Javascript, jQuery, and you: The road to d3

DataViz Landscape

Goals for Enrich

- ***Keep up*** with modern visualizations
- ***Surpass*** with analytics and application-specific solutions

Excel

Basic charts
My way
Pivot tables
Database linkages
Data bars

EPS:
Less configurable but useful for rapid review

EPS:
Application specific and easier to use

EPS:
Not nearly so pretty
Not nearly so flexible
Application specific

DataViz Consulting

PERISCOPIC

big ideas worth pursuing
stamen design

EPS:
Not nearly so pretty

What will we be able to do?

- Not be limited by Corda crazy

  "…sorry, we can't overlay that information on the graph…"
- Make visualizations more
  - Responsive
  - Interactive
  - Beautiful
  - Insightful

+ Knowledge of client problem space = *More value for customer*

Lessons Learned

- Forms
- Tablesplicing
- Datepickers
- Show-Hide
- Sum functions
- Tool tips
- Validations
- Combo box pull downs
- Table grouping

- “Cruise control” is not enough
  - Can’t troubleshoot
  - Can’t tweak
- Consultants need a real understanding of the underpinnings, syntax
- Knowing what is possible will make you a better consultant
- Learning must be deliberate
- It will take time

Lessons Learned 2

- Forms
- Tablesplicing
- Datepickers
- Show-Hide
- Sum functions
- Tool tips
- Validations
- Combo box pull downs
- Table grouping

- Need a style guide
- Need to write modular code
  - D3 layouts
  - Functions
  - HTML table readers
- Need to be diligent about tracking and fixing JavaScript errors
- Can we create unit tests?

What do we need to know?

- Client problem we want to solve
- Find/invent a visualization
- Steal/build the visualization
- Populate it with data from table(s) in a form
- Make it interactive
  - Bind data to controls
  - Tooltips with more info

- JavaScript
- jQuery
- CSS
- Reading and writing JavaScript object notation (JSON)
- jQuery
- d3

One user's perspective on what you need to use d3:
https://groups.google.com/forum/?fromgroups#!topic/d3-js/4M3jAS058Xk

Find/Invent Visualization

- Look at the d3 gallery: https://github.com/mbostock/d3/wiki/Gallery
- Look at the Tableau gallery: http://www.tableausoftware.com/public/gallery
- lmgtfy “d3 <graph type>”

How I learn

- Look at tutorials, pull them onto my computer and run them (use IIS and http://localhost/...)
- Pull examples of what I want to build onto my computer
- Poke at them until I think I understand them
  - Debug, look at data structures
- Edit and extend so that I understand a bit better
  - Make it do something more, closer to what I want
  - Constantly dive back into google groups, stackoverflow, reference documentation to figure out why it isn't working/look for alternative
    - https://groups.google.com/forum/?fromgroups#!forum/d3-js
    - https://github.com/mbostock/d3/wiki/API-Reference
- Explain it to someone else

JavaScript Concepts

- First turn on a debugger http://macwright.org/enable-web-developer-extensions/#firefox
- Basics of javascript
  - http://javascriptissexy.com/how-to-learn-javascript-properly/
  - http://eloquentjavascript.net/ online book with tutorials
  - https://developer.mozilla.org/en-US/ from the firefox people
- JSON
  - http://www.json.org/js.html
- Arrays
  - http://www.w3schools.com/js/js_obj_array.asp
- Prototypes and functions
- Closure notation
  - http://bit.ly/js-closure-explain
  - http://javascriptweblog.wordpress.com/2010/10/25/understanding-javascript-closures/
- Operation chaining
  - http://tobiasahlin.com/blog/quick-guide-chaining-in-jquery/
  -

jQuery Concepts

- jQuery API (for reference – I constantly go back here to understand usage and syntax): http://api.jquery.com/
- Selectors (an extension of CSS selectors, which you also need to know)
  - http://www.w3schools.com/jquery/jquery_ref_selectors.asp
- jQuery events: http://api.jquery.com/category/events/
- $(document).ready() http://learn.jquery.com/using-jquery-core/document-ready/

d3 Concepts

- Note: You may realize your Javascript is not up to par, especially with respect to object and array notation, array operations, casts and coersion - good time to fill in the blanks with http://javascriptissexy.com/how-to-learn-javascript-properly/
- Getting started
  - http://scottcheng.github.io/d3js-101/#/title
  - http://alignedleft.com/tutorials/ Scott Murray's tutorials – highly recommended to get started
  - http://d3js.org/ Main d3 site
  - http://www.d3noob.org/ unaffiliated tutorials
  - https://github.com/mbostock/d3/wiki/Tutorials Mike Bostock's list of all tutorials he knows about
- SVG objects
- Filtering and other data manipulations
  - http://www.jeromecukier.net/blog/2012/05/28/manipulating-data-like-a-boss-with-d3/
  - http://bl.ocks.org/phoebebright/raw/3176159/
- Domains and scales
  - http://alignedleft.com/tutorials/d3/scales/
- Accessor functions
  - http://www.jeromecukier.net/blog/2011/08/09/d3-adding-stuff-and-oh-understanding-selections/
- Data binding
  - Three circles tutorial: http://mbostock.github.io/d3/tutorial/circle.html
- How to roll your own reusable charts
  - http://bost.ocks.org/mike/chart/

What JavaScript is Needed for d3?

- Javascript Object Notation (JSON) is central to d3
  - JSON for beginners
  - JSON and d3 example
- Closure Notation is central to d3
  - http://bit.ly/js-closure-explain
  - http://javascriptweblog.wordpress.com/2010/10/25/understanding-javascript-closures/
  - Example of using closures with d3 rendering code from stackoverflow
- Math functions come up often
  - W3Schools reference
  - Converting strings to numbers comes up a lot: http://javascript.info/tutorial/object-conversion

Make it beautiful/useful

- Really old school: Tufte
  - http://www.edwardtufte.com/bboard/q-and-a?topic_id=1
- Old school: Stephen Few
  - http://www.perceptualedge.com/
- New school:
  - Nathan Yau, http://flowingdata.com
- How do we create and curate style sheets?

Where do I start?

- HTML, CSS, JS, jQuery basics
  - 6-8 week course described at: http://javascriptissexy.com/how-to-learn-javascript-properly/
  - Also:
    - Code Academy
    - W3 Schools
- Dev Tools
  - Chrome debugger: http://www.html5rocks.com/en/tutorials/developertools/part1/
  - Firebug (in Firefox) debugger: http://www.w3resource.com/web-development-tools/firebug-tutorials.php
  - Javascript IDEs: Web Storm, Sublime Text 2
- Stepping stones (following slides)

Stepping Stones

- Open the Pharma Demo System
  - Clients.txt - Pharma
- Create a new form for the indication project model (project.ana)

Ex 1

- Add the Financial_summary_c as an output
- Restyle the table using CSS
  a. To have grey interior cells
  b. To have white row and column headers
  c. To have no padding around each cell (maximally compact)
  d. To have the top left corner cell invisible

Ex 2

- Add the Financial_summary_c as an output
- Restyle the table using jQuery
  a. To have blue text when the value is greater than 0
  b. To have alternating stripes
  c. To highlight (light yellow background) on an entire row when any cell in that row is hovered over
  d. Add a totals cell to the end of every row-format it like the other cells' number formatting

Ex 3

- Use jQuery to create a second table that is a copy of Financial_summary_c
  - The values are the values in Financial_summary_c multiplied by the column position of each cell
- Use jQuery to create a third table that contains the ratio of the values in Financial_summary_c to the values in the second table
  - Format this value as a percent
- Hide the first and second tables
- When the user hovers over each cell of the third table, display a tooltip with the two values from the original tables
- Using firebug or the Chrome debugger, set breakpoints to halt execution when a hover event occurs

Ex 4

- Create a form for the indication portfolio template (portfolio.ana)
- Add the node Bubble_data_scaled2 as an output to the form
- Render the data in the node as a d3 bubble chart
  - Example of d3 bubble here: http://www.verisi.com/resources/d3-tutorial-basic-charts.htm
- Color the bubbles by therapeutic area (Ta_by_project will help)
- Render zero/negative NPV projects as black dots
- Create a transition effect, triggered by a click on a button, that swaps the x and y axis values for all data points

Balance

Good Habits

- HTML and CSS
  - http://net.tutsplus.com/tutorials/html-css-techniques/30-html-best-practices-for-beginners/
  - http://www.webdesignerdepot.com/2009/05/10-best-css-practices-to-improve-your-code/
  - http://msdn.microsoft.com/en-us/magazine/ff679957.aspx?goback=.gde_3820608_member_46639502