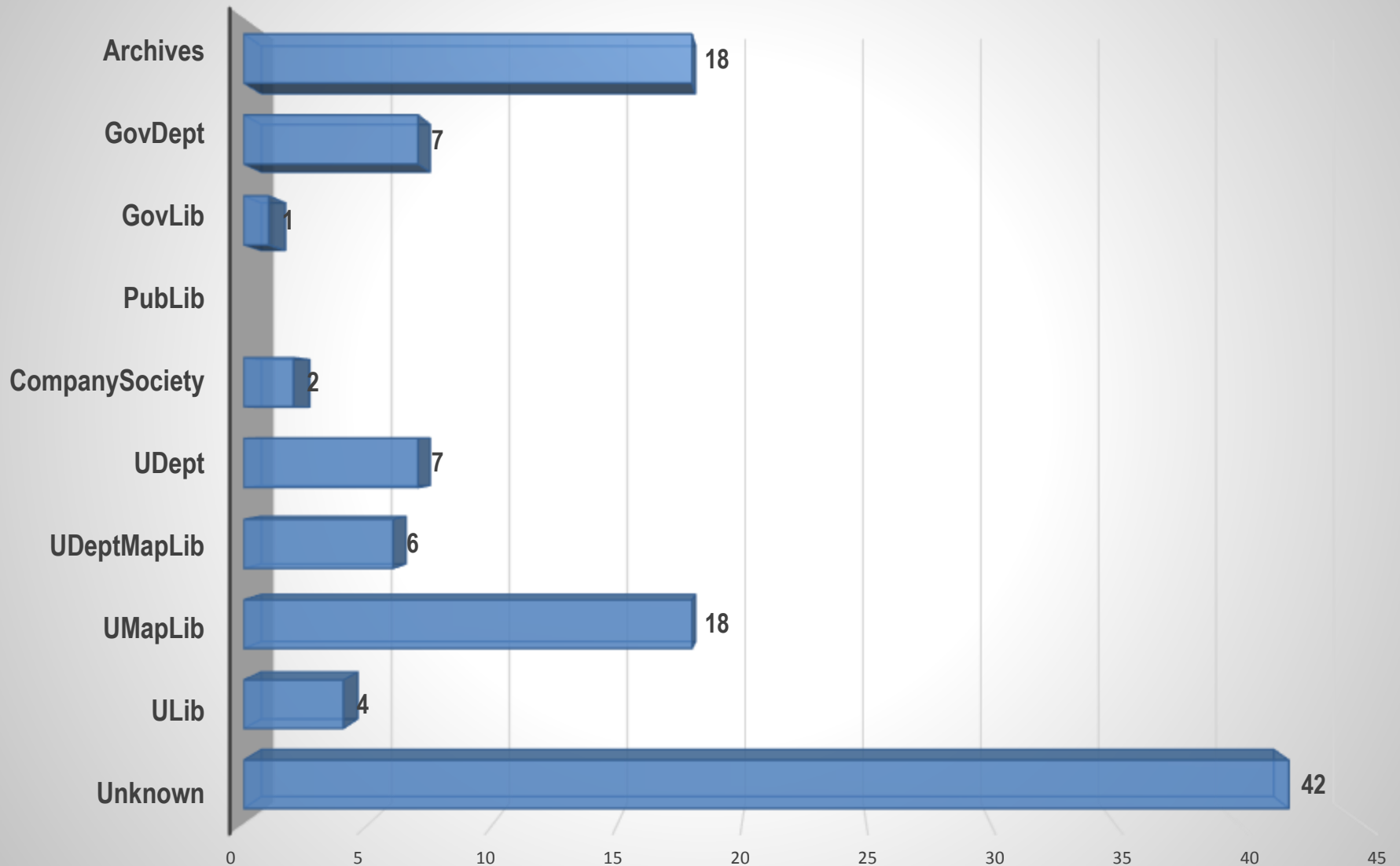
Why interactive charts?

“Data (and) Visualisation librarians”

- Brandenburg, M. D. et al. Interdisciplinary collaboration: Librarian involvement in grant projects. *College & Research Libraries*, (forthcoming 2017)
- Falcone, A. Practical strategies for demonstrating the value of public services in academic libraries. *International Information & Library Review* 48(1), 2016
- Sacco, K.L. *Supporting digital humanities for knowledge acquisition in modern libraries*, 2015

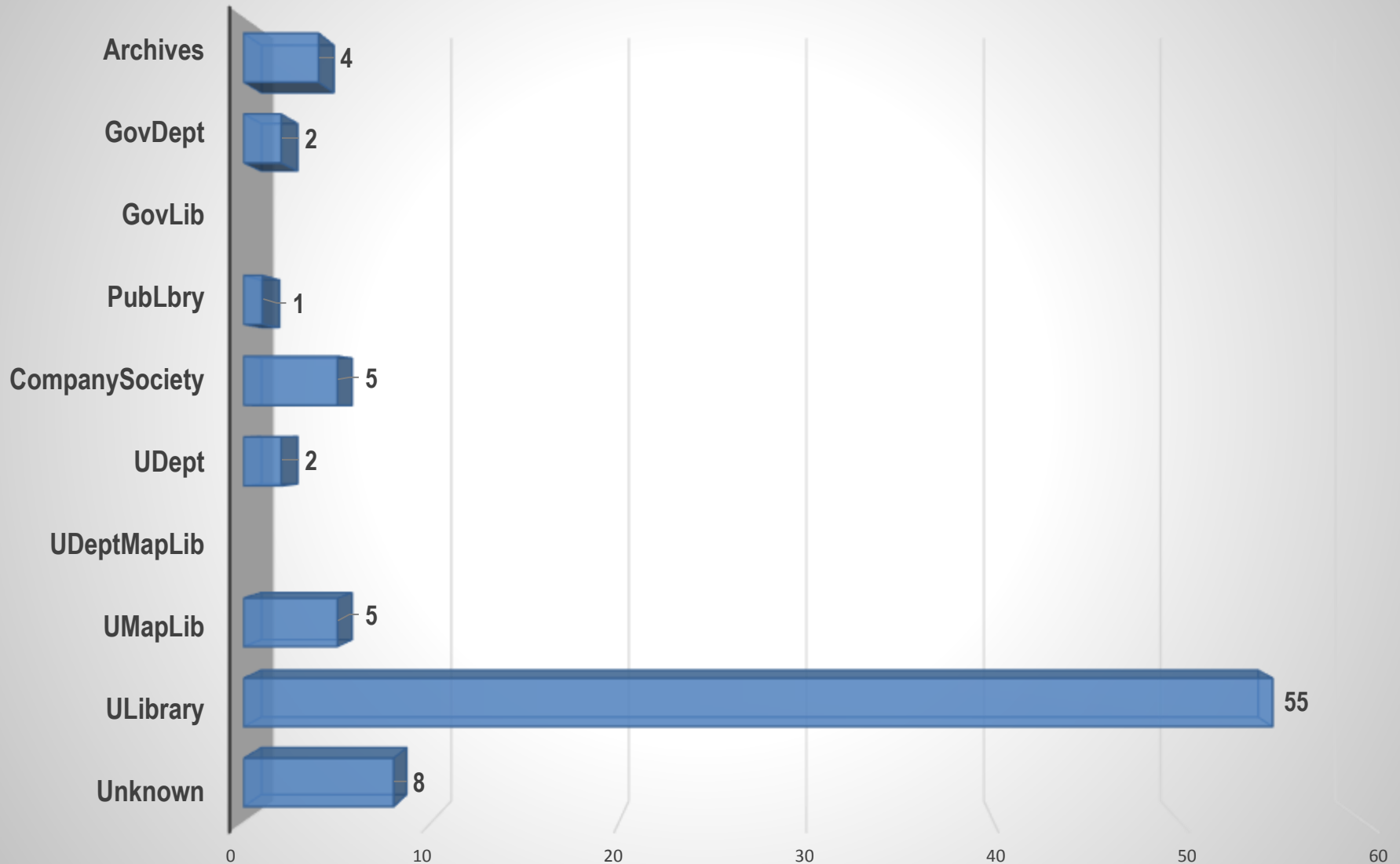
UofToronto Libraries 2016 job posting: *Data Visualisation Librarian*

Individual Members, 1979, from:

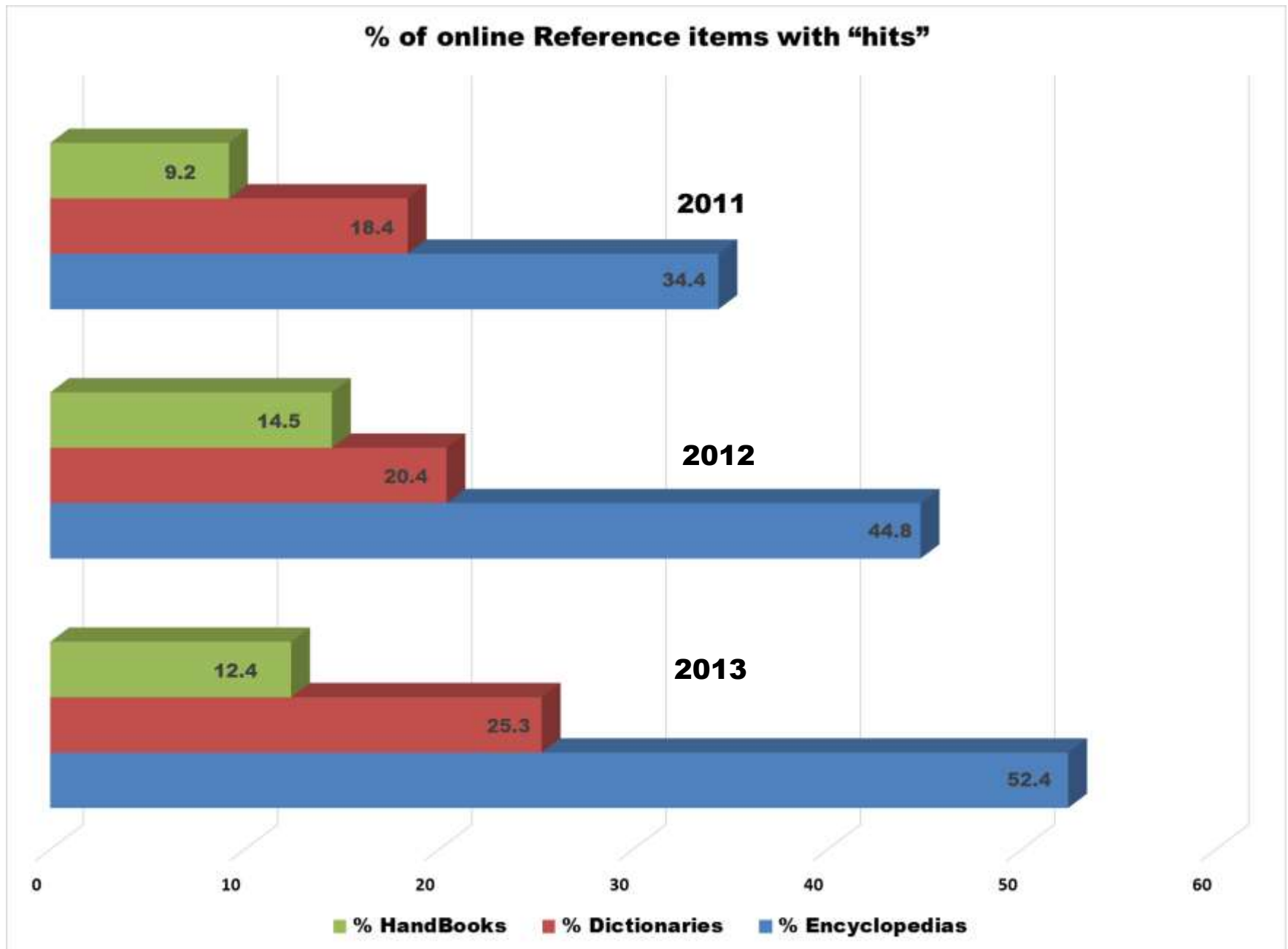


...static bar chart(s)

Individual Members, 2015, from:

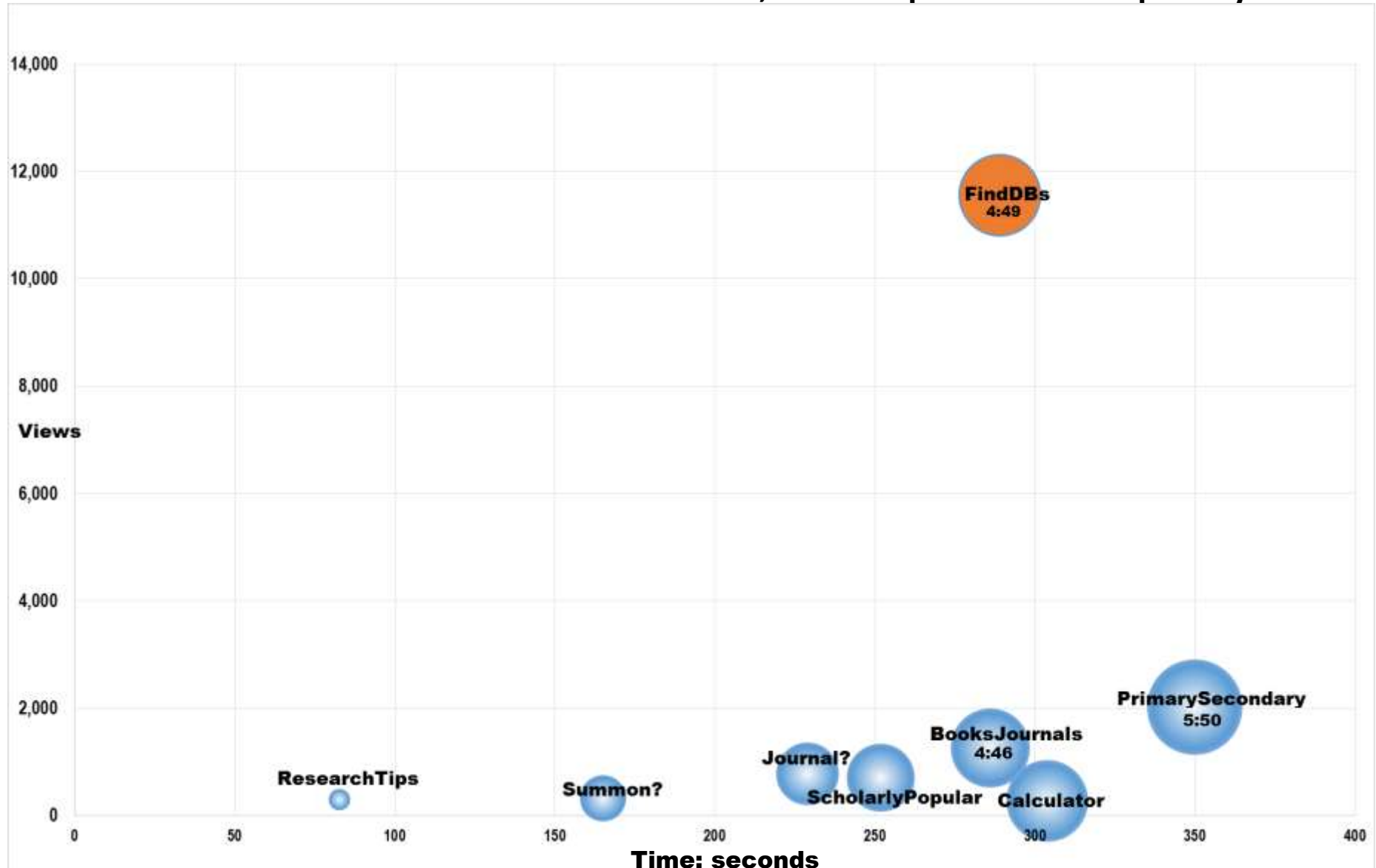


static multiple rows bar chart



static “bubble” chart

static are useful; learn a spreadsheets’ capability



Interactive (web) Charts

yes, Google charts/spreadsheets...

BUT data resides with them...

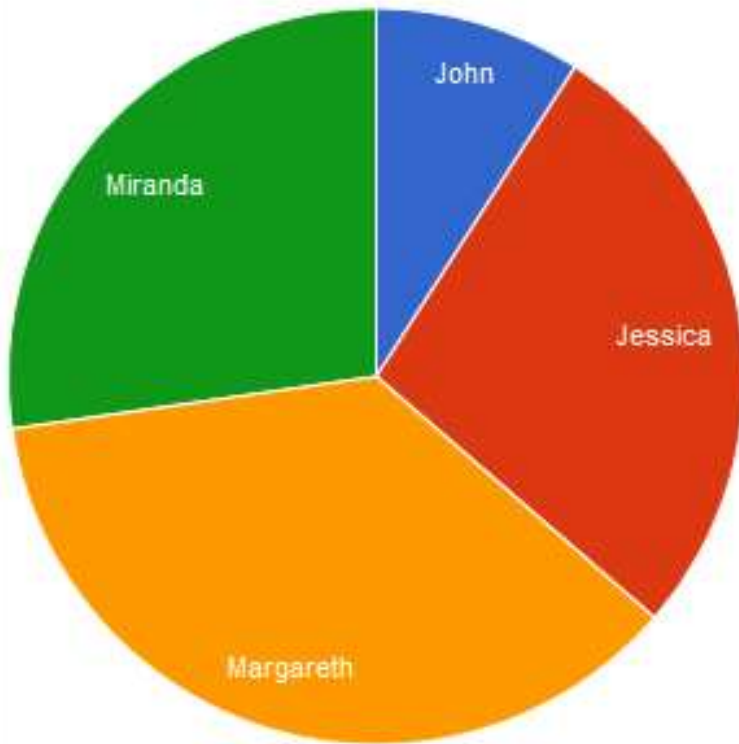
Donuts eaten per person

Age Filter:

21.0 54.0

Gender Selection:

Choose a value... ▼



Name	Gender	Age	Donuts eaten
John	Male	54	2
Jessica	Female	22	6
Margareth	Female	42	8
Miranda	Female	33	6

even with Google
need code for
advanced interactivity

```
<html>
<head>
  <!--Load the AJAX API-->
  <script type="text/javascript" src="https://www.gstatic.com/charts/loader.js">
  <script type="text/javascript">

    // Load the Visualization API and the controls package.
    google.charts.load('current', {'packages':['corechart', 'controls']});

    // Set a callback to run when the Google Visualization API is loaded.
    google.charts.setOnLoadCallback(drawDashboard);

    // Callback that creates and populates a data table,
    // instantiates a dashboard, a range slider and a pie chart,
    // passes in the data and draws it.
    function drawDashboard() {

      // Create our data table.
      var data = google.visualization.arrayToDataTable([
        ['Name', 'Donuts eaten'],
        ['Michael', 5],
        ['Elisa', 7],
        ['Robert', 3],
        ['John', 2],
        ['Jessica', 6],
        ['Aaron', 1],
        ['Margareth', 8]
      ]);

      // Create a dashboard.
      var dashboard = new google.visualization.Dashboard(
        document.getElementById('dashboard_div'));

      // Create a range slider, passing some options
      var donutRangeSlider = new google.visualization.ControlWrapper({
```

FOS: (Free & Open Source) Charts / Graphs options

C3.js D3-based reusable chart library

 **Data-Driven Documents**

 **dc.js - Dimensional Charting Javascript Library**

Epoch

 **HIGHCHARTS**

matplotlib

NVD3 Re-usable charts for d3.js

 **plotly**

pykCharts

 **Shiny**
by RStudio

 **uvCharts**

vis.js

3 code components: html(5); .js, .css

HTML

JS

Result

Edit on  CODEPEN

```
<head>
  <!-- Plotly.js -->
  <script src="https://cdn.plot.ly/plotly-latest.min.js"></script>
</head>

<body>
  <div id="myDiv" style="width: 480px; height: 400px;"><!-- Plotly chart will be drawn inside this DIV --></div>
  <script>
    <!-- JAVASCRIPT CODE GOES HERE -->
  </script>
</body>
```

HTML

JS

Result

```
var trace1 = {
  x: [1, 2, 3, 4],
  y: [10, 15, 13, 17],
  mode: 'markers'
};

var trace2 = {
  x: [2, 3, 4, 5],
  y: [16, 5, 11, 10],
  mode: 'lines'
};

var trace3 = {
  x: [1, 2, 3, 4],
  y: [12, 9, 15, 12],
  mode: 'lines+markers'
};

var data = [ trace1, trace2, trace3 ];

var layout = {
  title: 'Line and Scatter Plot',
```



Plot.ly example

Can edit either...

```

1 <html>
2 <head>
3   <!-- Plotly.js -->
4   <script src="https://cdn.plot.ly/plotly-latest.min.js"></script>
5 </head>
6
7 <body>
8
9   <div id="myDiv" style="width: 95%; height: 95%;><!-- Plotly chart will be drawn inside this DIV --></div>
10  <script>
11    <!-- JAVASCRIPT CODE GOES HERE -->
12    Plotly.d3.csv('http://maps.library.uvic.ca/Plotly/GapminderDataFiveYear.csv', function(err, rows){
13      var YEAR = 2007;
14      var continents = ['Asia', 'Europe', 'Africa', 'Oceania', 'Americas'];
15      var POP_TO_PX_SIZE = 2e5;
16      function unpack(rows, key) {
17        return rows.map(function(row) { return row[key]; });
18      }
19
20      var data = continents.map(function(continent) {
21        var rowsFiltered = rows.filter(function(row) {
22          return (row.continent === continent) && (+row.year === YEAR);
23        });
24        return {
25          mode: 'markers',
26          name: continent,
27          x: unpack(rowsFiltered, 'lifeExp'),
28          y: unpack(rowsFiltered, 'gdpPercap'),
29          text: unpack(rowsFiltered, 'country'),
30          marker: {
31            sizemode: 'area',
32            size: unpack(rowsFiltered, 'pop'),
33            sizeref: POP_TO_PX_SIZE
34          }
35        };
36      });
37      var layout = {
38        xaxis: {title: 'Life Expectancy'},
39        yaxis: {title: 'GDP per Capita', type: 'log'},
40        margin: {t: 20},
41        hovermode: 'closest'
42      };
43      Plotly.newPlot('myDiv', data, layout);
44    });
45  </script>
46 </body>
47 </html>

```

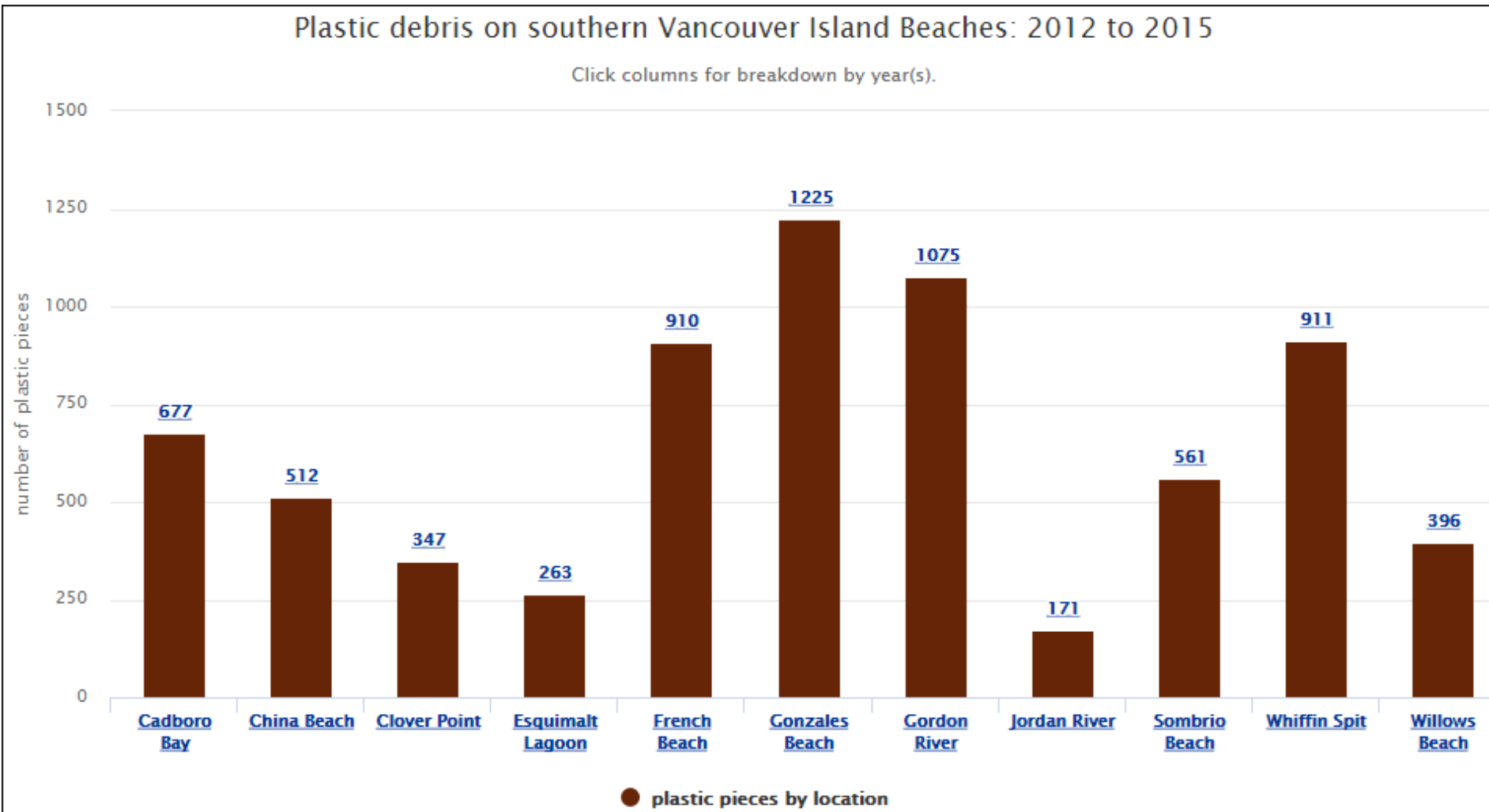
can get the .js to edit it and...

data not residing elsewhere:
<http://maps.library.uvic.ca/Plotly/GapminderDataFiveYear.csv>

Highcharts.js

Lots of examples; Minimal coding
data remains with researcher...

Plastic debris on southern Vancouver Island beaches: 2012 - 2015



from the html:

(edit) the javascript

```
132 <script src="https://code.highcharts.com/highcharts.js"></script>  
https://code.highcharts.com/highcharts.js
```

```
111 theme:{zIndex:20},position:{align:"right",x:-10,y:10}},width:null,height:null,borderColor:"#335cad",  
backgroundColor:"#ffffff",plotBorderColor:"#cccccc"},title:{text:"Chart title",align:"center",margin:15,style  
: {color:"#333333",fontSize:"18px"},widthAdjust:-44},subtitle:{text:"",align:"center",style:{color:"#666666"},  
widthAdjust:-44},plotOptions:{},labels:{style:{position:"absolute",color:"#333333"}},legend:{enabled:!0,align  
:"center",layout:"horizontal",labelFormatter:function(){return this.name},borderColor:"#999999",borderRadius:  
0,navigation:{activeColor:"#003399",inactiveColor:"#cccccc"},itemStyle:{color:"#333333",  
112 fontSize:"12px",fontWeight:"bold"},itemHoverStyle:{color:"#000000"},itemHiddenStyle:{color:"#cccccc"},shadow  
:!1,itemCheckboxStyle:{position:"absolute",width:"13px",height:"13px"},squareSymbol:!0,symbolPadding:5,  
verticalAlign:"bottom",x:0,y:0,title:{style:{fontWeight:"bold"}}},loading:{labelStyle:{fontWeight:"bold",  
position:"relative",top:"45%"},style:{position:"absolute",backgroundColor:"#ffffff",opacity:.5,textAlign:  
"center"}},tooltip:{enabled:!0,animation:a.svg,borderRadius:3,dateTimeLabelFormats:{millisecond:"%A, %b %e,  
%H:%M:%S.%L",  
113 second:"%A, %b %e, %H:%M:%S",minute:"%A, %b %e, %H:%M",hour:"%A, %b %e, %H:%M",day:"%A, %b %e, %Y",week:  
"Week from %A, %b %e, %Y",month:"%B %Y",year:"%Y"},footerFormat:"",padding:8,snap:a.isTouchDevice?25:10,  
backgroundColor:z("#f7f7f7").setOpacity(.85).get(),borderWidth:1,headerFormat:'\x3cspan style\x3d"font-size:  
10px"\x3e{point.key}\x3c/ span\x3e\x3cbr/\x3e',pointFormat:'\x3cspan  
style\x3d"color:{point.color}"\x3e\u25cf\x3c/ span\x3e {series.name}: \x3cb\x3e{point.y}\x3c/ b\x3e\x3cbr/\x3e'  
,shadow:!0,  
114 style:{color:"#333333",cursor:"default",fontSize:"12px",pointerEvents:"none",whiteSpace:"nowrap"}},credits:{  
enabled:!0,href:"http://www.highcharts.com",position:{align:"right",x:-10,verticalAlign:"bottom",y:-5},style  
: {cursor:"pointer",color:"#999999",fontSize:"9px"},text:"created utilizing Highcharts.com"};a.setOptions=  
function(f){a.defaultOptions=m(!0,a.defaultOptions,f);D();return a.defaultOptions};a.getOptions=function(){  
return a.defaultOptions};a.defaultPlotOptions=a.defaultOptions.plotOptions;D())(M);(function(a){var D=  
115 a.arrayMax,z=a.arrayMin,F=a.isDefined,J=a.destroyObjectProperties,m=a.each,f=a.erase,h=a.merge,q=a.pick;a.  
PlotLineOrBand=function(a,k){this.axis=a;k&&(this.options=k,this.id=k.id)};a.PlotLineOrBand.prototype={render  
:function(){var a=this,k=a.axis,f=k.horiz,d=a.options,g=d.label,w=a.label,B=d.to,c=d.from,e=d.value,l=F(c)&&F  
(B),u=F(e),L=a.svgElem,b=!L,t=[],y,K=d.color,x=q(d.zIndex,0),m=d.events,t={"class":"highcharts-plot-"+(l?  
"band ":"line")+ (d.className|| "")},r={},G=k.chart.renderer,H=l?"bands":"lines",  
116 N=k.log2lin;k.isLog&&(c=N(c),B=N(B),e=N(e));u?(t={stroke:K,"stroke-width":d.width},d.dashStyle&&(t.dashstyle=  
d.dashStyle)):l&&(K&&(t.fill=K),d.borderWidth&&(t.stroke=d.borderColor,t["stroke-width"]=d.borderWidth));r.  
zIndex=x;H+= "-"+x;(K=k[H])||(k[H]=K=G.g("plot-"+H).attr(r).add());b&&(a.svgElem=L=G.path().attr(t).add(K));if  
(u)t=k.getPlotLinePath(e,L.strokeWidth());else if(l)t=k.getPlotBandPath(c,B,d);else return;if(b&&t.length  
{if(L.attr({d:t}),m)for(y in d=function(b){L.on(b,function(e){m[b].apply(a,  
117 [e])})},m)d(y)}else L&&(t?(L.show(),L.animate({d:t}):(L.hide(),w&&(a.label=w.w.destroy())));g&&F(g.text)&&t  
&&t.length&&0<k.width&&0<k.height&&!t.flat?(g=h({align:f&&l&&"center",x:f?!l&&4:10,verticalAlign:!f&&l&&
```

save the edited .js to your directory

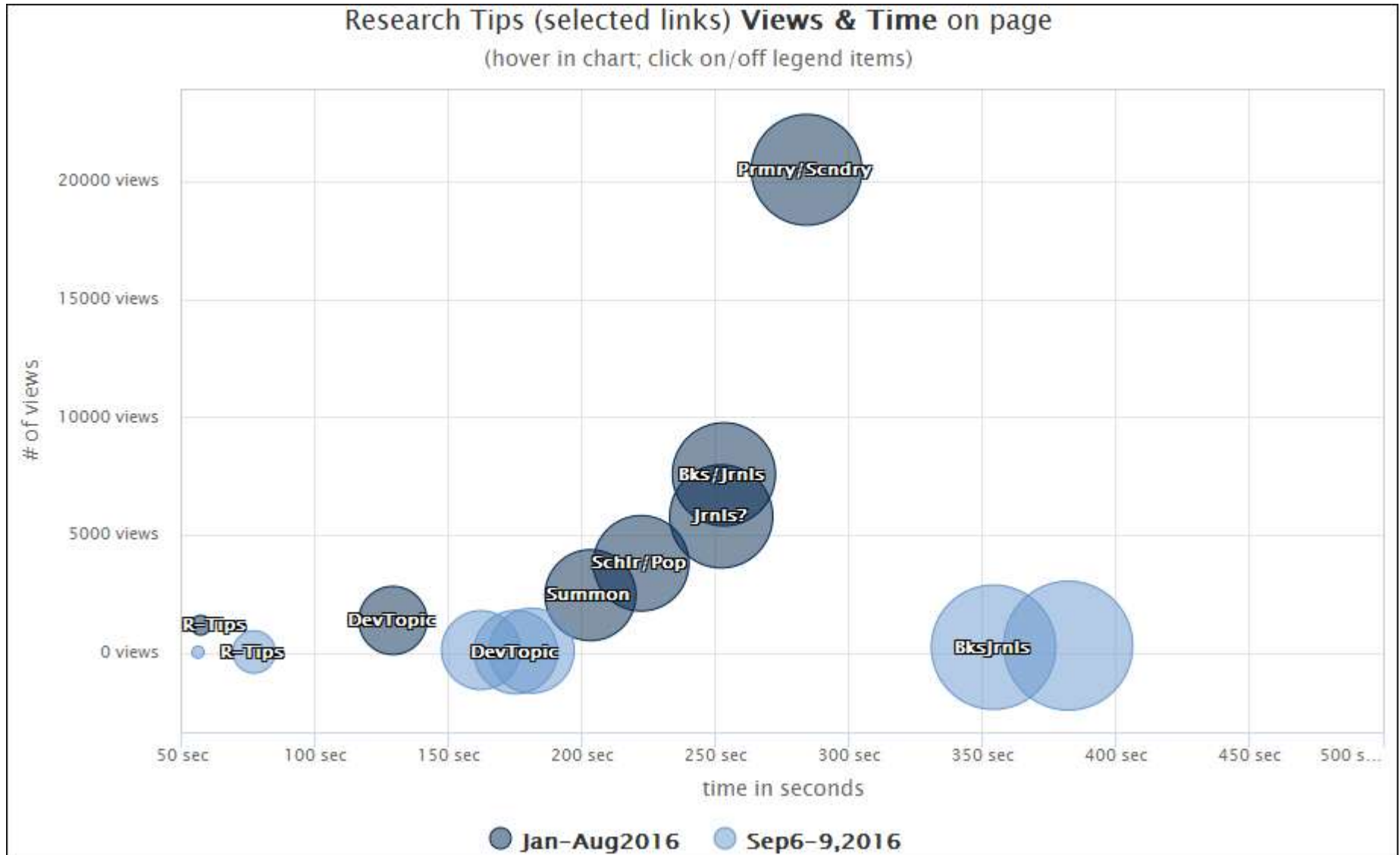
```
<script src="http://maps.library.uvic.ca/HighCharts/HighchartsHS.js"></script>
```

<http://maps.library.uvic.ca/HighCharts/HighchartsHS.js>

```
385     name: 'Willows Beach',
386     id: 'Willows Beach',
387     data: [
388         [
389             '12-Jul-2015',
390             90
391         ],
392         [
393             '13-Jul-2014',
394             84
395         ],
396         [
397             '7-Nov-2013',
398             117
399         ],
400         [
401             '7-Aug-2012',
402             105
403         ]
404     ]
405 }
406 }
407 });
408 });
409 </script>
410 </head>
411 <body>
412 <script src="http://maps.library.uvic.ca/HighCharts/HighchartsHS.js"></script>
413 <script src="https://code.highcharts.com/modules/data.js"></script>
414 <script src="http://maps.library.uvic.ca/HighCharts/DrilldownX.js"></script>
```

example:

[UVicLibraries research tips links: Views & time on page](#)



**Data (visualisation) librarians
and
Interactive web charts/graphs have arrived...**

or

Coming very soon...



library.duke.edu



lib.ncsu.edu