Prototyping the Comparative Methodology

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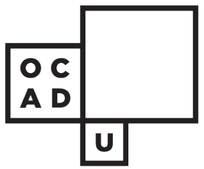
OCAD University



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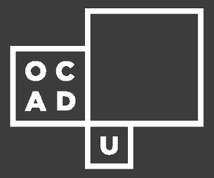
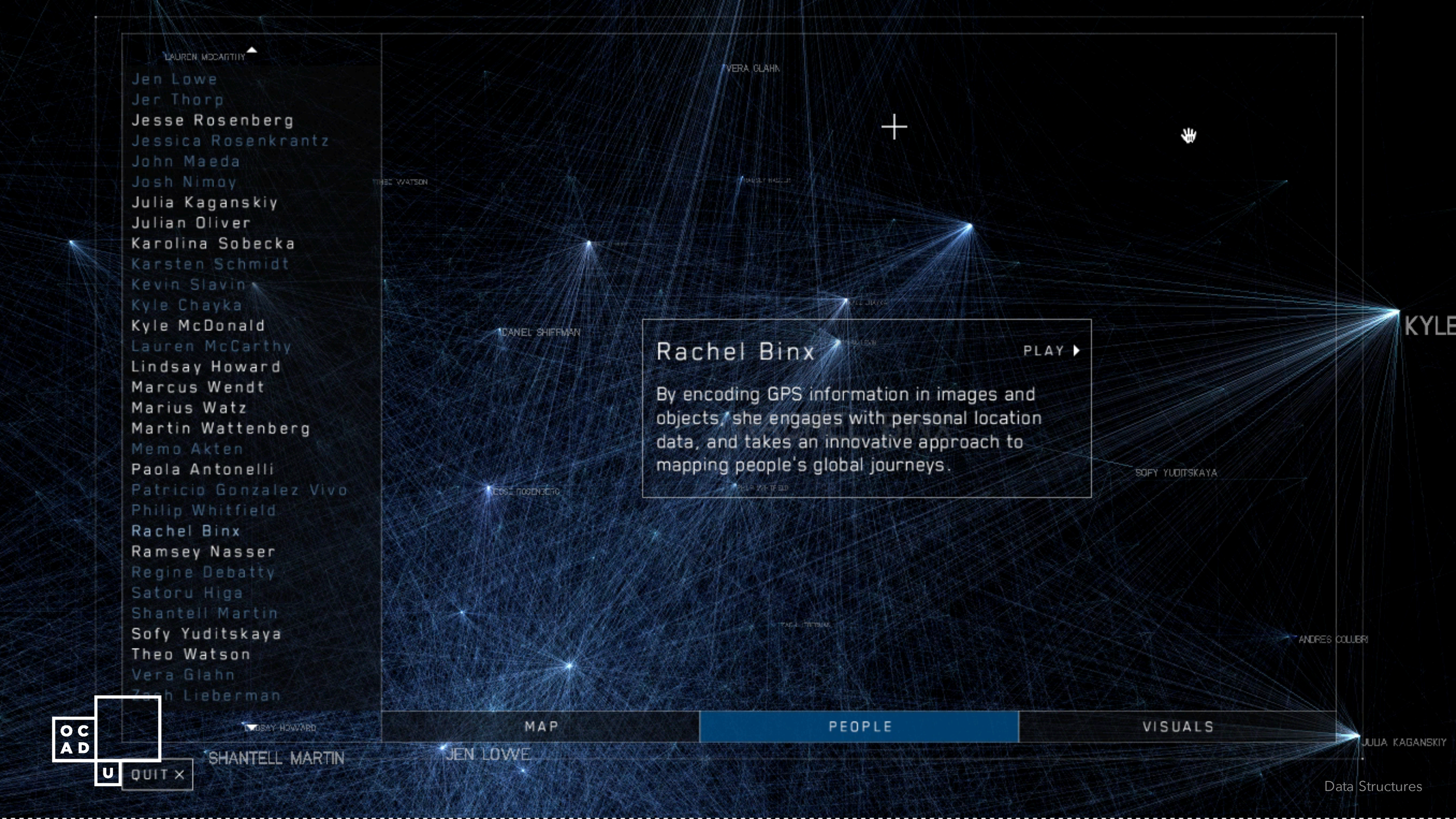
Research Brief

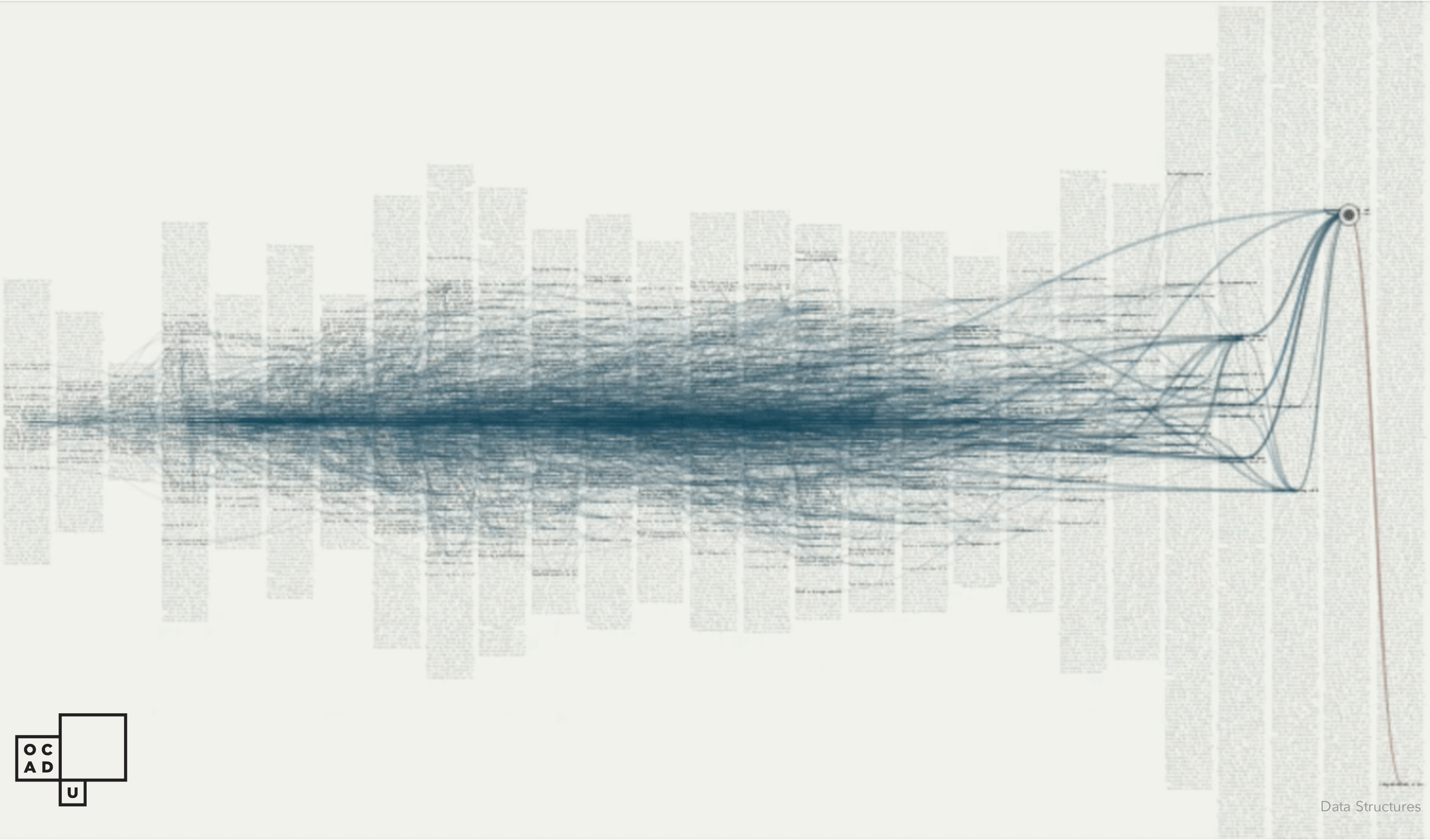
The role that my current research plays in the comparative methodology is to contribute to the cataloguing and mobilization of common visual analytics, visualization methods, information technologies, and tools. The comparative toolsets list we created at OCAD U acted as the driving force for the process I engaged in to produce these prototypes.

Prototyping Data Structures.





Data Structures



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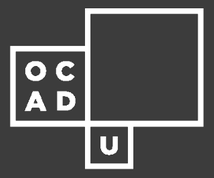
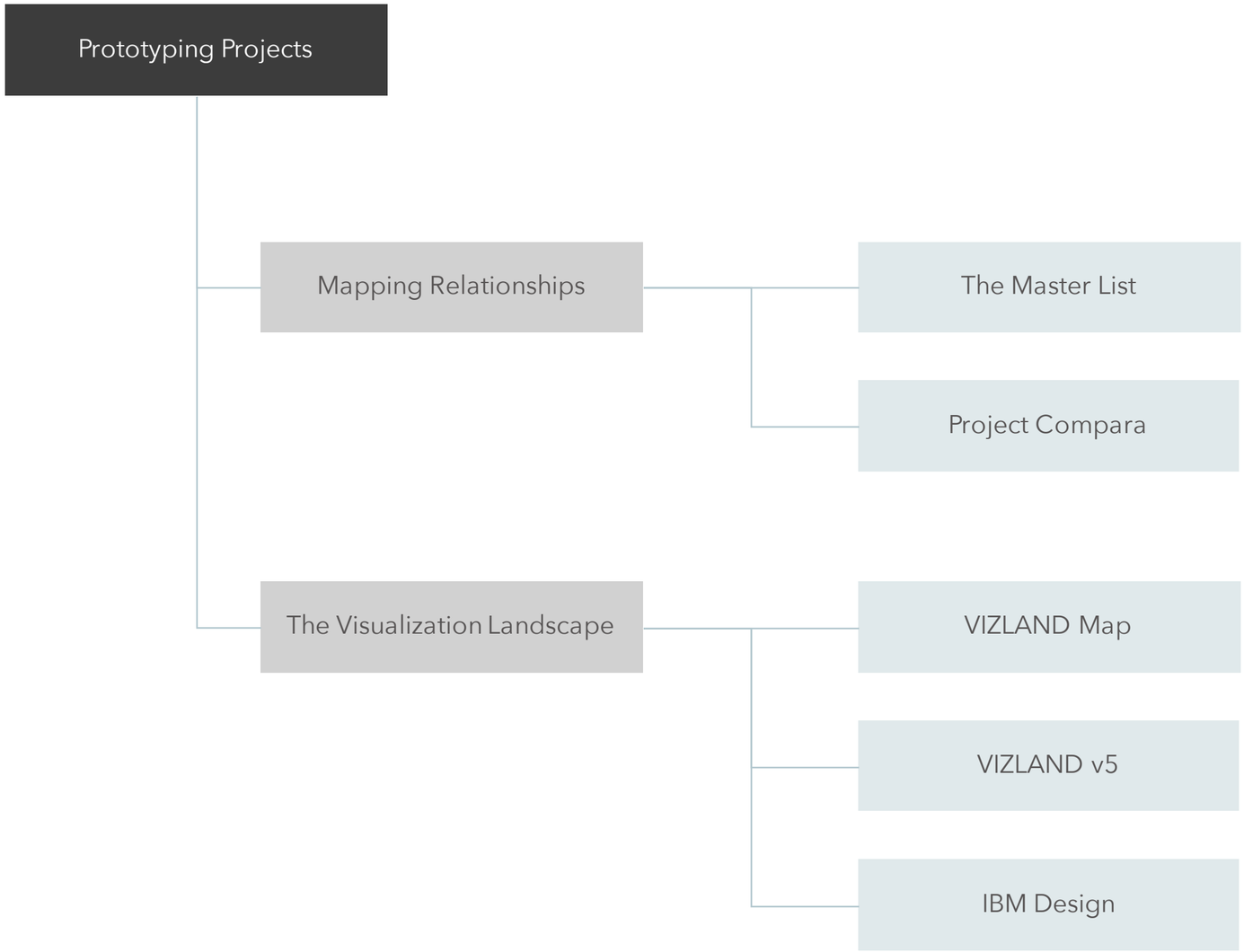
Prototyping Objectives

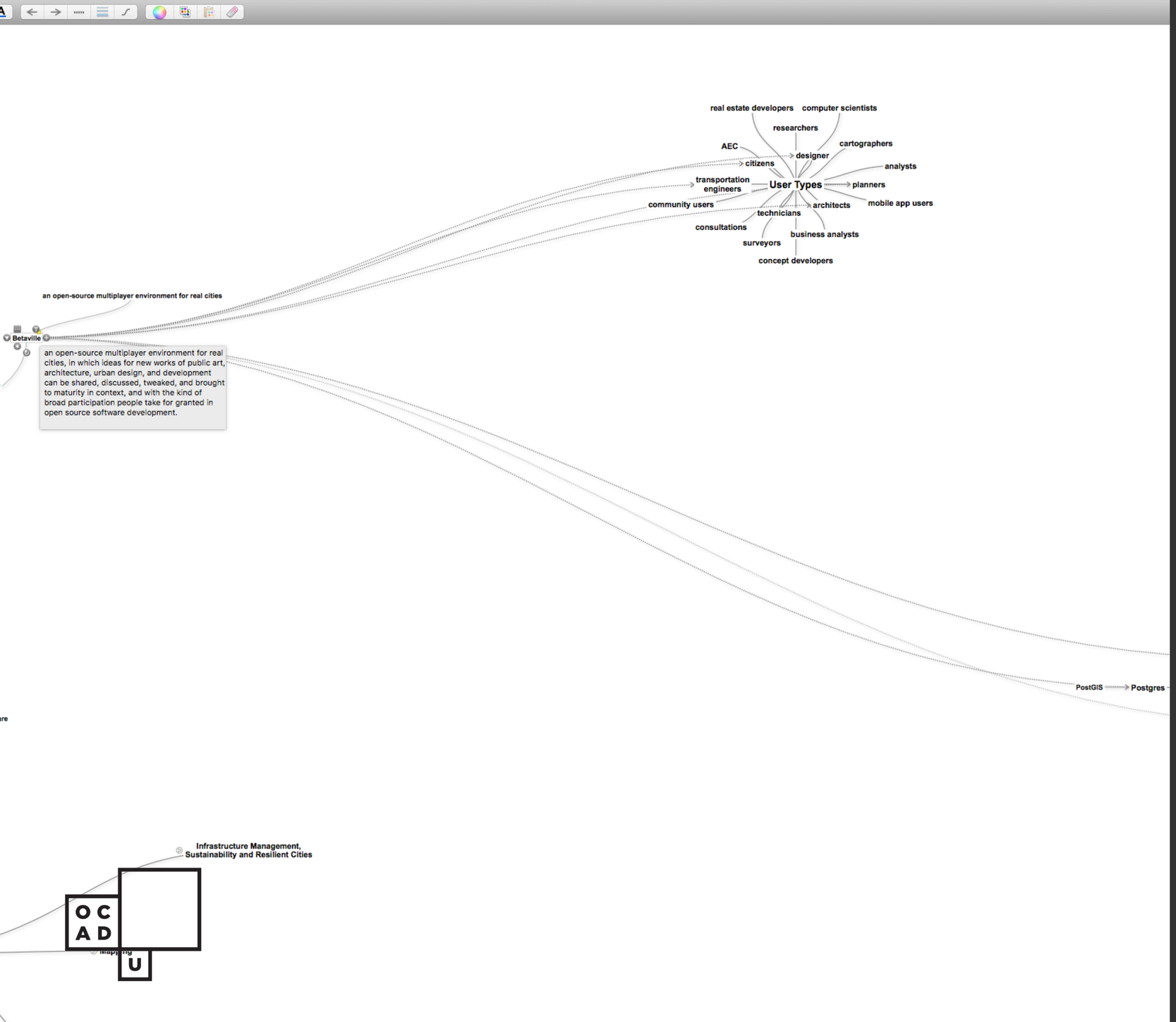
- Provide a semi-interactive explorative view of our comparative toolset list.
- Create a query tool to search keywords and characteristics of common 2D data visualization types.



Contents

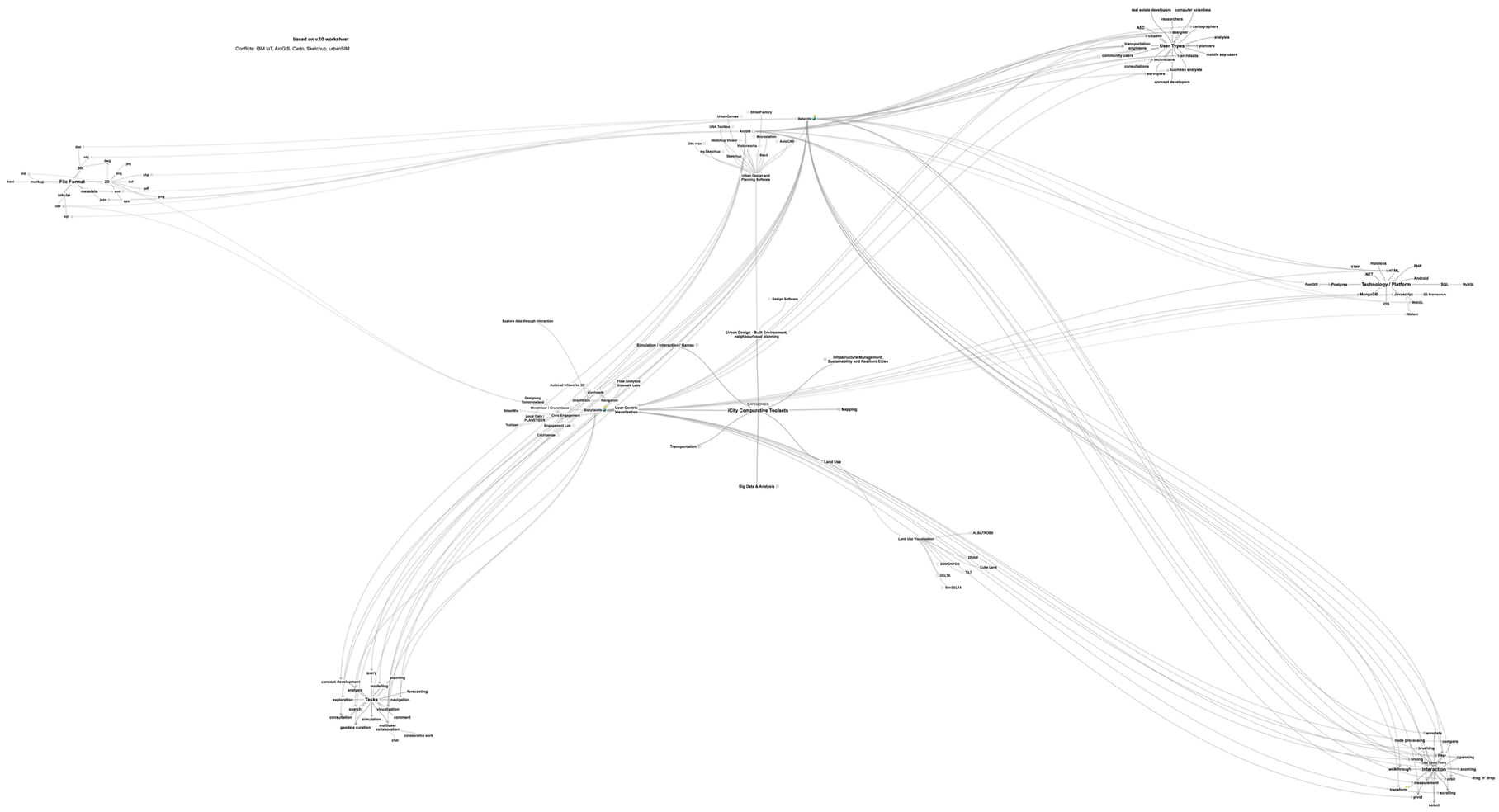
As a lens into my thinking, this presentation will unravel in sequential order, the prototyping stages invoked for both Project Compara and VIZLAND.





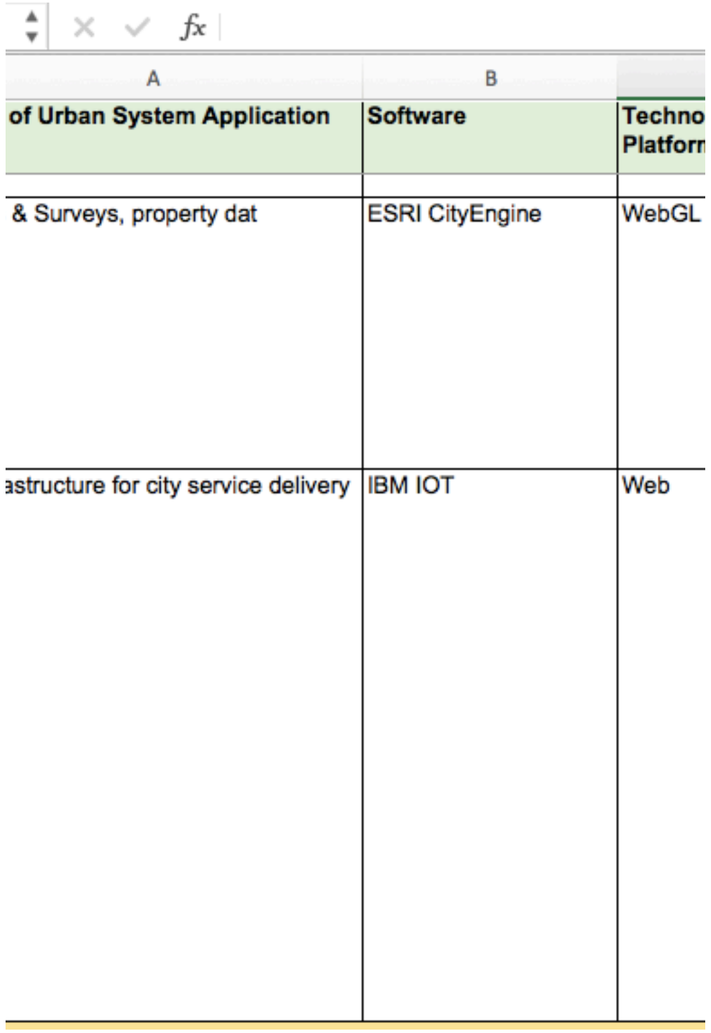
Mapping Relationships

The first of the two prototypes focuses on the mapping of relationships. A worksheet was created in our research group with the intent to make it a first attempt towards a taxonomy in visual analytics for iCity. The potential created by this effort is to create a discourse around visualization methods and software tools that deliver or utilize these methods.



Overview

My approach to this revolved around the mind map as my visual language of choice when working on the structure of data. Its hierarchical nature combined with its freeform abilities faired well as a method to move from the digital spreadsheet list, to a form of interactive navigation.



A	B	
of Urban System Application	**Software**	**Techno Platforn**
& Surveys, property dat	ESRI CityEngine	WebGL
astructure for city service delivery	IBM IOT	Web

Comparative Toolset: Master List

Spreadsheet

The starting point of this taxonomy research led to a spreadsheet that consisted of 8 main categories of content groups. This list was further divided into buckets, such as toolset name, owner/manufacturer, technology platform and others.

Tasks

modelling, navigation, visualization, search, exploration, analysis, simulation, query, comment, multiuser collaboration

User Types

designer, planners, architects, technicians, transportation engineers, citizens, business analysts, researchers, cartographers, surveyors, concept developers

Interactions

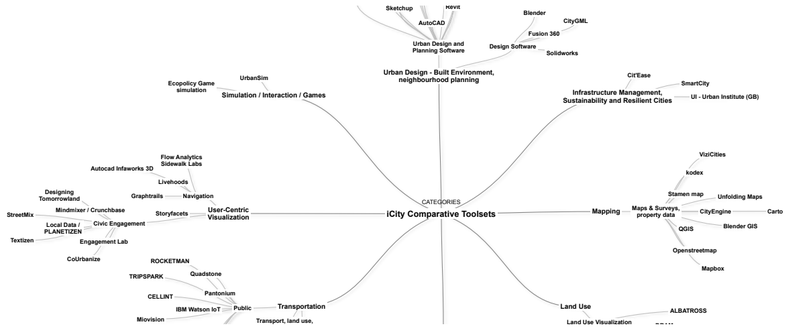
filter, zooming, orbit, measurement, walkthrough, linking, brushing, scrolling, panning, compare, pivot, select, annotate

File Types

obj, dae, dwg, dxf, svg, jpg, png, eps, pdf, shp, json, xml, csv, sql, html, md

Technology / Platform

HTML, Javascript, WebGL, D3, Meteor, Postgres, PostGIS, MongoDB, .NET, XTMF, Hololens, SQL



Toolset Map

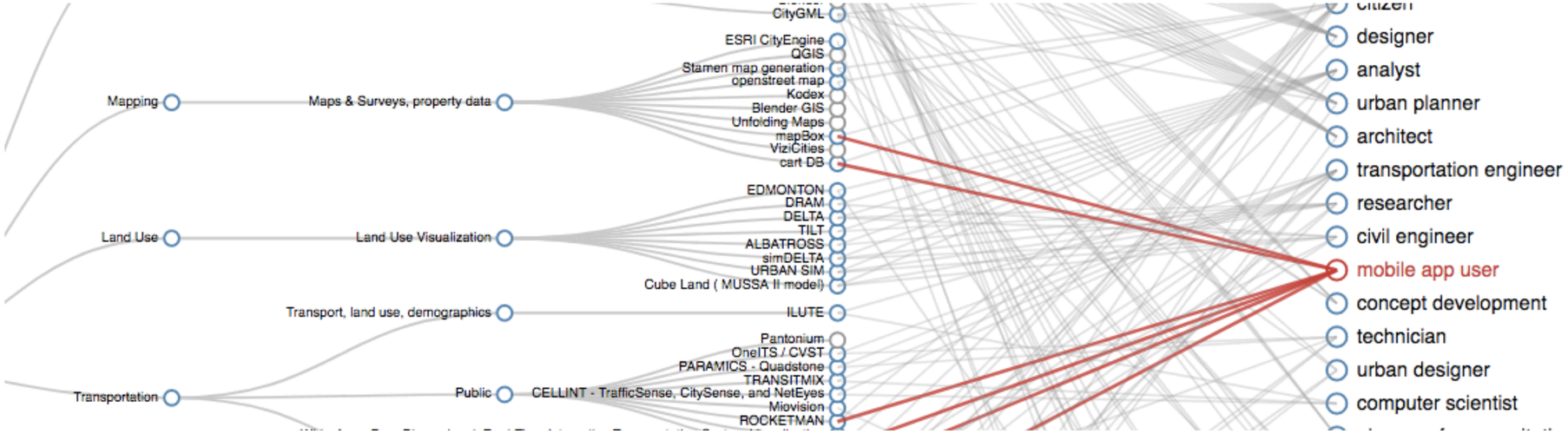
Placing these items in focus and seeking a slightly improved way to navigate the data, a mind map was made.

The premise here for the prototype was to envision a way to take this map, in its tree form, and convert it to a web format for anyone's use in the near future.

D3

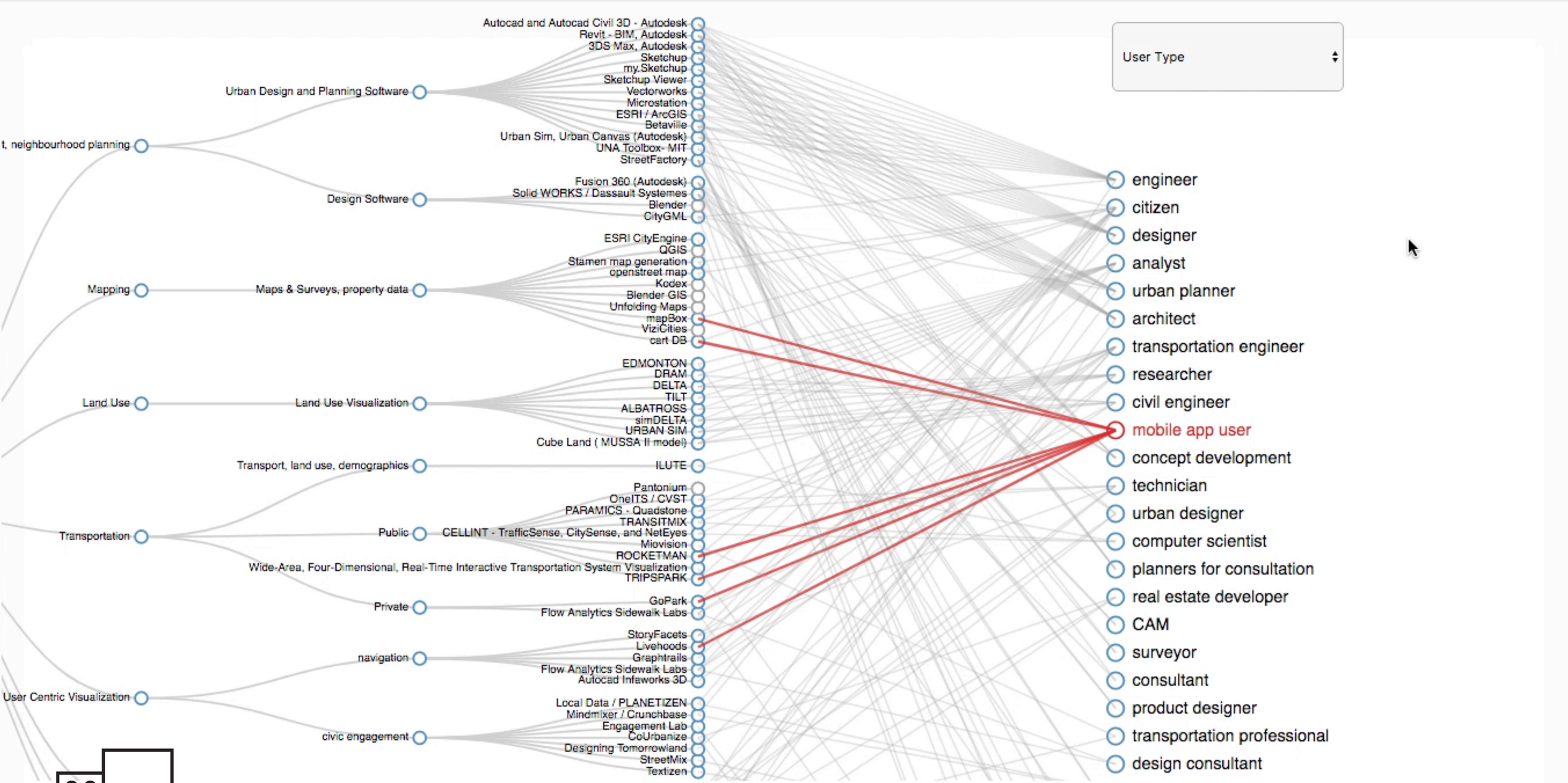
CATEGORIES

iCity Comparative Toolsets



Compara v1

Working together with research assistants Davidson Zheng and Michael Carnevale, we created a first iteration of a web based prototype. This allowed for the dataset modelled from the master spreadsheet, to be explored interactively. The interaction here showed the various connections that tools had with the user types and tasks.



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Mapping Relationships

Compara v2

So what's next for Compara? The idea is for Compara to act as a component to a larger dashboard-like environment, and also to become a stepping stone into further experimentation with the D3 visualization library. This experimentation is for the purpose of building more tools in the Theme 3 working group.

COMPARA V.2.1

Search

User Demo D

- Home
- Gantt
- Reports
- Calendar
- Analytics
- Settings

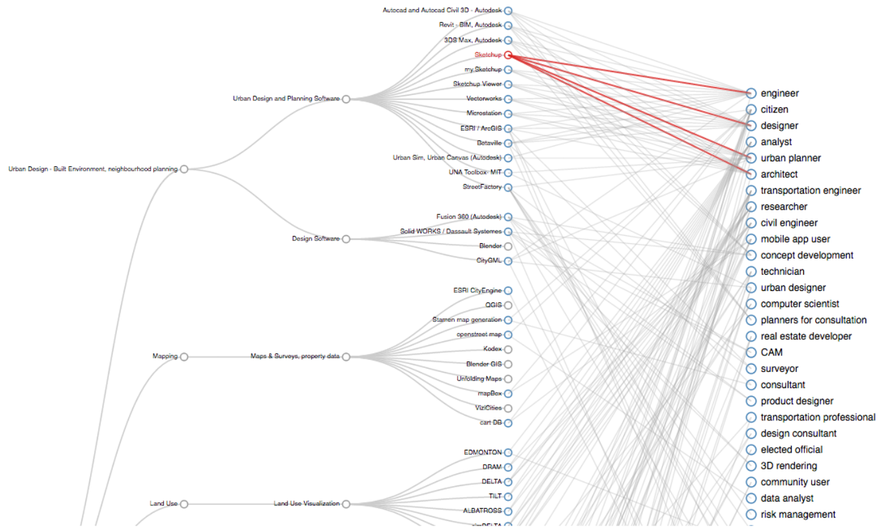
Select a toolset node

Choosing a node will show a user type or task relationship to the tools in the tree.

Compara Tree

Toolset : User Type

USER TYPE



Relationships & Hierarchy

Multi-modal views for focused analysis of selected tree nodes above.

Focus: Software

Relationships

Sketchup

Sketchup is a connected tool in *Urban Planning and Design.*

Focus: Software

Sketchup

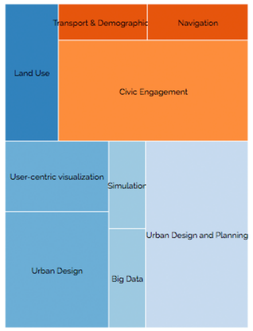
3D modeling of building, site, and urban planning modeling. SketchUp is useful from the earliest stages of design to the end of construction. Programming, diagramming, design development, detailing, documentation, RFIs—SketchUp Pro

engineer citizen designer urban planner architect

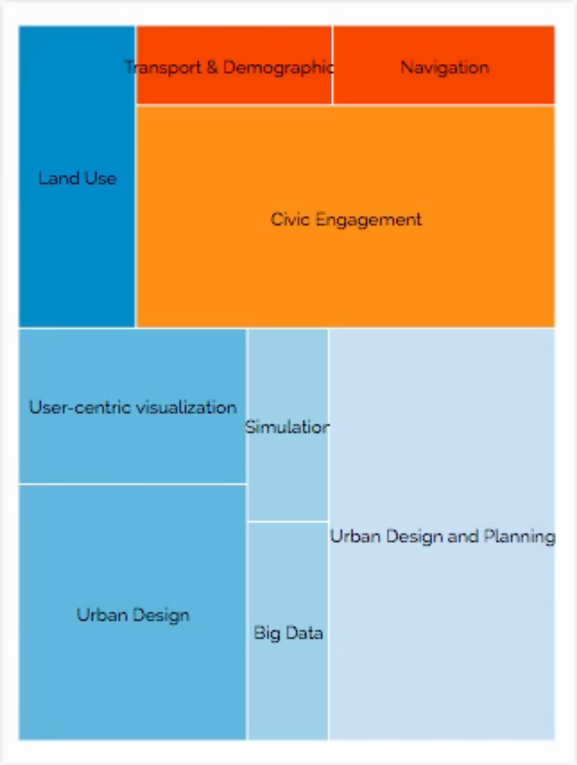
Export PDF

Hierarchy

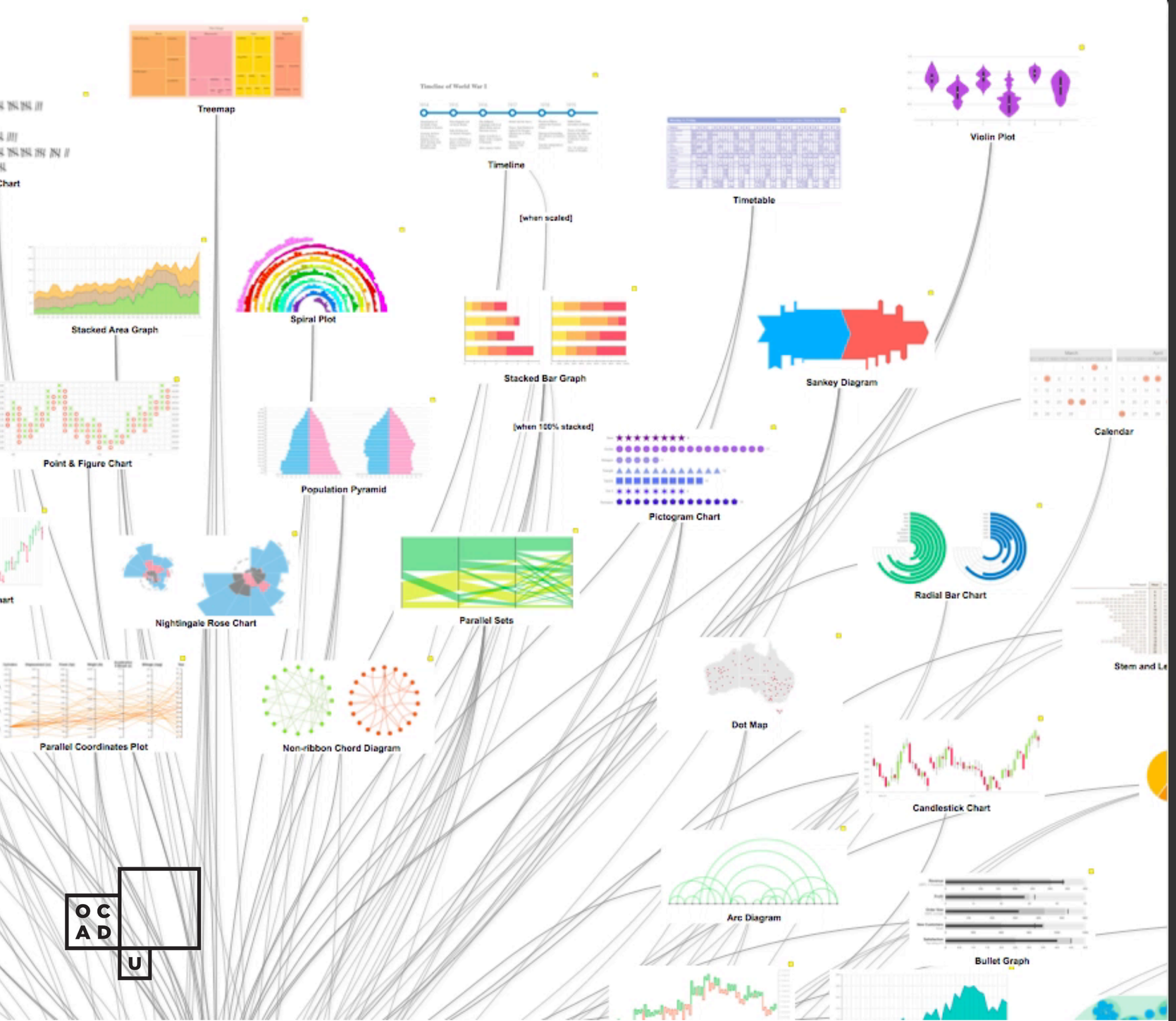
Urban Planning and Design



This reflects the current architectural modelling, BIM, landscape architecture, and general design toolsets.



A hierarchical navigation view of selected software and toolsets. The correlation of tasks and user types are omitted for focus on categorical structures.



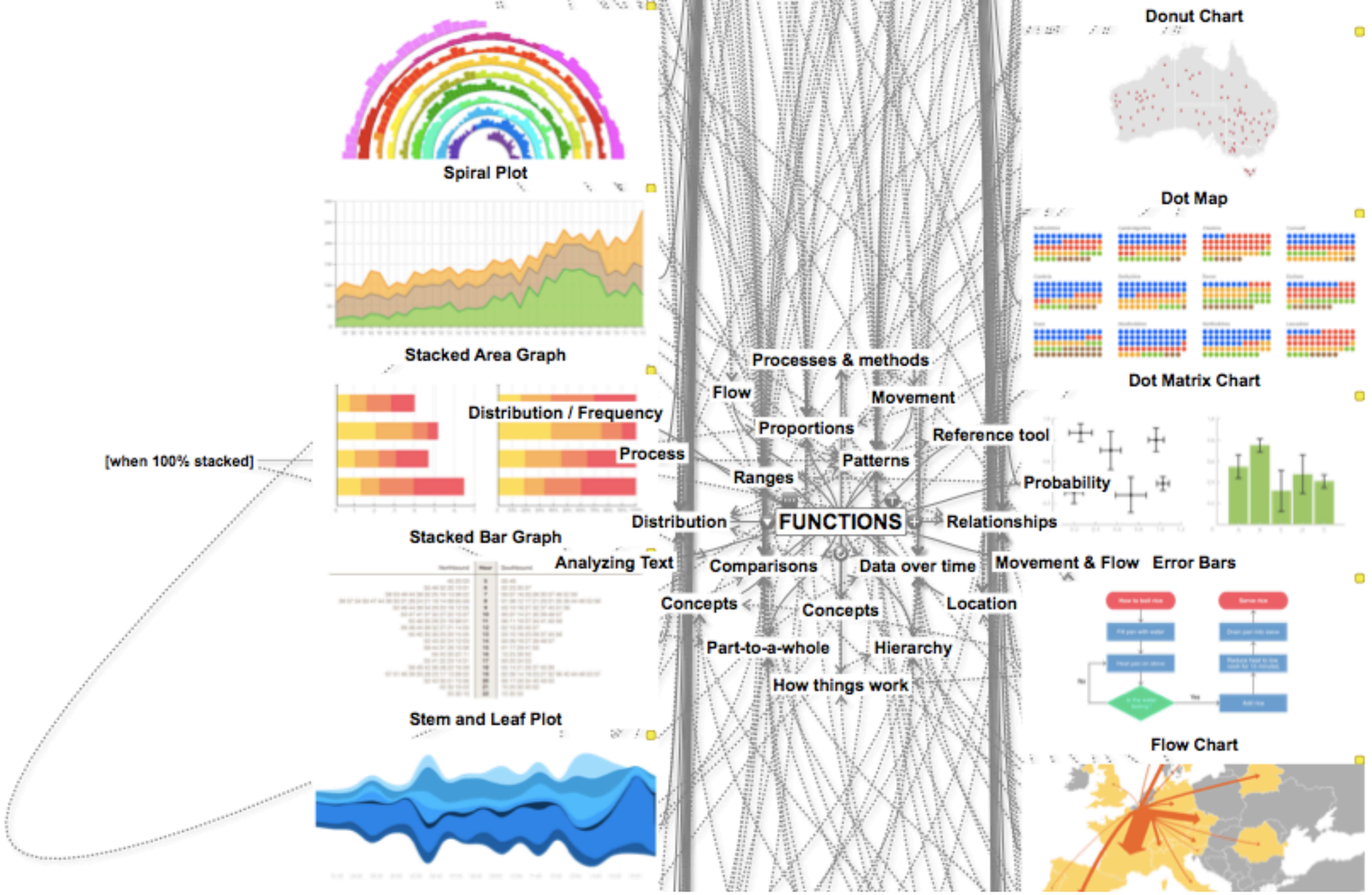
The Visualization Landscape

The ability to query keywords associated to these visualizations is to give the user quick access to matching keywords that relate to the visuals. This is done by the user typically to match functions that are prominent in selected visualizations.

Data Source:

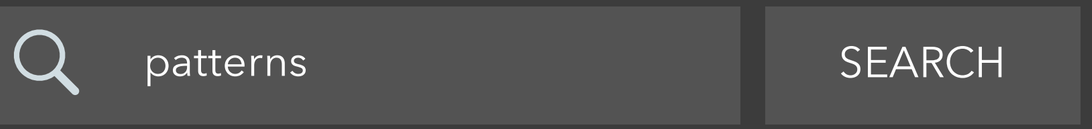
Severino Ribecca

Data Visualisation Catalogue



Overview

The purpose of this project is to build a queryable and visual database of over 60+ data visualizations. Amidst an upcoming design charrette, my goal was to find the quickest and simplest way to expose our participants to the variety of data visualization options at their disposal. Most importantly, it was necessary for them to have an undesrtanding of the most common types out there, in order to facilitate decision making in their respective groups.


patterns
SEARCH

Steps

These are the high level steps to prototype VIZLAND.

Step 1

Locate a source for the info

In this case, I chose Severino Ribecca's Data Visualisation Catalogue. Why? Most specifically because he tasked himself to find to make a comprehensive descriptions of common visualization methods.

Step 2

Create a dataset

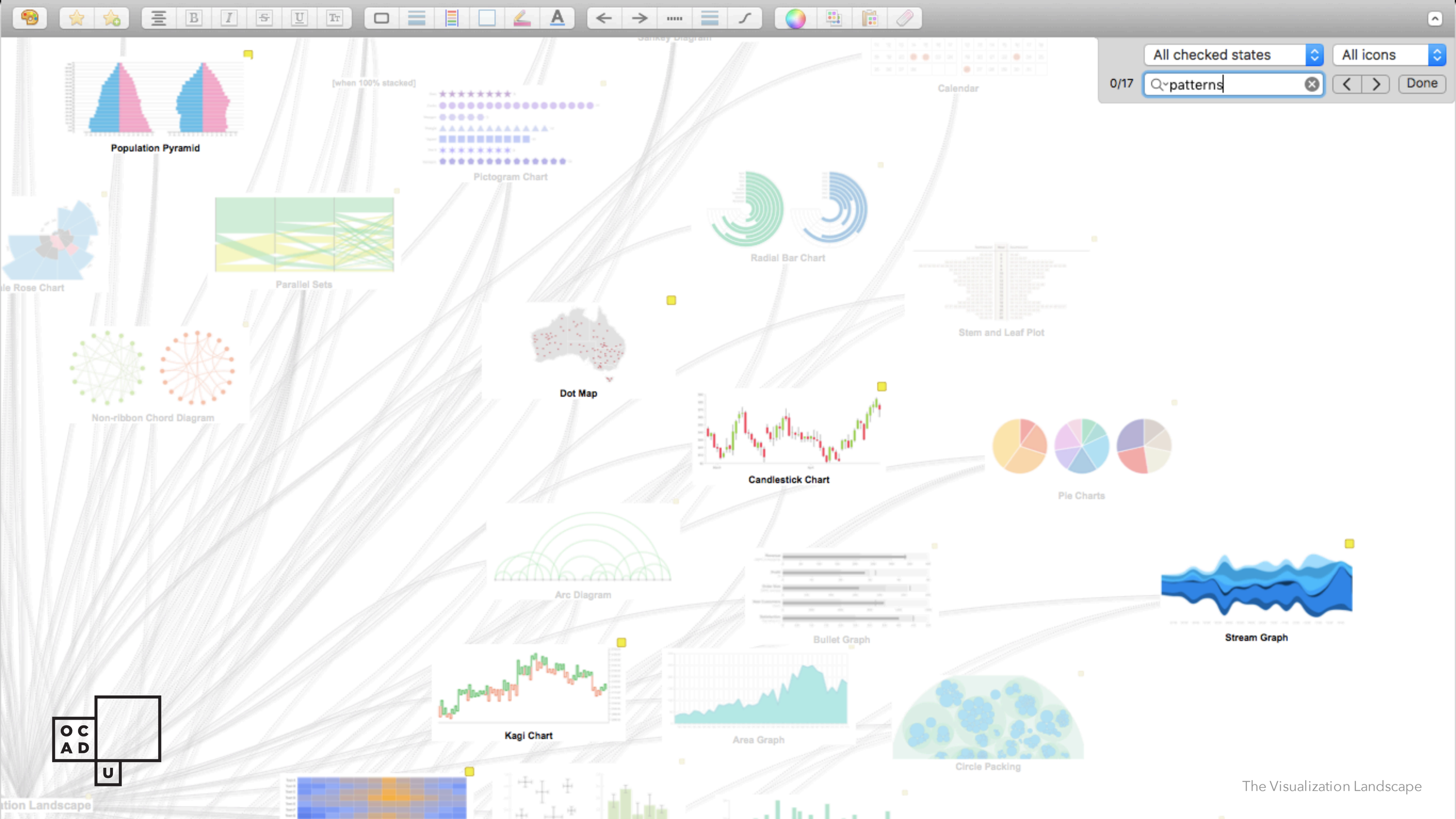
This was manually done by transcribing all 60 definitions and include Ribecca's dataviz clip art.

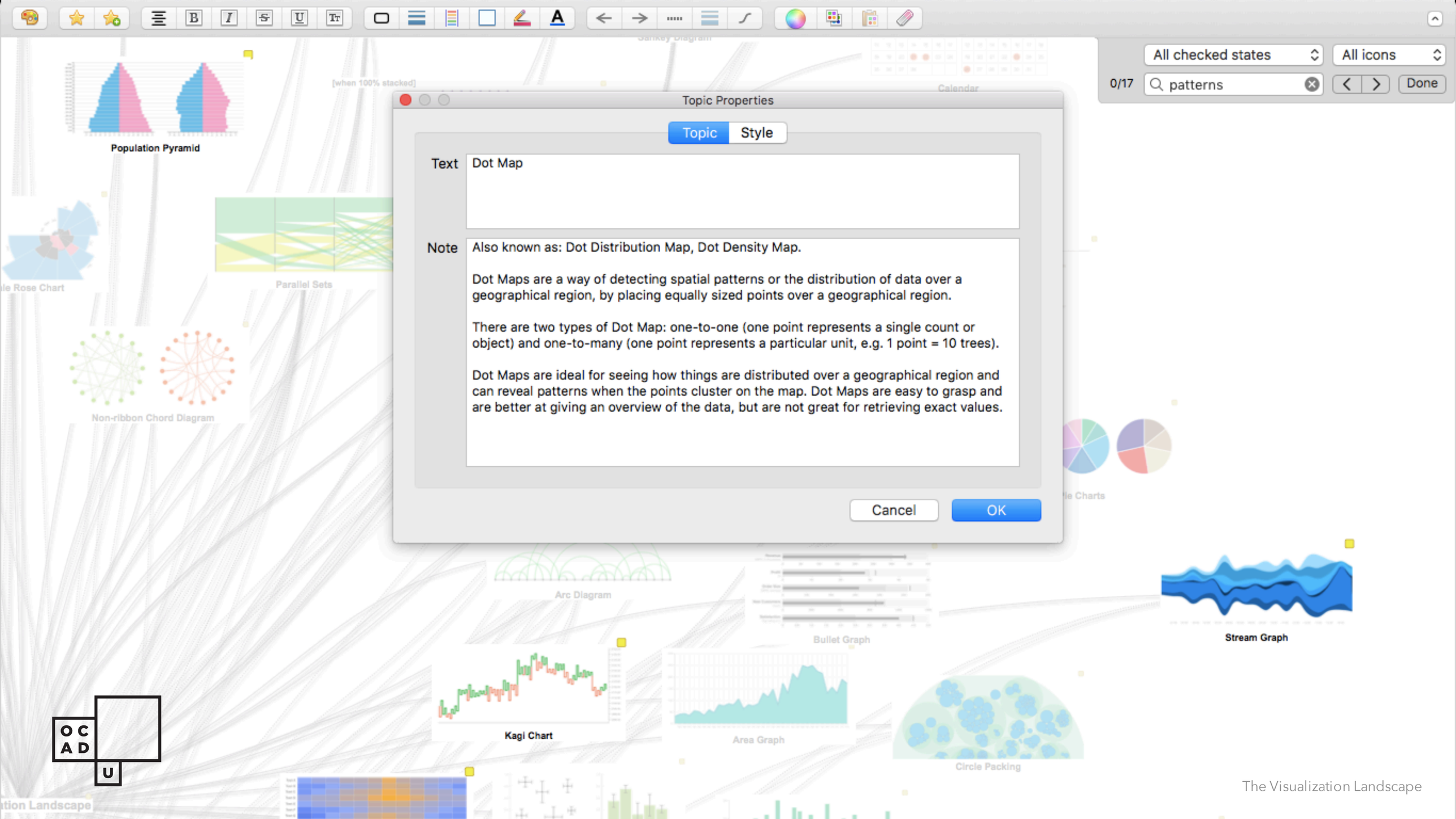
Step 3

Visualize the data

To visualize with a method that anyone can see and read, that was quick to absorb and quick enough to put together.

simplemind™


All checked states
All icons
0/17
patterns
Done
Population Pyramid
[when 100% stacked]
Pictogram Chart
Calendar
Parallel Sets
Radial Bar Chart
Stem and Leaf Plot
Non-ribbon Chord Diagram
Dot Map
Candlestick Chart
Pie Charts
Arc Diagram
Bullet Graph
Stream Graph
Kagi Chart
Area Graph
Circle Packing
The Visualization Landscape


All checked states
All icons
0/17
patterns
Done
Topic Properties
Topic
Style
Text
Dot Map
Note
Also known as: Dot Distribution Map, Dot Density Map.
Dot Maps are a way of detecting spatial patterns or the distribution of data over a geographical region, by placing equally sized points over a geographical region.
There are two types of Dot Map: one-to-one (one point represents a single count or object) and one-to-many (one point represents a particular unit, e.g. 1 point = 10 trees).
Dot Maps are ideal for seeing how things are distributed over a geographical region and can reveal patterns when the points cluster on the map. Dot Maps are easy to grasp and are better at giving an overview of the data, but are not great for retrieving exact values.
Cancel
OK
Population Pyramid
Parallel Sets
Non-ribbon Chord Diagram
Arc Diagram
Bullet Graph
Stream Graph
Kagi Chart
Area Graph
Circle Packing
The Visualization Landscape

*based on using the visualization landscape concept map

Visualization Response

Traffic Management

Design Charrette

keyword query — spatial, flow, pattern

Pattern / Spatial

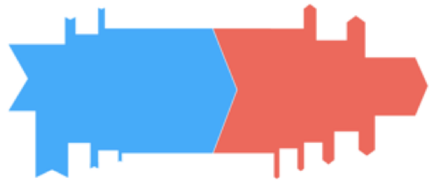
Connection Map

- great for showing connections and relationships geographically
- mapping routes through a single chain of links
- reveals spatial patterns through connection distributions/concentrations

Dot Map

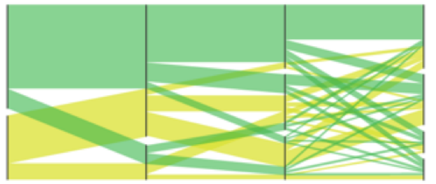
- detecting spatial patterns
- distribution of data over geographical regions
- reveals patterns when points cluster on a map

Pattern / Flow



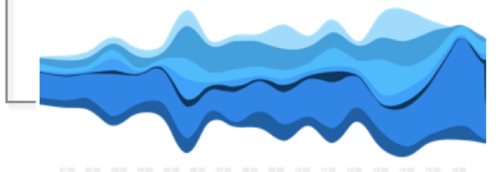
Sankey Diagram

- display flows and their qualities in proportion to one another
- width of arrows and lines show magnitude including flow magnitude
- colour can be used for categories/states



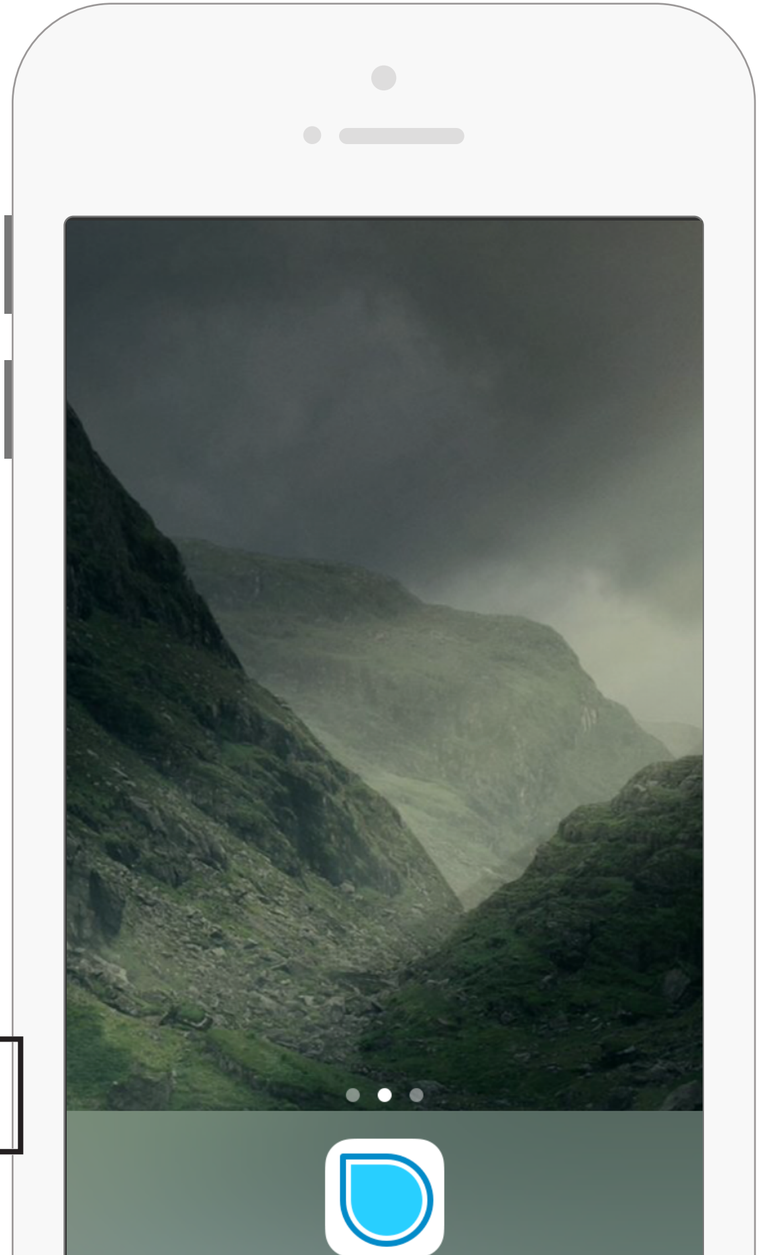
Parallel Sets

- shows flow and proportions (like Sankey)
- each time-set corresponds to a dimension/date
- width and flow path data of a line is a proportional fraction of a category total



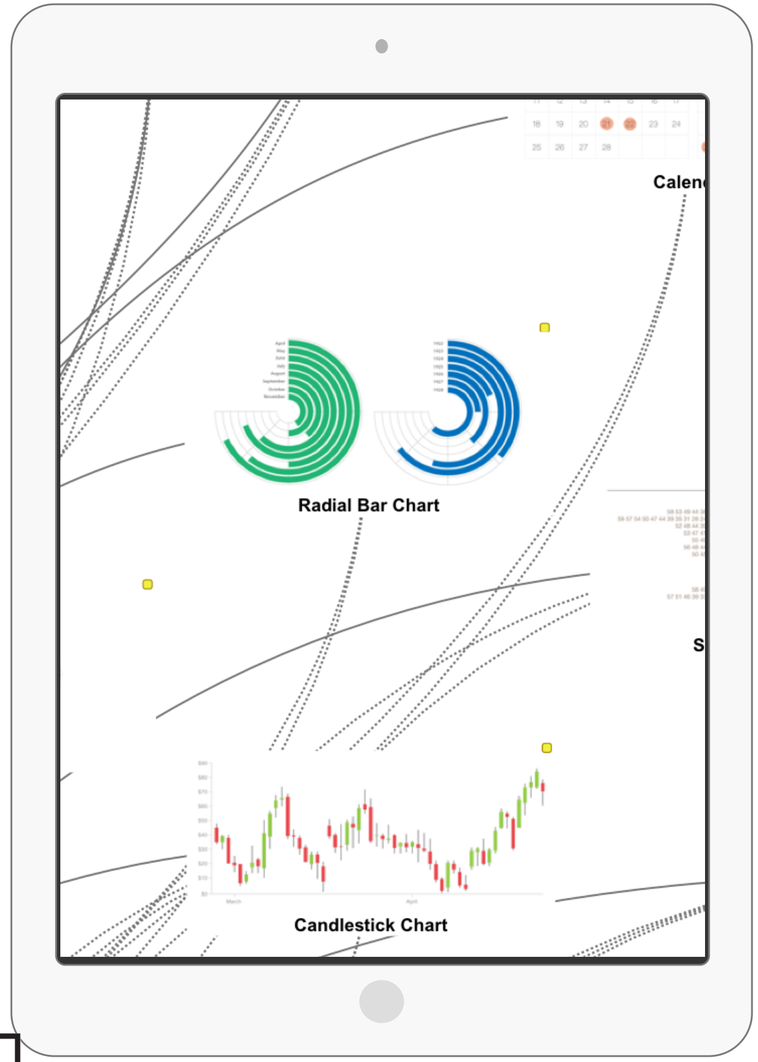
Stream Graph

- a variation of a stacked area graph
- values displayed against a varying central baseline
- changes by varying organic shapes resembling river streams



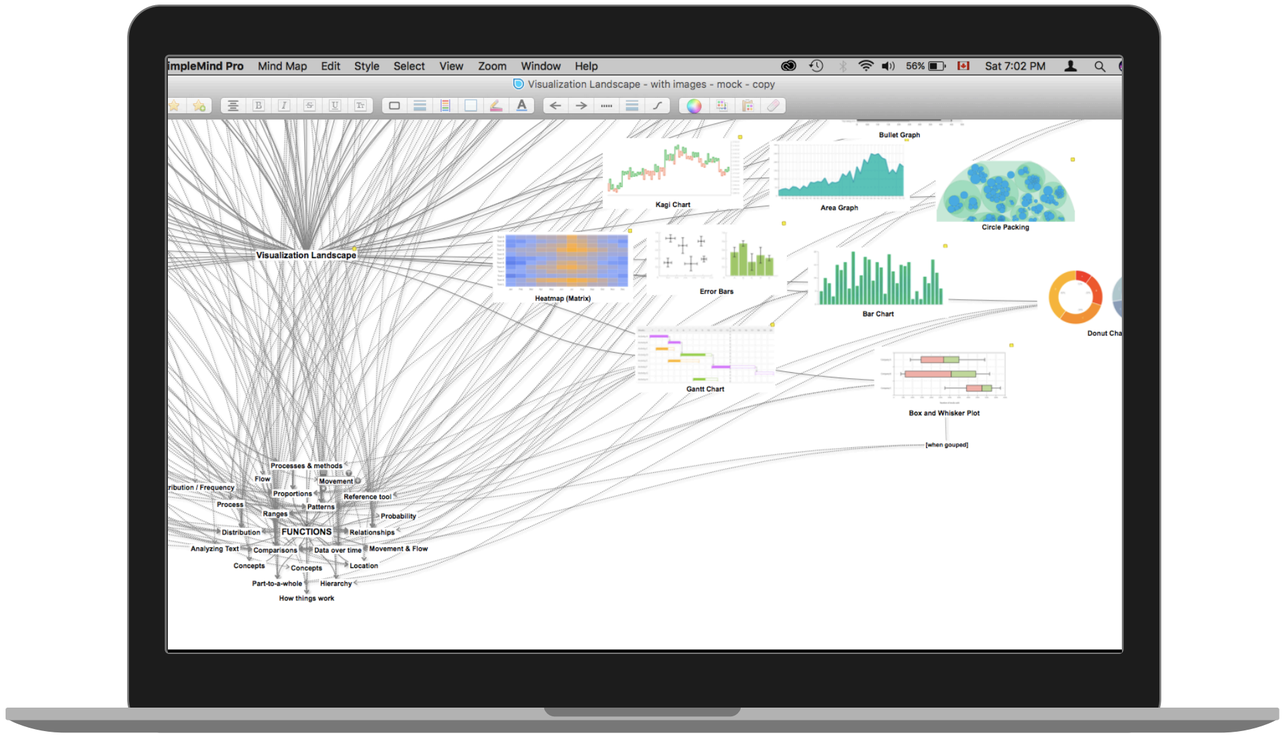
VIZLAND on mobile

Works on multiple mobile platforms including Android, iOS, and desktop platforms MacOS and Windows.



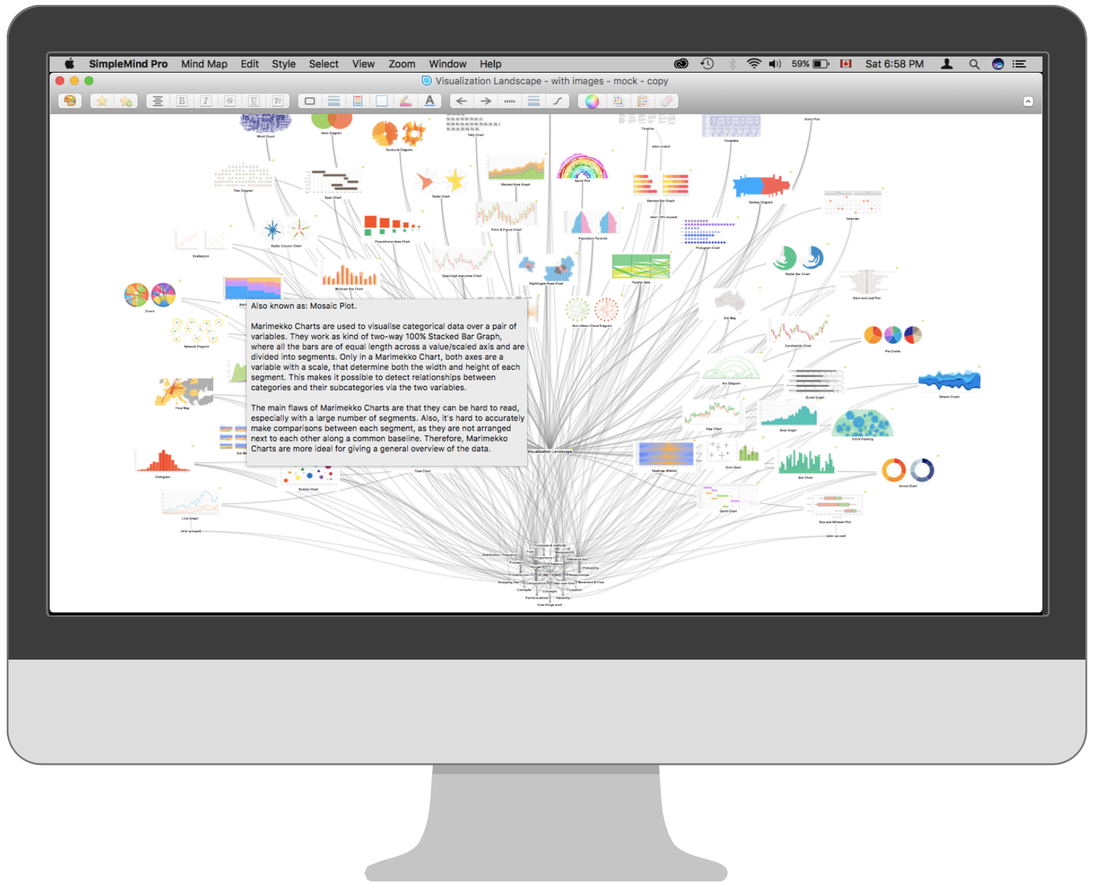
VIZLAND on tablet

Works on multiple mobile platforms including Android, iOS, and desktop platforms MacOS and Windows.



VIZLAND on laptop

Works on multiple mobile platforms including Android, iOS, and desktop platforms MacOS and Windows.



VIZLAND on desktop

Works on multiple mobile platforms including Android, iOS, and desktop platforms MacOS and Windows.

Step 4

Isolate prototype limitations

Thinking mostly in terms of navigation, selection, and deep dive capabilities.

Step 5

Design a web version

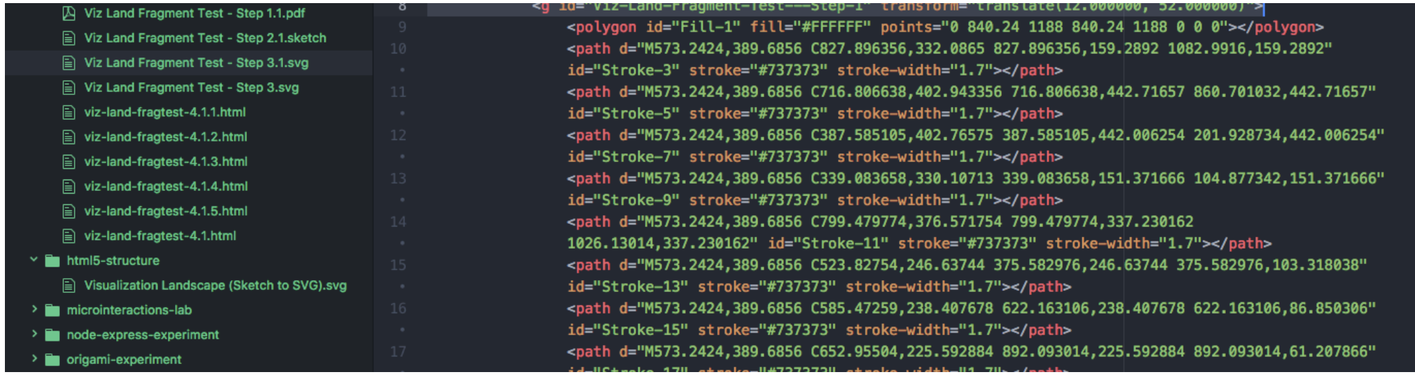
Determine web solutions to the listed limitations.

Step 6

Deploy new prototype

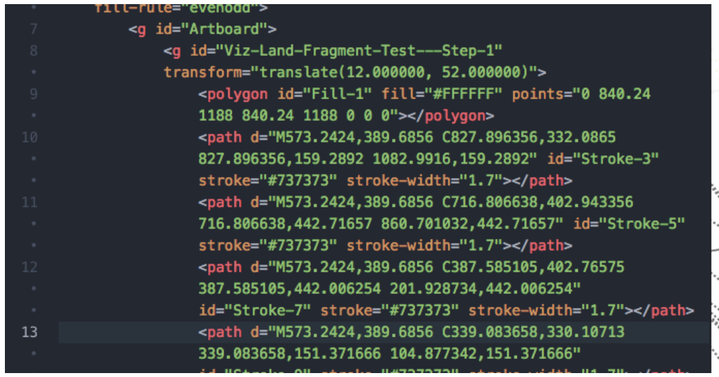
Learn enough about Node.js to create a self-sustained application for web and desktop platforms.

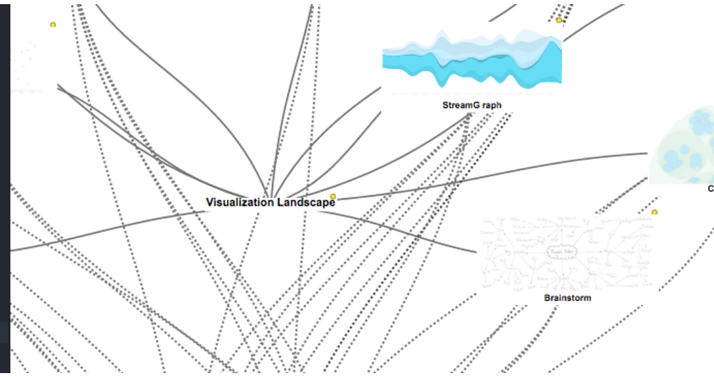
New VIZLAND Prototype



The prototyping process that I took to start this, was very much influenced by my desire to increase my use of SVG file format for images (and more), and the D3 visualization library. As a vector format and XML format, its scalable and customizable with markup code. The fragment test files here are numbered by the steps taken to do this:

Conversion





Can a workable data structure be transferred from a portable document format file (**PDF**) that is ***converted*** to a scalar vector format file (**SVG**), that allows for it to be amendable by user interaction?

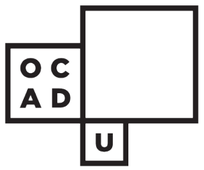
Data URI + SVG

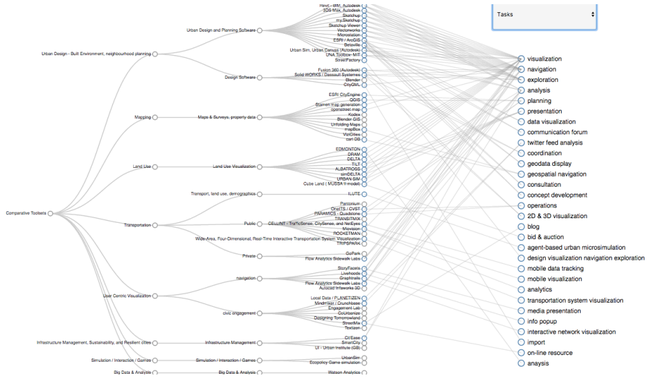
The secondary research question is about Data URI's [example seen above], which is what the graphics are converted to, like the Stream Graph thumbnail you see here.

VIZLAND V5

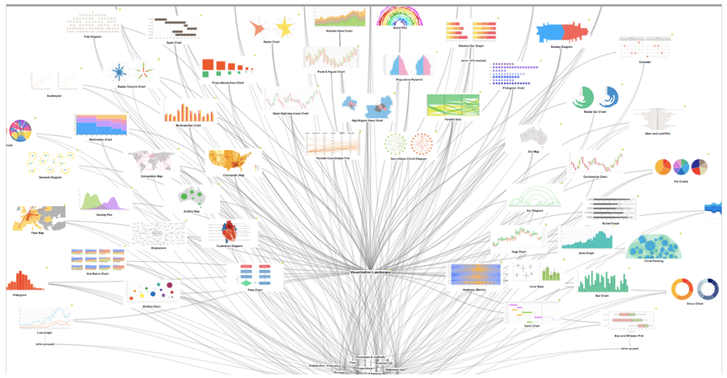
THE VISUALIZATION LANDSCAPE SLIDE DATABASE

Created by Marcus A. Gordon / @magfoto





Project Compara



VIZLAND

Next Steps

IBM Design and Watson Analytics Research

The summer internship at IBM Design at the moment is working mostly with the Business Analytics teams. They have given me the opportunity to steer my learning and contributions to their projects. In addition to learning more about and contributing to Watson Analytics and other products, my intention is to develop hands on experience with a few key things….

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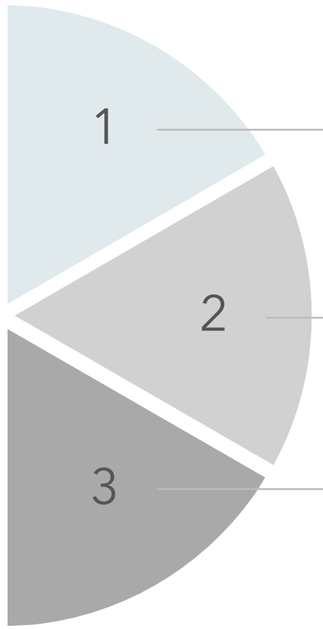
IBM Design Internship



IBM Design Language

- Learning the Business Analytics Design Guide
- Mining the SVG File Format
- Iconography database research

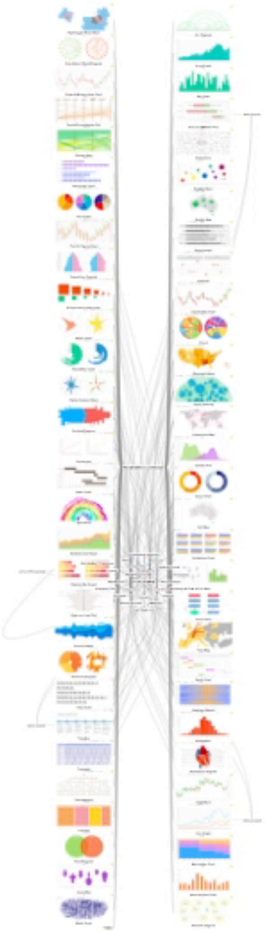
Watson Analytics

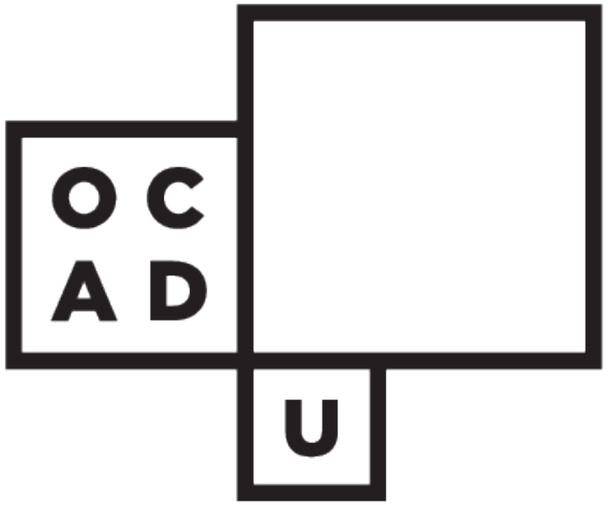
- MapBox

UX / Information Architecture

- Adobe XD / InVision
- ReactJS + Sass
- GitHub Enterprise

Thank You

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