

# Using the Google Visualisation API with R

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useR! 2011

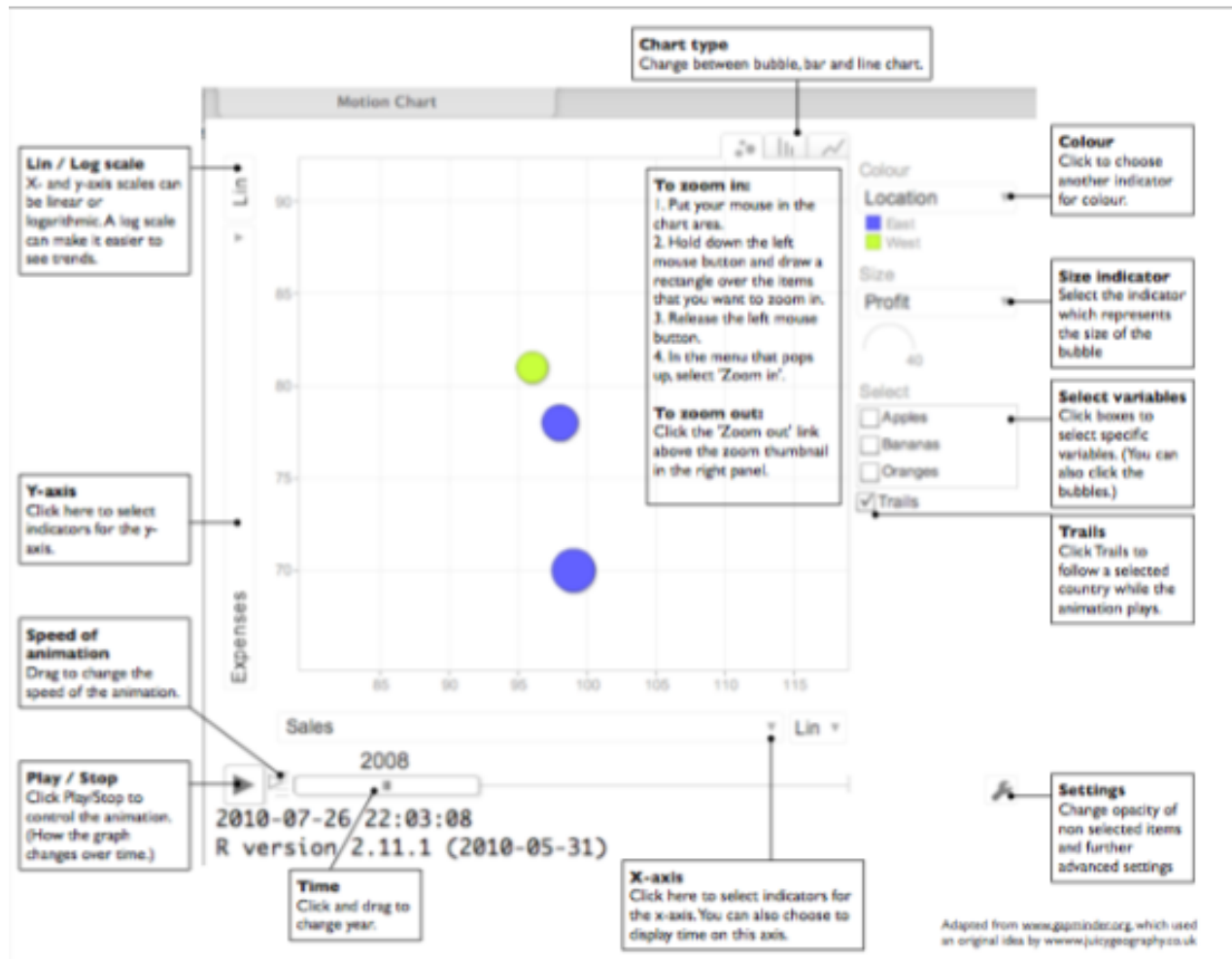
16 - 18 August 2011

# Motivation

- New ‘Statistics Relating to Lloyd’s’
  - Desire to help readers using the data
- Hans Rosling's (Gapminder) TED talk
  - [Hans Rosling shows the best stats you've ever seen](#)
- Sebastián Pérez Saaibi talk on motion charts at Rmetrics 2010
  - [Visualisation of multivariate data over time](#)
- Increased access to public data, e.g.
  - [World Bank](#), [Google Open Data Explorer](#)



# Output example: Google Motion Chart



- A dynamic chart to explore several indicators over time.
- The chart is rendered within the browser using Flash.

Source: <http://google-motion-charts-with-r.googlecode.com/svn/trunk/inst/doc/MotionChart.pdf>

# Input example: Google Motion Chart

```
1 <html>
2 <head>
3 <script type="text/javascript" src="http://www.google.com/jsapi"></script>
4 <script type="text/javascript">
5   google.load('visualization', '1', {'packages':['motionchart']});
6   google.setOnLoadCallback(drawChart);
7   function drawChart() {
8     var data = new google.visualization.DataTable();
9     data.addColumn('string', 'Fruit');
10    data.addColumn('date', 'Date');
11    data.addColumn('number', 'Sales');
12    data.addColumn('number', 'Expenses');
13    data.addColumn('string', 'Location');
14    data.addRows([
15 ['Apples',new Date (1988,0,1),1000,300,'East'],
16 ['Oranges',new Date (1988,0,1),1150,200,'West'],
17 ['Bananas',new Date (1988,0,1),300,250,'West'],
18 ['Apples',new Date (1989,6,1),1200,400,'East'],
19 ['Oranges',new Date (1989,6,1),750,150,'West'],
20 ['Bananas',new Date (1989,6,1),788,617,'West']
21 ]);
22 var chart = new
23 google.visualization.MotionChart(document.getElementById('chart_div'));
24   chart.draw(data, {width: 600, height:300});
25 }
26 </script>
27 </head>
28 <body>
28 <div id="chart_div" style="width: 600px; height: 300px;"></div>
29 </body>
30 </html>
```

Source: <http://code.google.com/apis/visualization/documentation/gallery/motionchart.html>

# Google Visualisation API

- Google Charts Tools provide interactive charts for web pages
- API uses JavaScript and DataTable / JSON as input
- Output is either HTML5/SVG or Flash
- Browser with internet connection required to display chart
- Read the [Google Terms of Use](#)
  - Charts using geo location data may require a license



Source: <http://code.google.com/apis/chart/interactive/docs/gallery.html>

# The googleVis package for R

- Interface between R and the Google Visualisation API
- Development started in August 2010 by
  - Markus Gesmann and Diego de Castillo
- Project web site (with examples and case studies):
  - <http://code.google.com/p/google-motion-charts-with-r/>
- Key ideas:
  - Transform R data frames into
    - JSON objects with RJSONIO
    - Create HTML code with JavaScript references
    - Display the HTML output with the R HTTP help server
- Read [overview document](#) and/or [vignette](#)



# Overview googleVis

- googleVis plot method uses R HTTP help server
- Some charts use Flash and require web server
- Chart options follow those of the Google documentation
- See the demos for more examples
  - `demo(package="googleVis")`

# Current googleVis interfaces

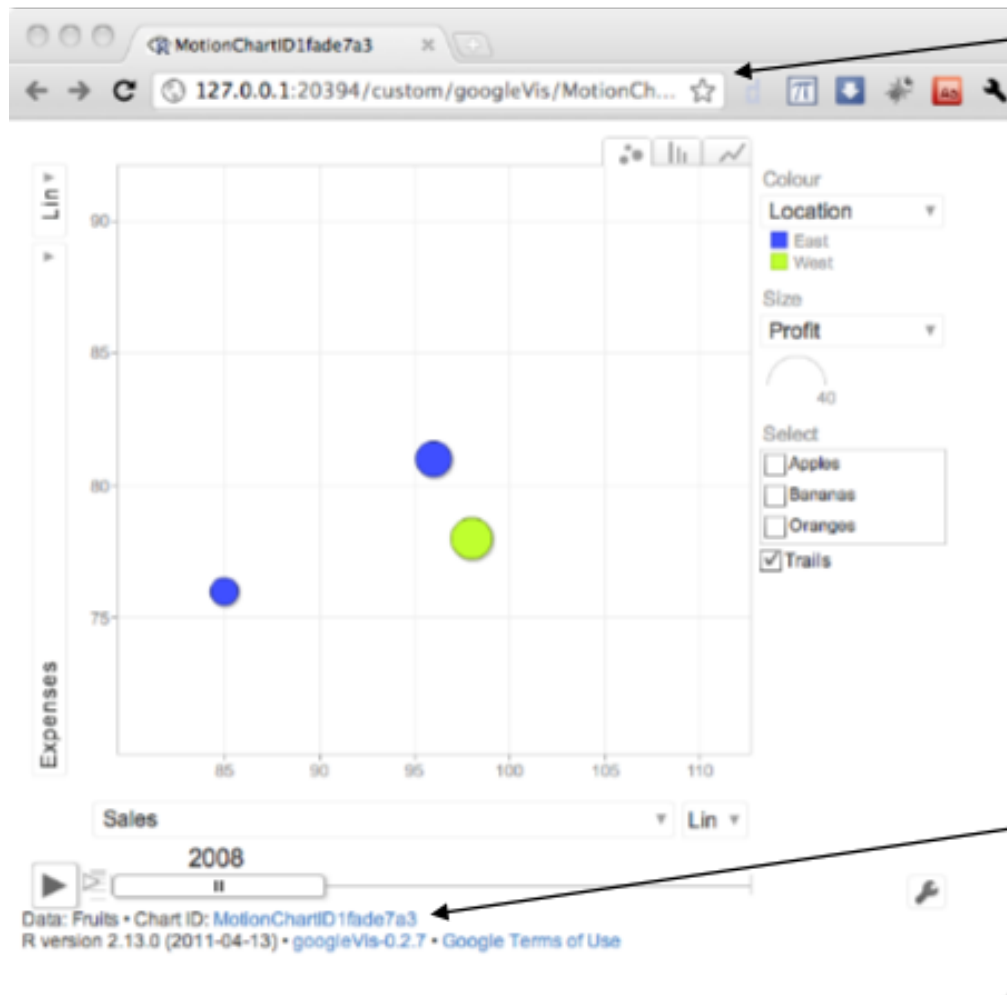
- Version 0.2.8 provides interfaces to:
  - Motion Charts
  - Annotated Time Lines
  - Maps
  - Geo Maps and Charts
  - Intensity Maps
  - Tables
  - Gauges
  - Tree Maps
  - Line-, Bar-, Column-,
  - Area-, Combo-,
  - Scatter-, Candlestick-, Pie- and Org Charts
- See the project page for [examples](#)



Screen shot of some of the outputs of demo(googleVis)



# Output example: `gvisMotionChart()`



By default files are written into temp folder and displayed via R HTTP

```
library(googleVis)
M <- gvisMotionChart(
  Fruits,
  idvar="Fruit",
  timevar="Year"
)
plot(M)
```

Click on the chart id to get access to the underlying HTML code

Screen cast: [goo.gl/zfQdG](http://goo.gl/zfQdG)

# The googleVis concept

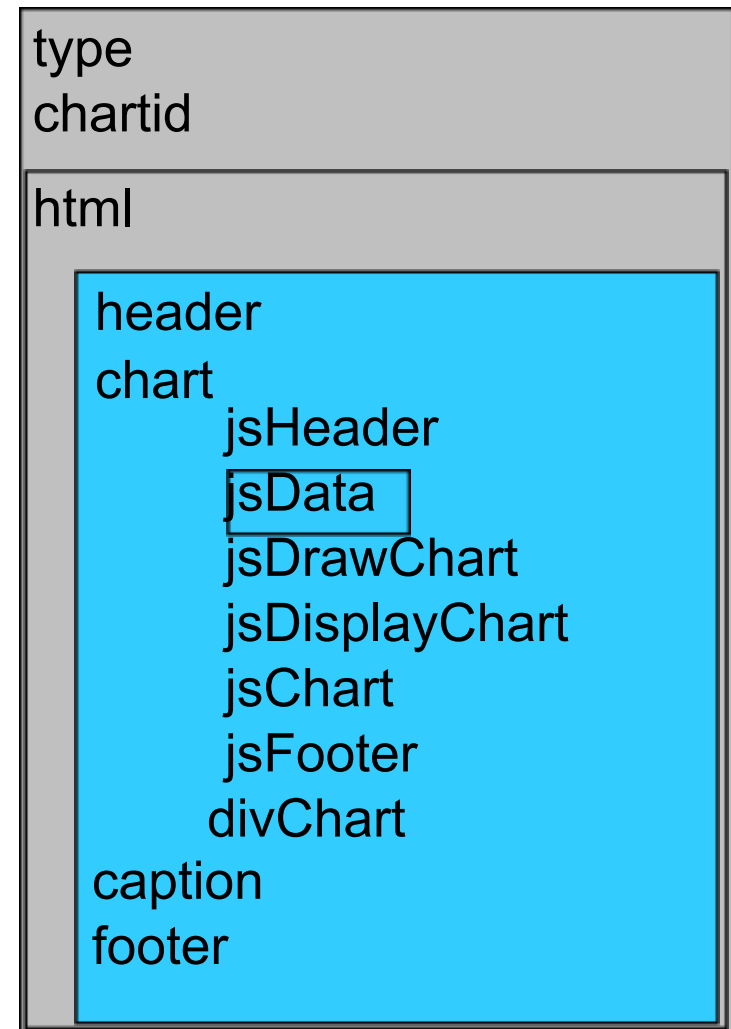
- Charts: 'gvis' + **ChartType**
- Output of googleVis is a list of list
- Specific parts can be extracted, e. g. the data or chart

**gvisMotionChart(data, idvar,  
timevar, options)**

data in R



**gvis-object:**



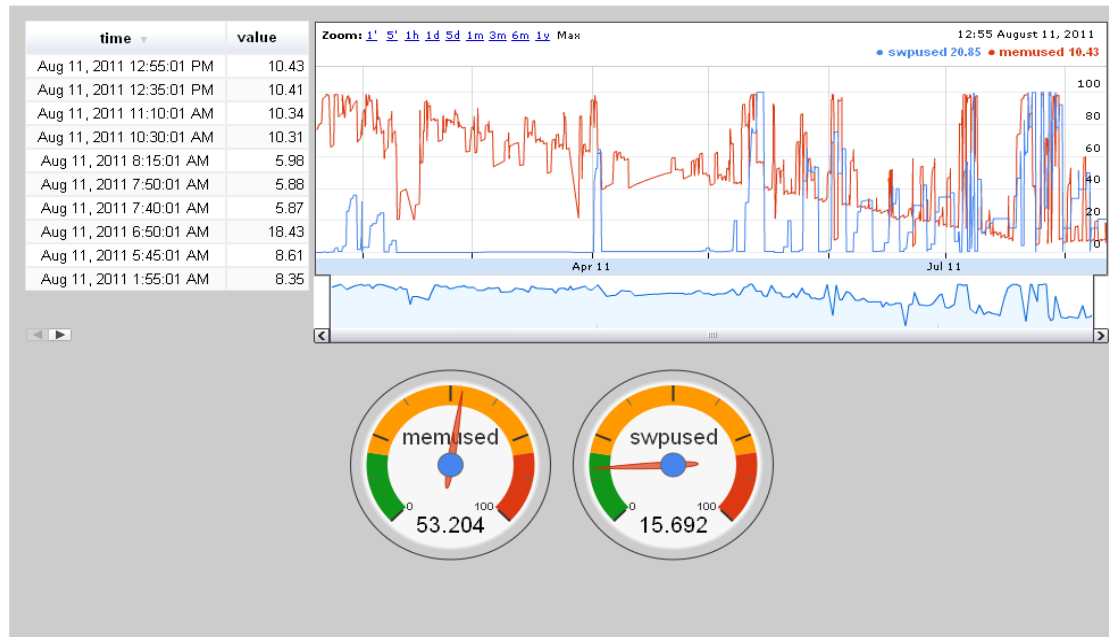
# Embedding googleVis dynamically

- Mix HTML and R code in one file
- Use Apache with the RApache module to host those files
- The R brew function with RApache executes the R chunks to create the HTML output (like Sweave for .Rnw)

```
1 <html>
2 <body>
3 <% library(googleVis) %>
4 <% M <- gvisMotionChart(Fruits,
5                          idvar="Fruit", timevar="Year")
6 %>
7 <%= M$html$chart %>
8 </body>
9 </html>
```

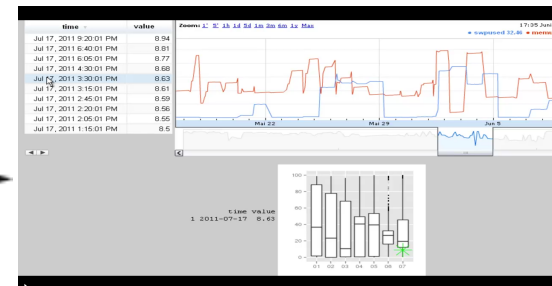
- See the googleVis package vignette for more details

# System Monitoring: Memory Usage



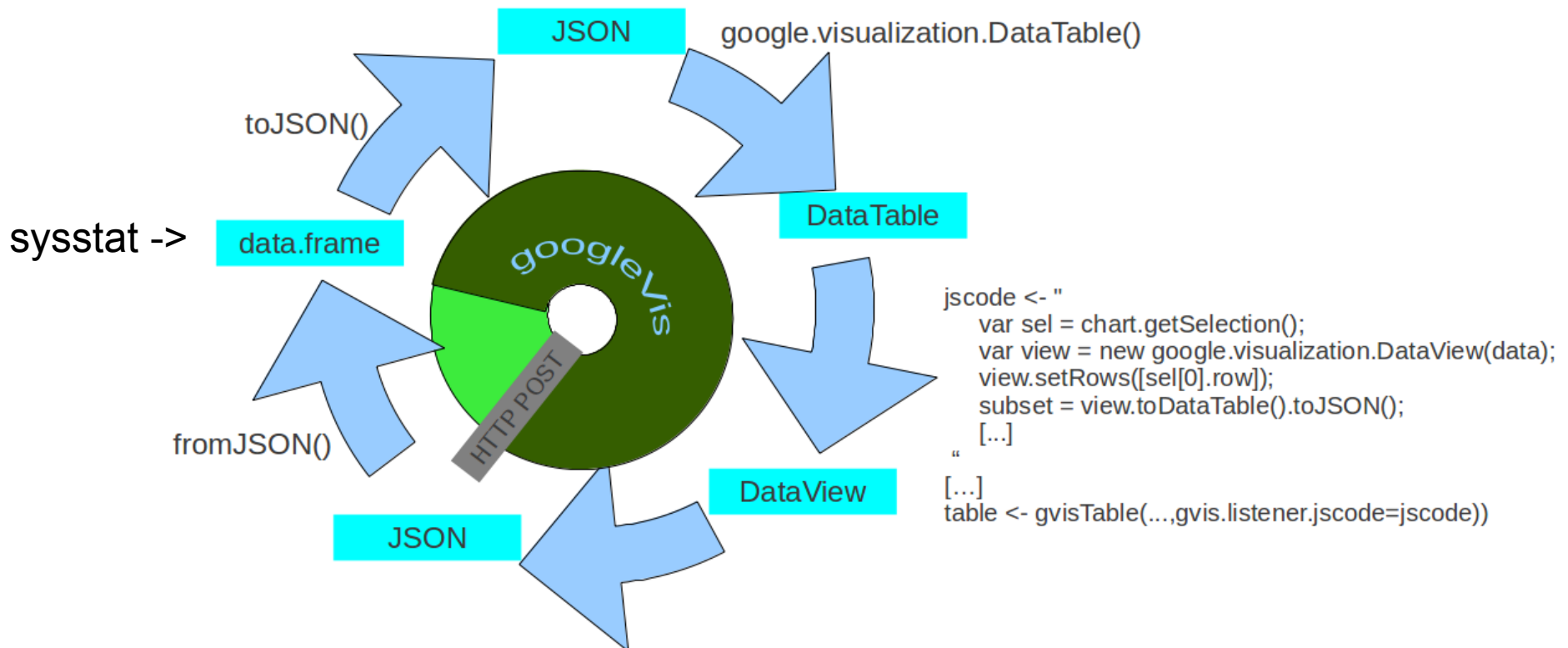
Select event handler

Screen cast: [goo.gl/Y9lhhy](http://goo.gl/Y9lhhy)



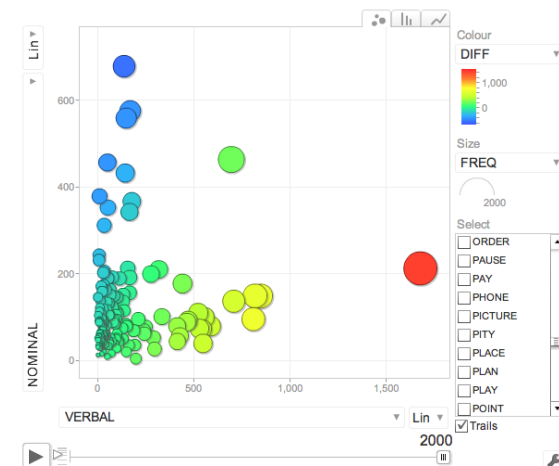
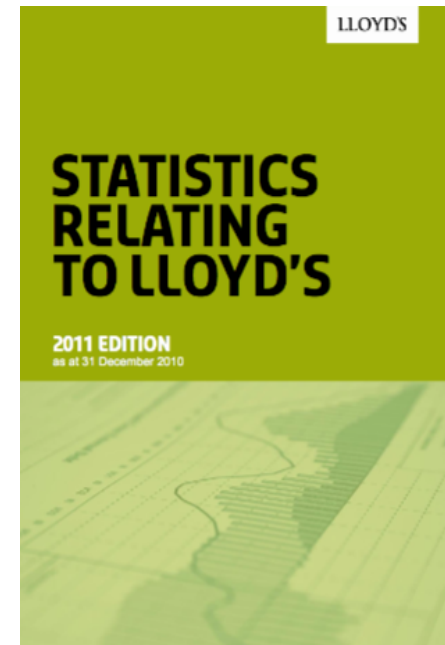
# Case study: System Monitoring

- Visualise long time historical computing performance
- Use linux tool **sysstat** to collect performance data
- Create dynamic page with googleVis & RApache/brew
- User selections can be processed further



# Other case studies

- Statistics Relating to Lloyd's
  - [www.lloyds.com/stats](http://www.lloyds.com/stats)
- [Analysis of the US domestic airline market from 1999 - 2010](#)
- [Linguistic analysis of the English language](#)



# Conclusions

- googleVis enables R-users to
  - create quickly powerful analysis tools,
  - which can be shared online.
- The Google charting interface is easily accessible to
  - data analysts and
  - non-data analysts.
- Potential next steps
  - Feedback loop to R
  - Development of dashboards

# Thank you

- Any questions?
  
  
  
  
  
  
  
  
  
  
- Any feedback is much appreciated, e.g. via our [feedback form](#)
- Please contact us with ideas, suggestions or if you would like to collaborate
  - [rvisualisation@gmail.com](mailto:rvisualisation@gmail.com)



# Some other R packages of interest ...

- R.rsp [R Server Pages and Light-weight HTTP daemon \(server\)](#)
- [RJSONIO](#) reading and writing data in JSON
- [XML](#) reading and writing XML/HTML
- [plotGoogleMaps](#): Plot HTML output with Google Maps API and your own data
- [R2GoogleMaps](#): Provides a mechanism to generate [JavaScript](#) code from R that displays data using Google Maps
- [RgoogleMaps](#): Overlays on Google map tiles in R
- [R animation package](#) allows to create SWF, GIF and MPEG directly, e.g. [bubble animation](#)
- [playwith](#): A GUI for interactive plots using [GTK+](#)
- [iplots](#): iPlots - interactive graphics for R
- [rggobi](#): Interface between R and GGobi

# Thanks to ...

- Henrik Bengtsson for providing the 'R.rsp: R Server Pages' package and his reviews and comments
- Duncan Temple Lang for providing the 'RJSONIO' package
- Sebastian Pérez Saaibi for his inspiring talk on 'Generator Tool for Google Motion Charts' at the R/RMETRICS conference 2010
- All the guys behind [www.gapminder.org](http://www.gapminder.org) and Hans Rosling for telling everyone that data is not boring
- Deepayan Sarkar for showing us in the lattice package how to deal with lists of options
- Google, who make the visualisation API available
- Paul Cleary for a bug report on the handling of months: Google date objects expect the months Jan.- Dec. as 0 - 11 and not 1 - 12.
- Ben Bolker for comments on plot.gvis and the usage of temporary files
- John Verzani for pointing out how to use the R http help server
- Cornelius Puschmann and Jeffrey Breen for highlighting a dependency issue with RJSONIO version 0.7-1
- Manoj Ananthapadmanabhan and Anand Ramalingam for providing ideas and code to animate a Google Geo Map