

Interactive Data Visualization of Adverse Events Clinical Trial Data with the D3.js script

Johann-Dan Laurent, Hugh McDevitt

Advanced Quantitative Sciences, programming team – Novartis Pharma Development, Basel

Objectives

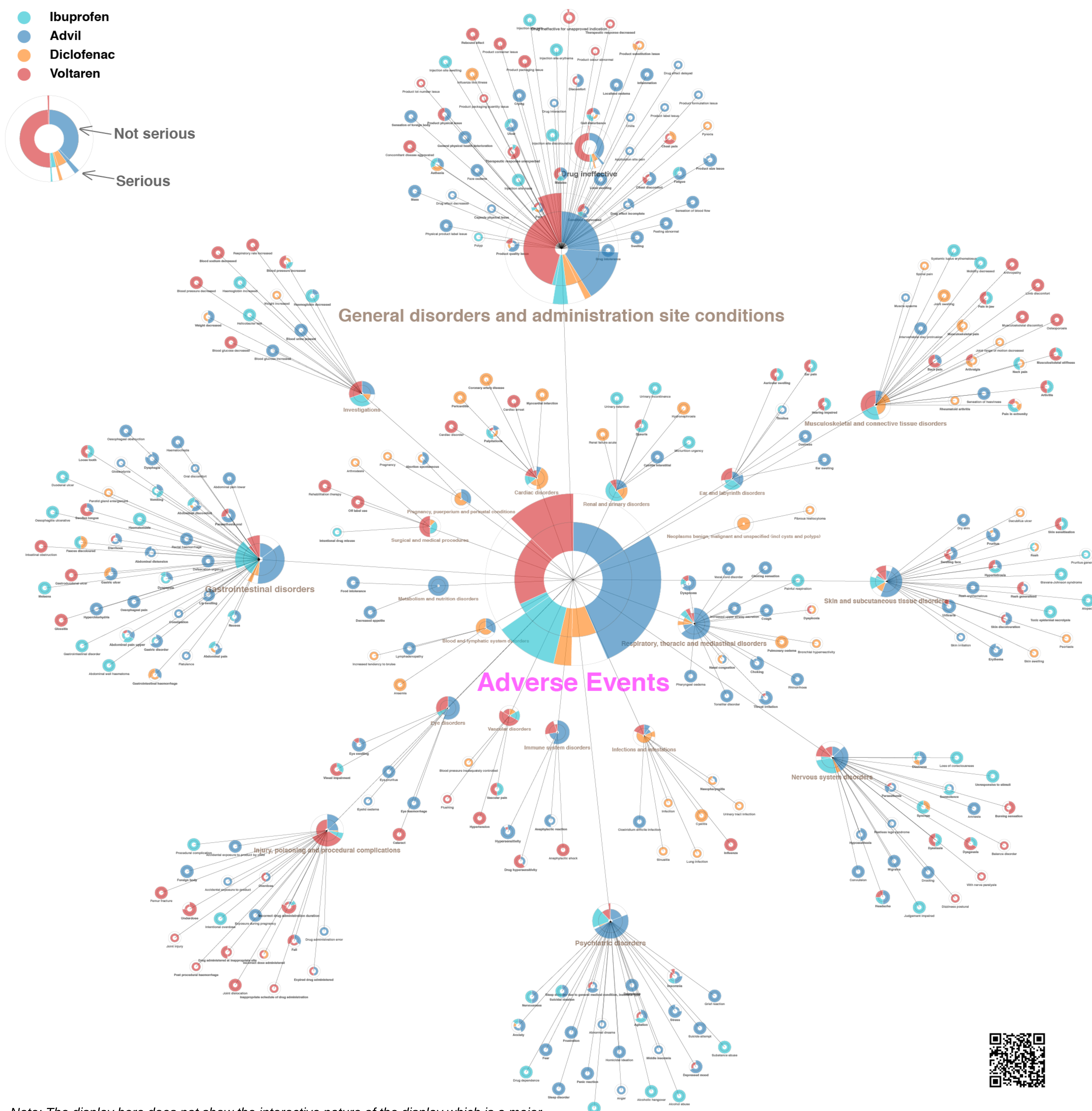
Interactive data visualization of data can provide a clear and straight forward way of quickly communicating information.

The purpose of this poster is to demonstrate the potential to display adverse events information using a force directed graph motif. This approach makes it possible to interact with the display, for example, to drag pie charts around and zoom in and out with standard browser functionality. Graphic lines represent the hierarchy between MedDRA System Organ Class (SOC) and Adverse Reaction Terms. Size of each pie slice is proportional to the frequency of adverse events. Outer radius of pie charts is double when the adverse event is serious. Inner radius is reduced by half when it is SOC category element. Color represents the medicinal product group.

Methods

The data structure is the key element. Raw data have been transformed to structured json format which contains node information then children details. Several functions from D3.js library was used to perform this data visualization. Firstly, the `d3.layout.tree()` function parses our preformatted data structure and builds links between elements, then this `d3.layout.force()` function allow us to draw force directed graph. And finally, the `d3.layout.pie()` and the `d3.svg.arc()` functions are used to display nodes. The web page needs to be served from a web server to enable the JavaScript library to run and to be accessed from a JavaScript enabled web browser.

Figure 1. Interactive data visualization force directed graph of Adverse Events



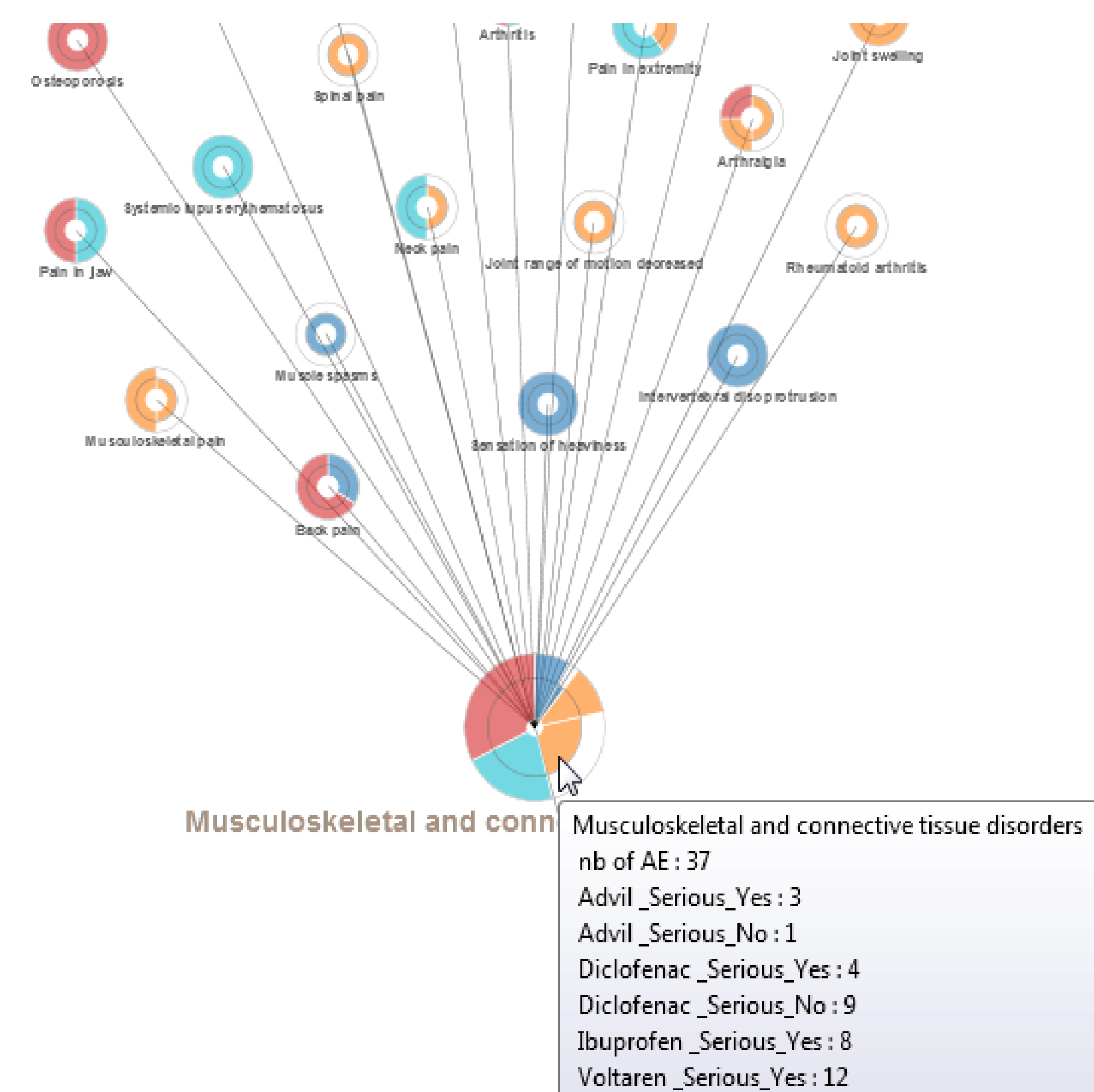
Note: The display here does not show the interactive nature of the display which is a major value driver in terms of the use of this approach. Figure 2 demonstrates that additional information can be surfaced to the user when hovering over a particular pie chart.

Results

Figure 1 below shows the typical representation of the selected data. As can be seen a considerable amount of data can be displayed in one view.

Figure 1 Interactive data visualization force directed graph of Adverse Events with the D3.js script library showing the distribution of adverse events broken down by SOC and then treatment regimen.

Figure 2. Drill down to more specific data on hovering over a particular pie slice.



Conclusions

This interactive data visualization provides a powerful overview of adverse events. One way of displaying a complex arrangement of hierarchical data is shown. However, clearly there are many different approaches that can be considered. Many alternatives are possible. Equally important is that such analysis can be performed quickly and easily.

Use of the D3 library makes it easy and straight forward to produce these kinds of visualization.

This approach can be extended to facilitate search of a specific adverse event or drill down to the actual data when a pie chart is hovered over. It clearly offers huge potential to display all sorts of data inside and outside clinical research.

Acknowledgments

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References

Information extracted from the Canada Vigilance Adverse Reaction Online Database on the 17th of April 2014:

<http://webprod3.hc-sc.gc.ca/arquery-recherche/index-eng.jsp>

Further details about interpretation of suspected adverse reaction data on Health Canada website:

http://www.hc-sc.gc.ca/dhp-mps/medeff/databasdon/conditions_search-recherche-eng.php

Nota bene, numerical comparisons should not be made between reactions associated with different health products on the basis of the data in these line-listings. D3 Data-Driven Document JavaScript library version 3.4.6 downloaded on the 17th of April 2014: <http://d3js.org/>