KEEPING PACE with EMERGING

web mapping technologies

Richard Donohue (@rgdonohue)
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Tanya Buckingham (@tanmabuck)

University of Wisconsin-Madison

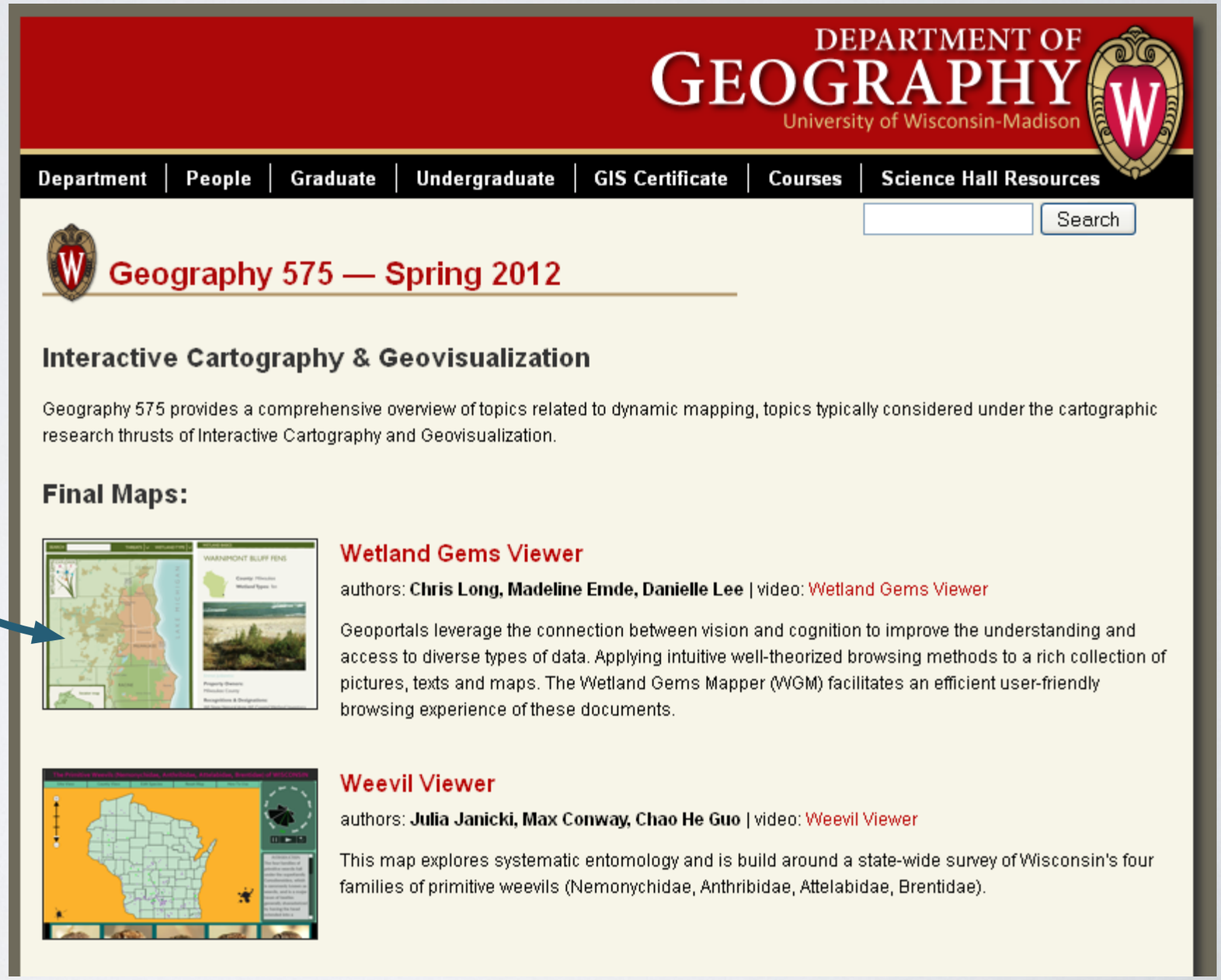
D3 satellite projection by @mbostock

we ***research***
design
develop
and ***teach***
web
maps

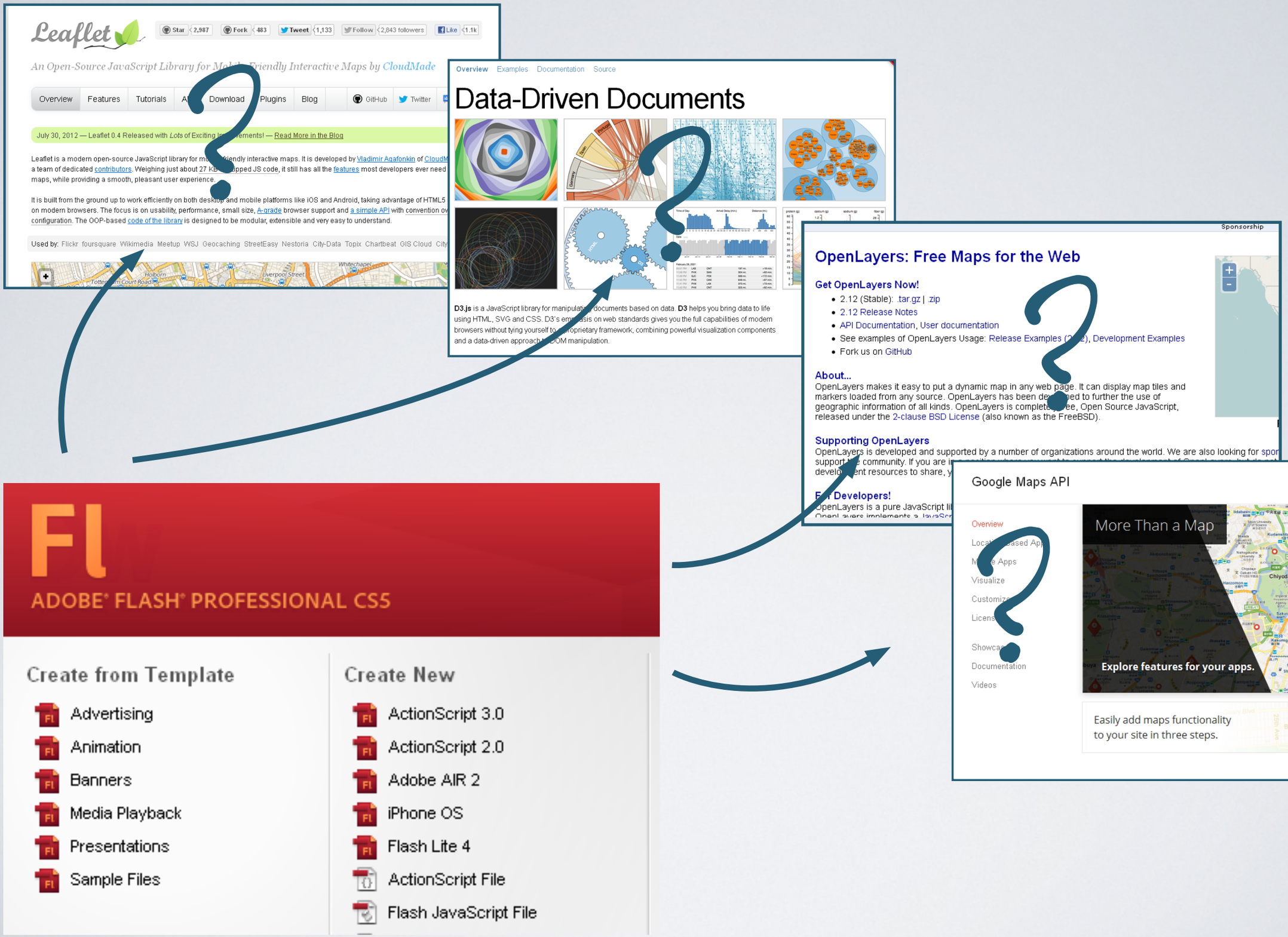
introduction

farewell sweet Flash...

Winner of 2012 NACIS Dynamic Map Competition!



problem statement



4 guiding questions

Q#1 **which technologies** or tool(s) should we use for web mapping?

4 guiding questions

Q#2

what are web maps
and **what is web mapping**?

Q#1

development?

4 guiding questions

how do we

teach these tools?

Q#3

design?

Q#2

development?

Q#1

4 guiding questions

Q#4 can we cope with **change**?

Q#3 teaching?

Q#2 design?

Q#1 development?

4 guiding questions

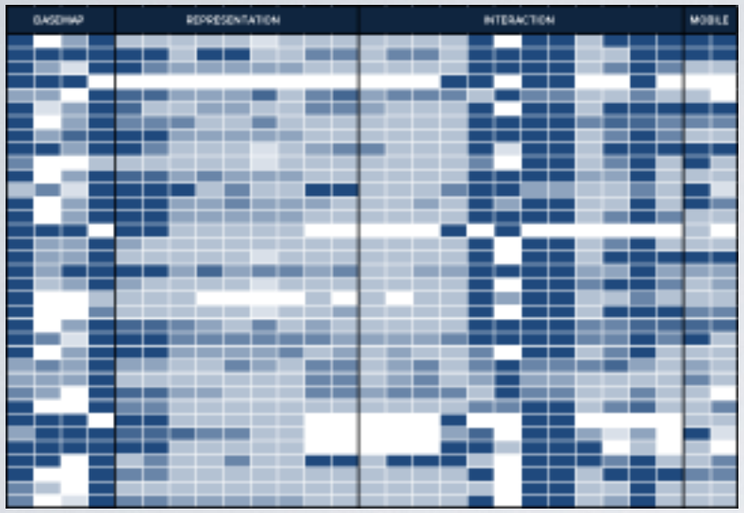
Q#4 process?

Q#3 teaching?

Q#2 design?

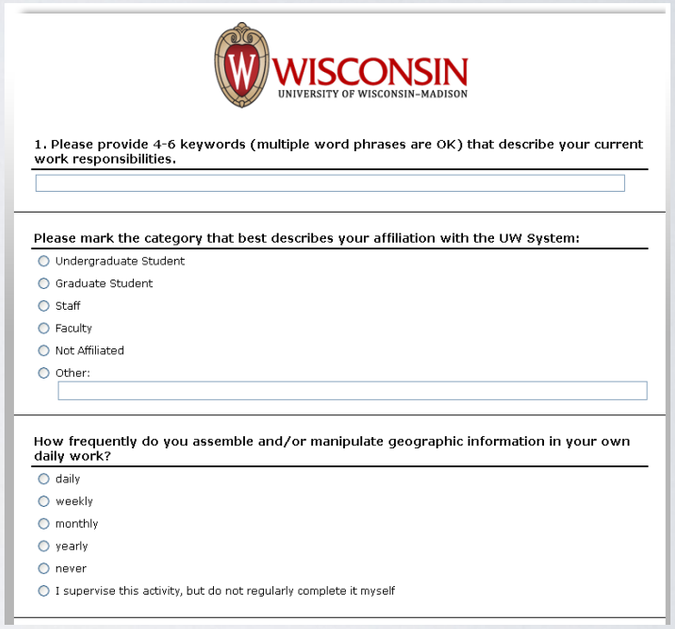
Q#1 development?

overview of our process



part I. **competitive analysis study**

part II. **needs assessment survey**



WISCONSIN
UNIVERSITY OF WISCONSIN-MADISON

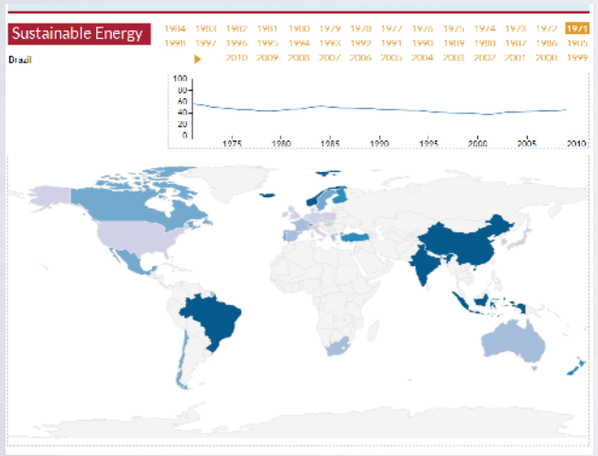
1. Please provide 4-6 keywords (multiple word phrases are OK) that describe your current work responsibilities.

Please mark the category that best describes your affiliation with the UW System:

- Undergraduate Student
- Graduate Student
- Staff
- Faculty
- Not Affiliated
- Other:

How frequently do you assemble and/or manipulate geographic information in your own daily work?

- daily
- weekly
- monthly
- yearly
- never
- I supervise this activity, but do not regularly complete it myself



part III. **diary study**

How did we do it?

GeoMoose

Tile Stache

Wax
from MapBox

TileMill
an open source project by MapBox

MapServer
open source web mapping

NOKIA

Mapbender3

mapnik

mapquest developers

TILE DRAWER

KARTOGRAPH

Polymaps

{modest maps}

Processing

jump

CLOUD MADE

ViaMichelin

Leaflet

MapQuery

MAPSTRACTION
Javascript mapping abstraction library

OpenLayers

Bing Maps API
CartoDB
CartoWeb
Cloudmade
d3
deCarta
GeoEXT
GeoMoose
G Maps API
Jump
Ka-Map
Kartograph
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Mapstraction
Modest Maps
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ReadyMap
Tiledrawer
TileMill
Tilestache
TimeMap
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Wax
WorldKit

Web mapping options go here!

	BASEMAP	REPRESENTATION	INTERACTION	MOBILE
Bing Maps API				
CartoDB				
CartoWeb				
Cloudmade				
d3				
deCarta				
GeoEXT				
GeoMoose				
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Tilestache				
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ViaMichelin				
Wax				
WorldKit				

	BASEMAP				REPRESENTATION														INTERACTION								MOBILE	
	Toggle Map Types	Map Styling	Custom Tiling	Custom Vectors	Choropleth	Proportional Symbol	Dot Density	Isoline/Surface	Flow	Cartogram	Bivariate/Multivariate	Animation	Graphics/Charts	Reexpress	Arrange/Linked Views	Sequence	Resymbolize	Overlay/Toggle	Reproject	Pan	Zoom	Filter	Search	Retrieve	Calculate	Mobile Support	Location Aware
Bing Maps API																											
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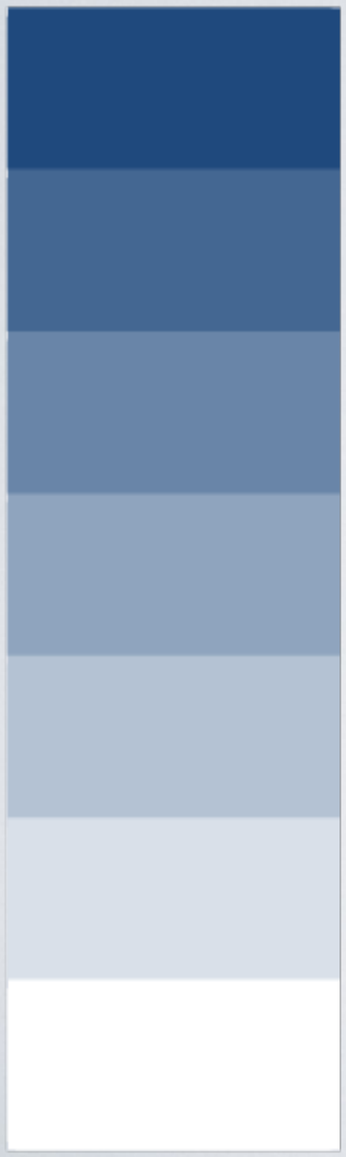
Specific feature requirements go here.

How did we code these options for feature support?

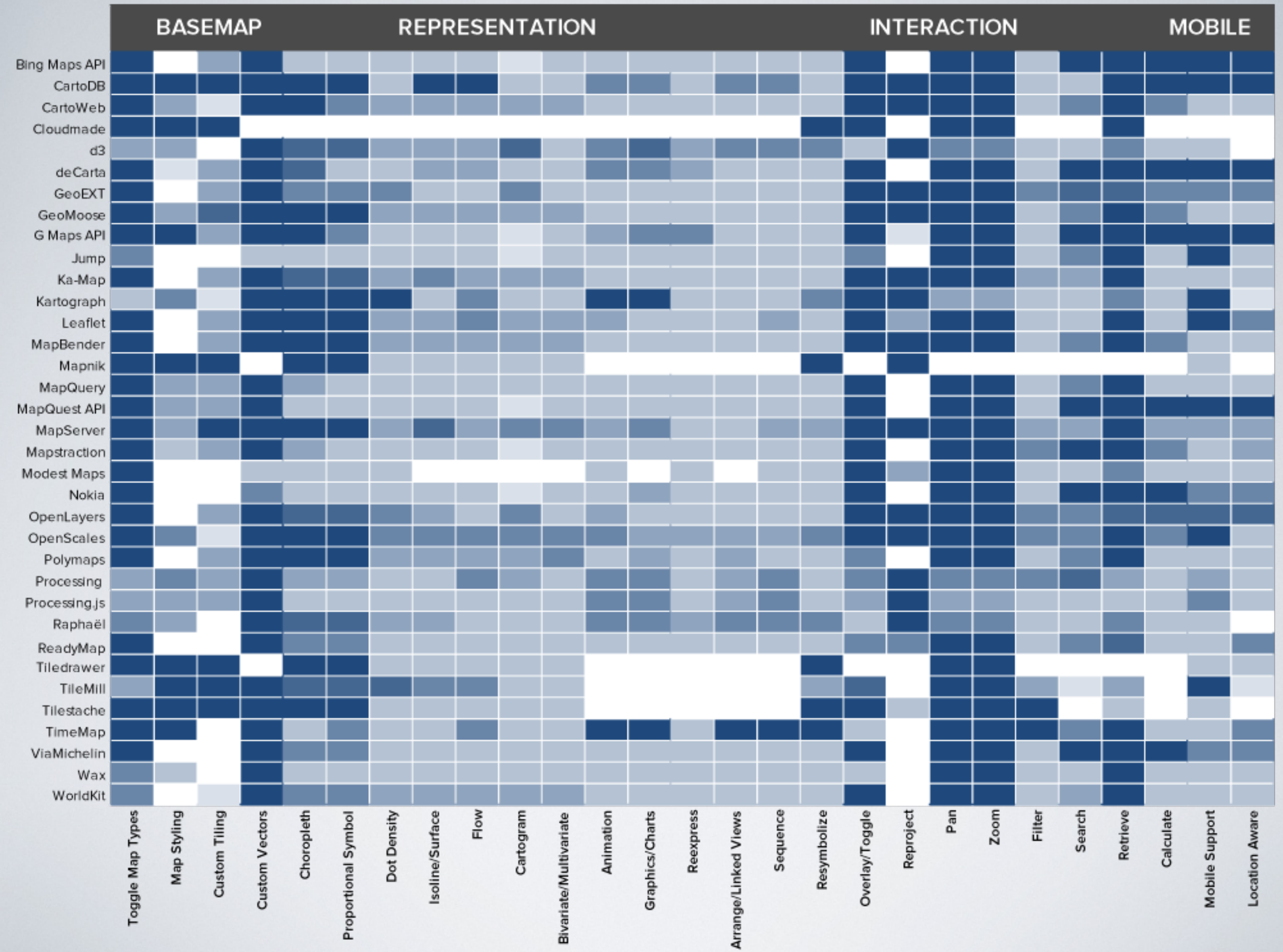


1: supported natively out-of-the-box

2: knowing existing work-around

3: appears to require a hack

4: not possible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Location Aware

BASEMAP | REPRESENTATION | INTERACTION | MOBILE

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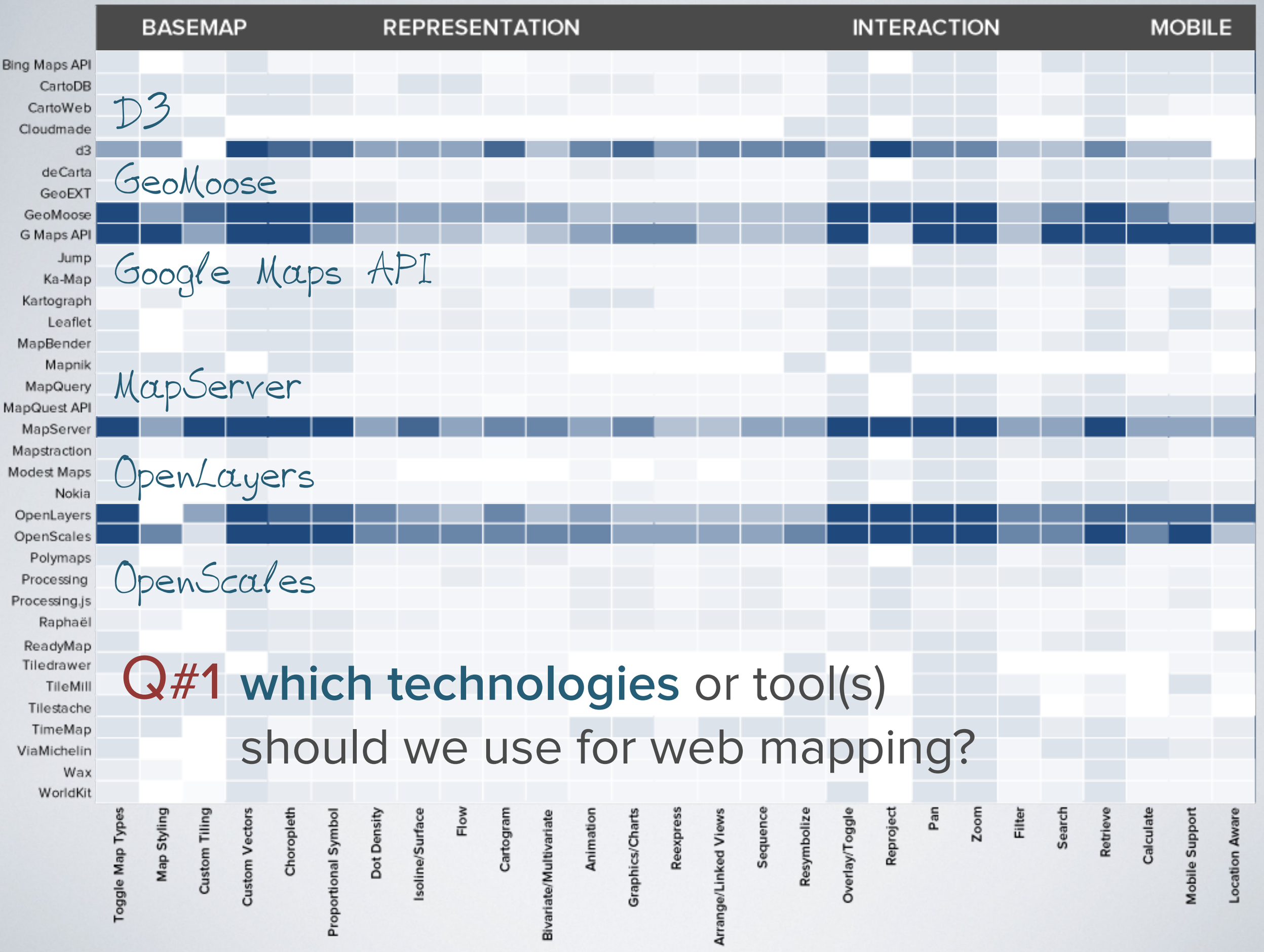
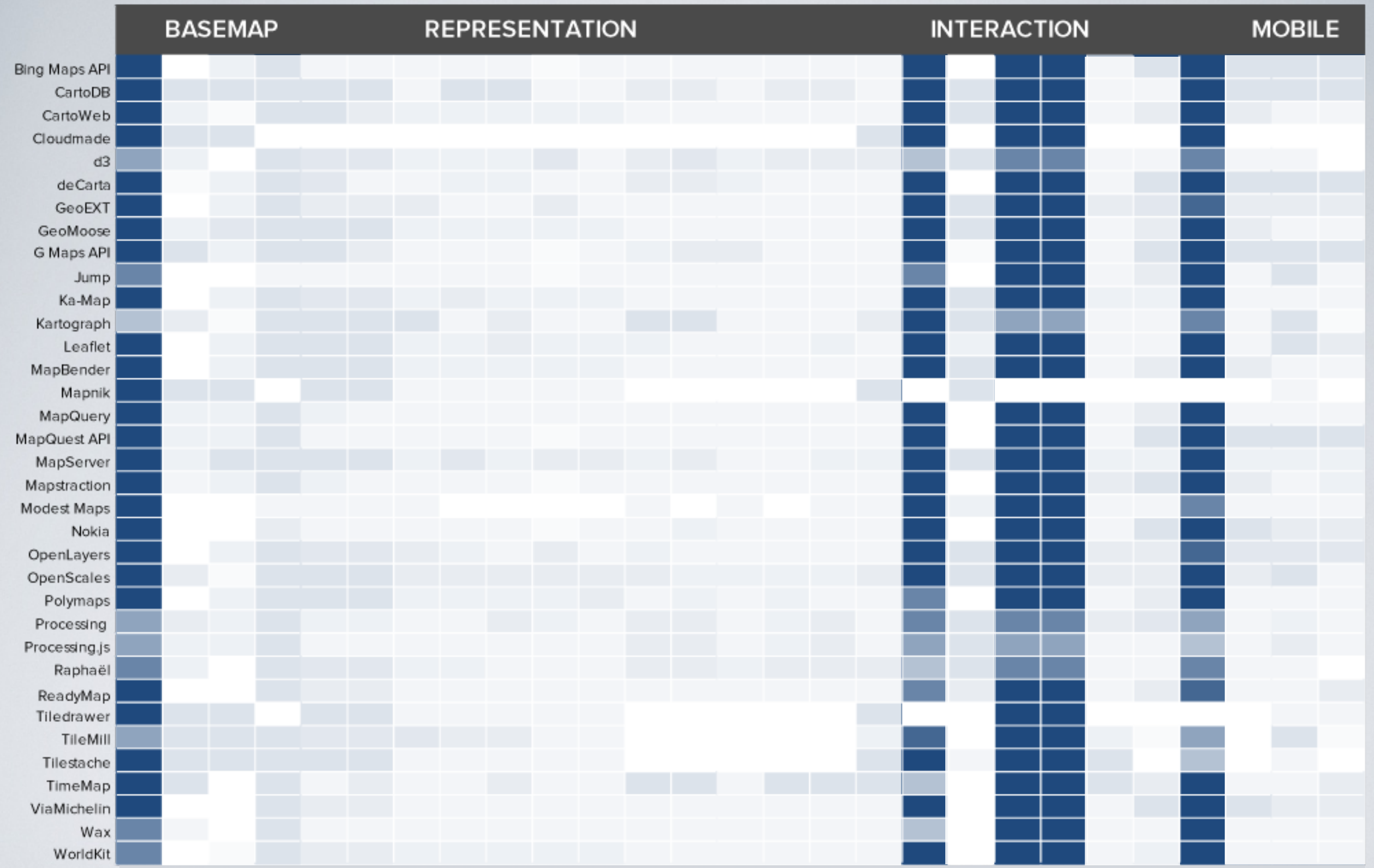


Q#1 **which technologies** or tool(s) should we use for web mapping?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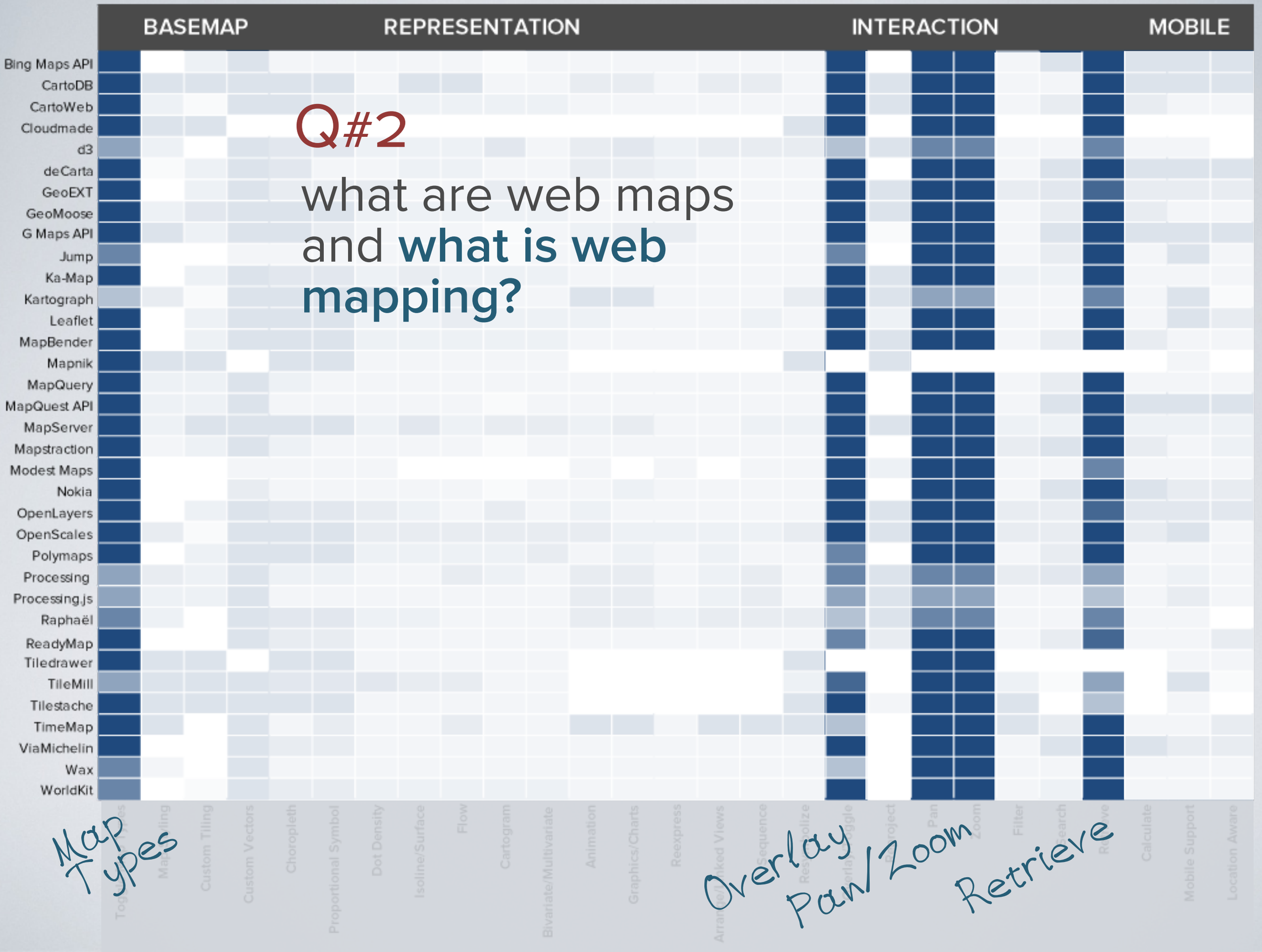
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Q#2
what are web maps and what is web mapping?
Map Types
Overlay
Pan/Zoom
Retrieve

BASEMAP | REPRESENTATION | INTERACTION | MOBILE

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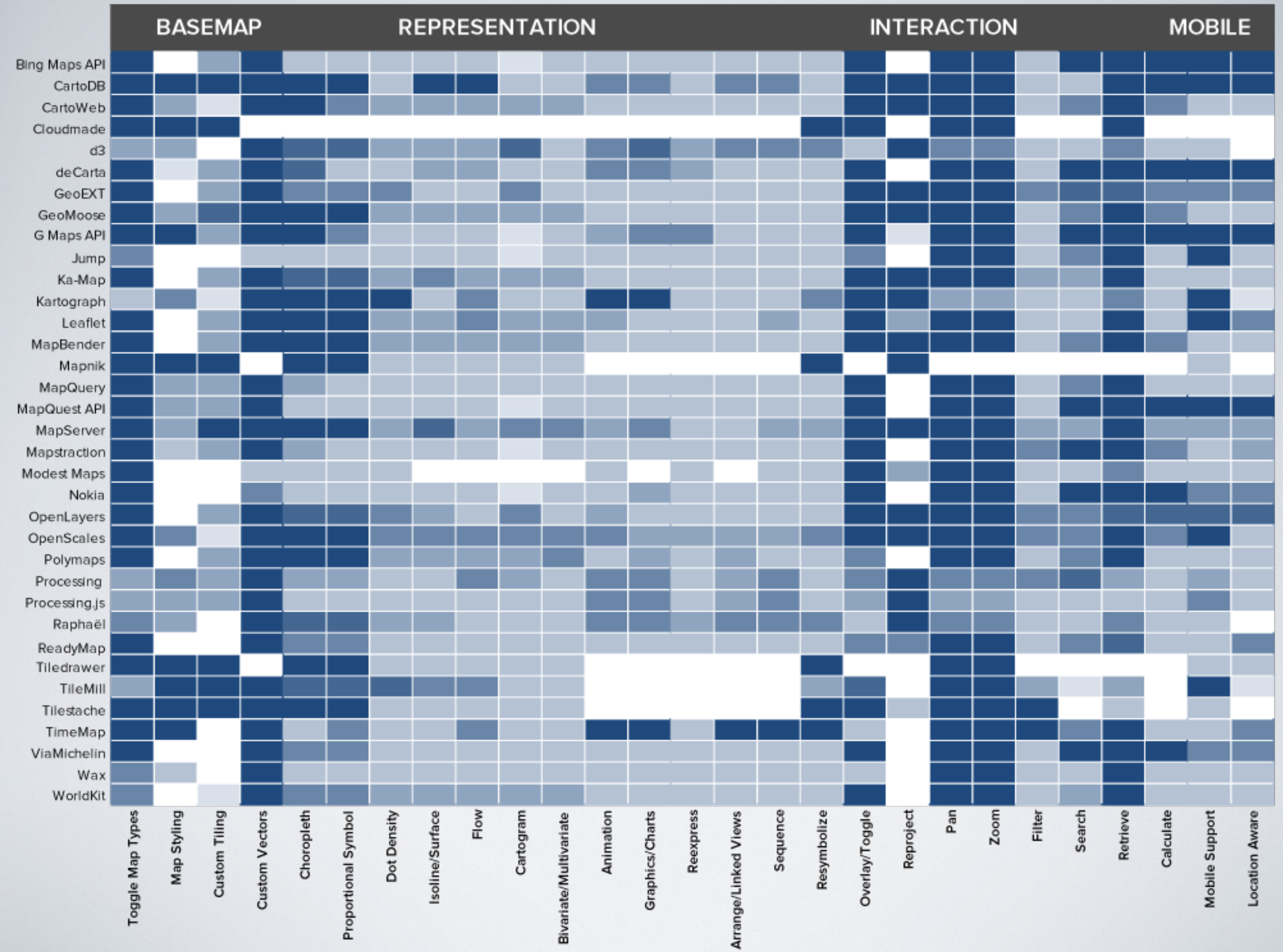
Mobile Support
Location Aware

Custom Vectors

Reproject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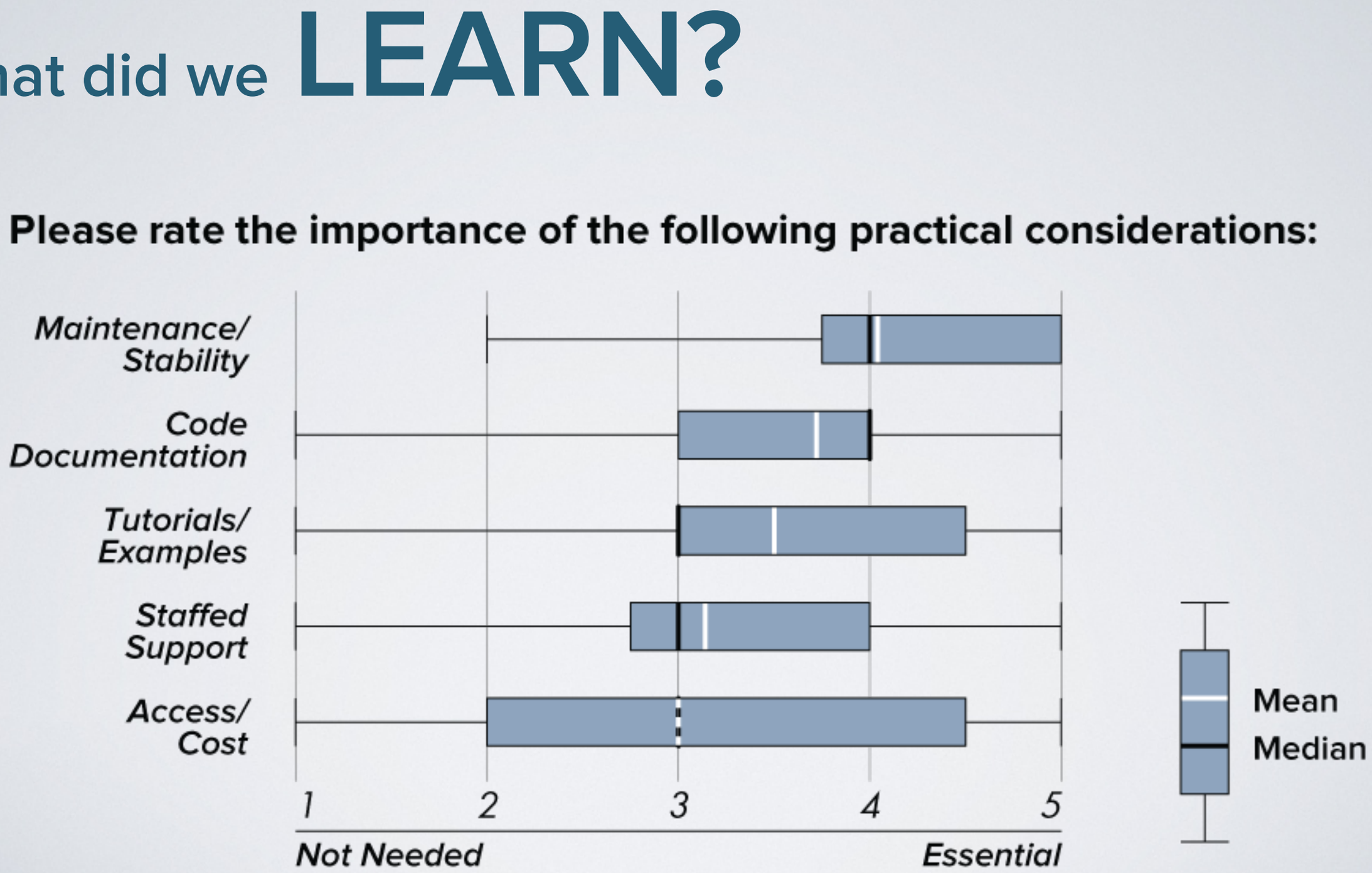
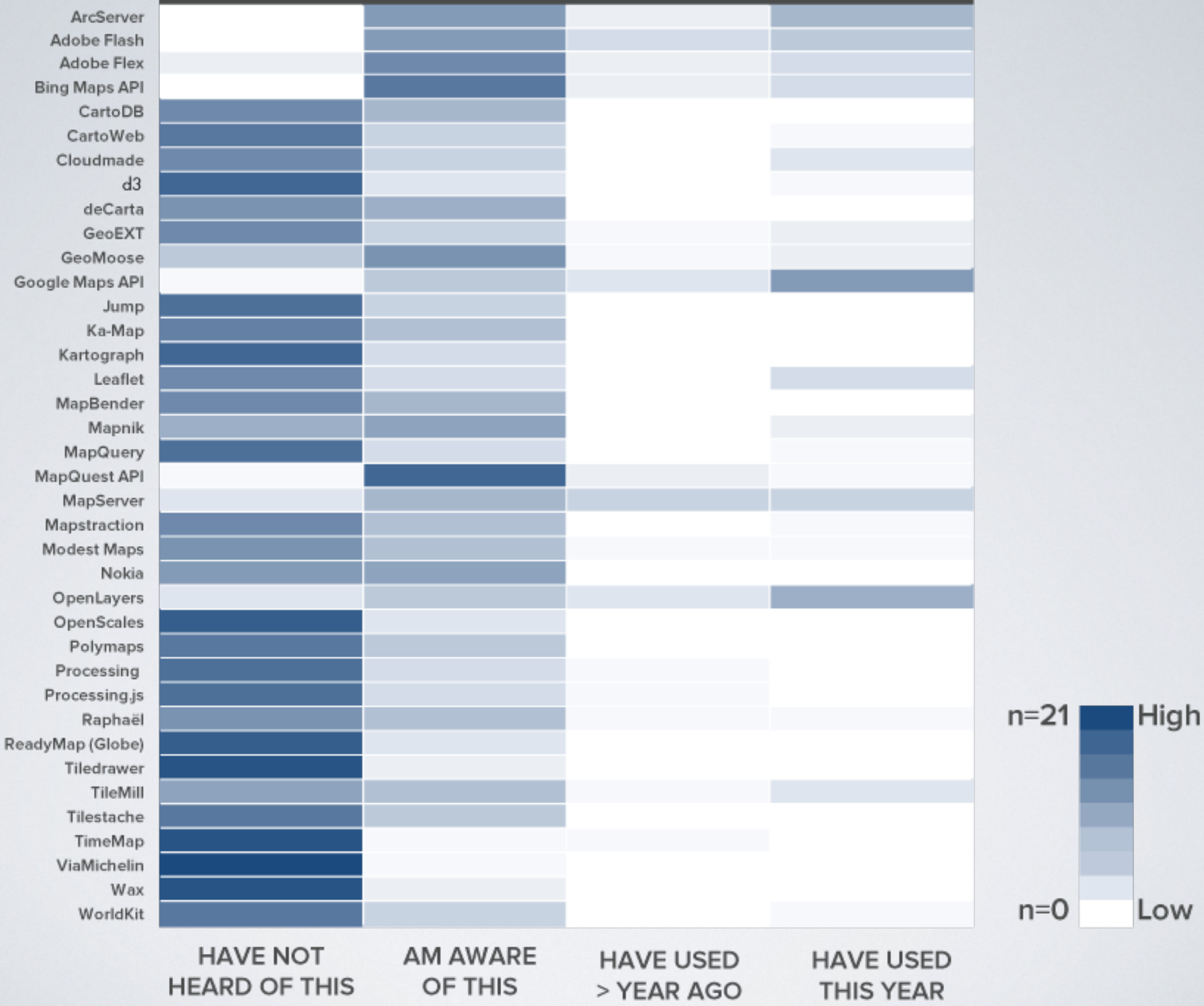
How did we do it?

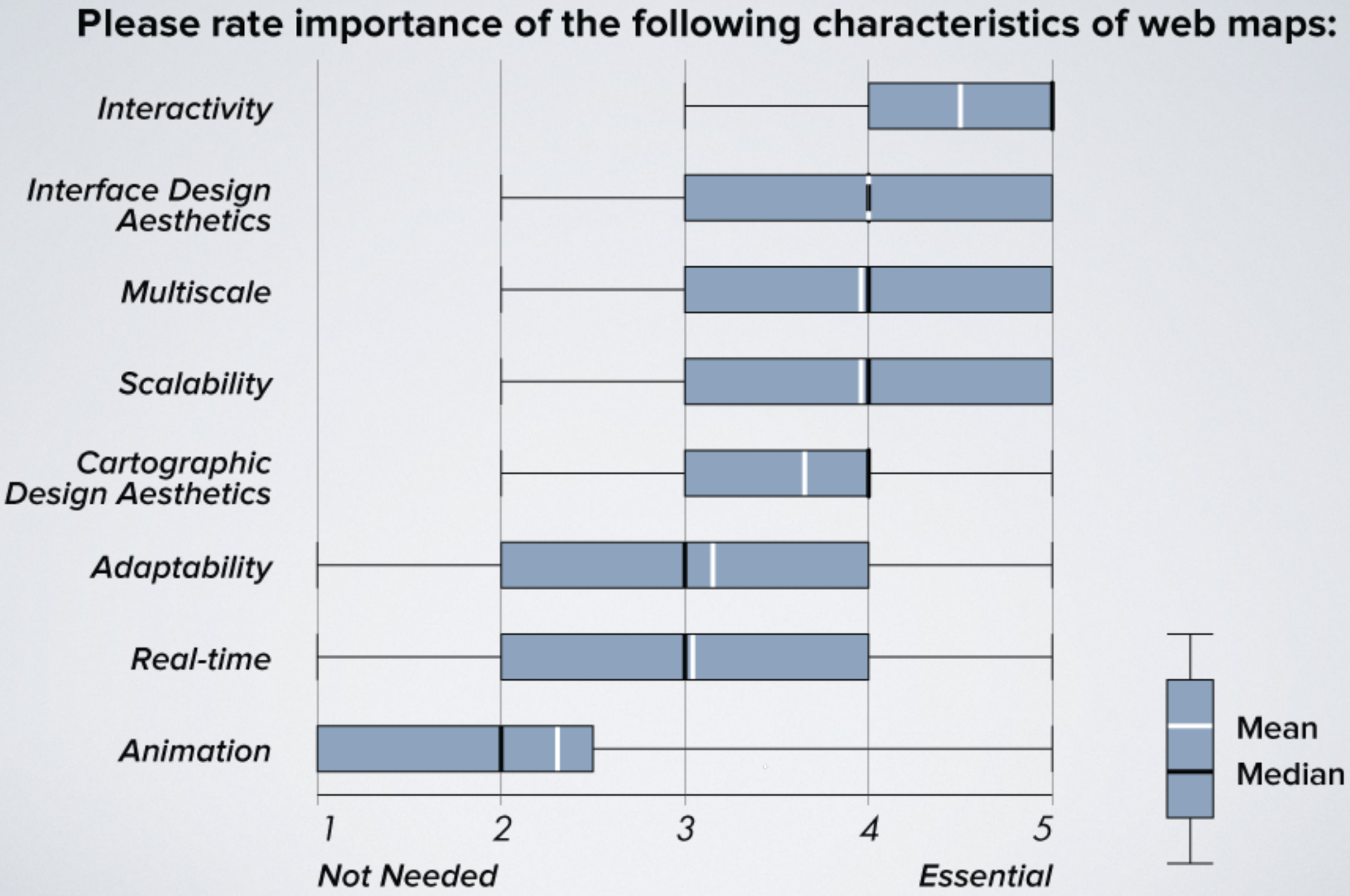
what did we LEARN?



ENGAGEMENT WITH WEB TECHNOLOGIES



part II. needs assessment survey



part II. needs assessment survey

* engagement with web mapping technologies

> “In testing technologies for next generation web apps, we’re quickly moving primarily toward **JavaScript**-based frameworks. Current frameworks under consideration include **OpenLayers**, **Leaflet**, and **GeoEXT**. This is primarily for interface development.
>
> Web service and **tile authoring, storage and delivery** are fairly independent of this.”
>
> - anonymous survey participant

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Tilestache	
TimeMap	
ViaMichelin	
Wax	
WorldKit	

Toggle Map Types · Styling · Custom Vectors

Custom Vectors

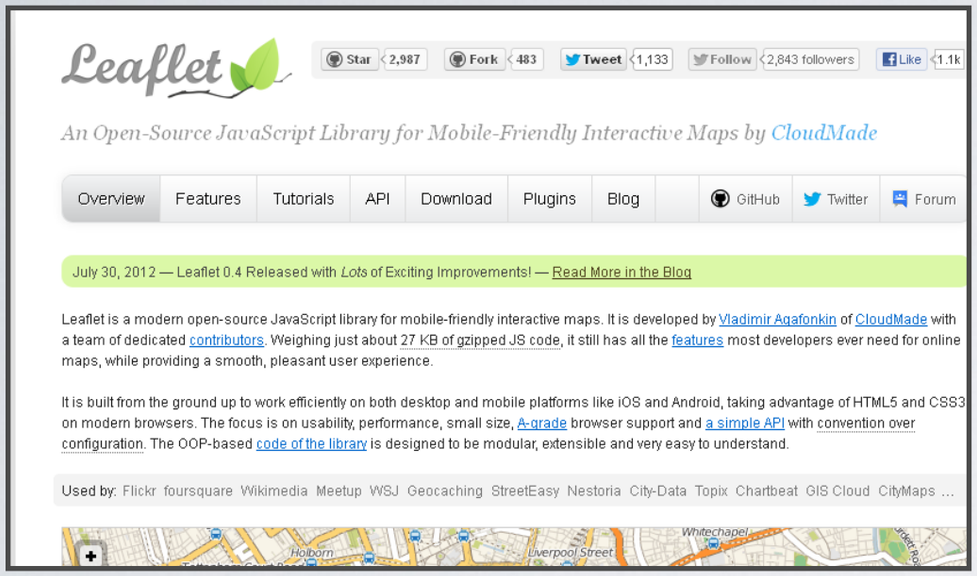
	DYNAMIC LAYER SUPPORT									TYPE
Bing Maps API										Renderer
CartoDB										API
CartoWeb										Base Library
Cloudmade										API
D3										API
deCarta										API
GeoEXT										API
GeoMoose										Base Library
Google Maps API										Wrapper Library
Jump										Wrapper/Extension Library
Ka-Map										jQuery Base Library
Kartograph										Base Library
Leaflet										Base Library
MapBender										Map Server
Mapnik										Non-Mapping-Specific Base Library
MapQuery										Non-Mapping-Specific Wrapper Library
MapQuest API										Web Application/Renderer
MapServer										Renderer/Tile Server
Mapstraction										Renderer
Modest Maps										Web Application/Renderer
Nokia										Renderer/Base Library
OpenLayers										Extension Library
OpenScales										Base Library (ActionScript)
Polymaps										Framework
Processing										Framework
Processing.js										Base Library
Raphaël										Framework
ReadyMap (Globe)										Application
Tiledrawer										Extension Library
Tilemill										API
Tilestache										Extension Library
TimeMap										Non-Map-Specific Wrapper Library
ViaMichelin										Non-Map-Specific Extension Library
Wax										Extension Library
WorldKit										Framework
	Google Tiles	TMS	ESRI REST	WMS	WFS	GeoRSS	GeoJSON	KML	Layer Control	

* GeoJSON

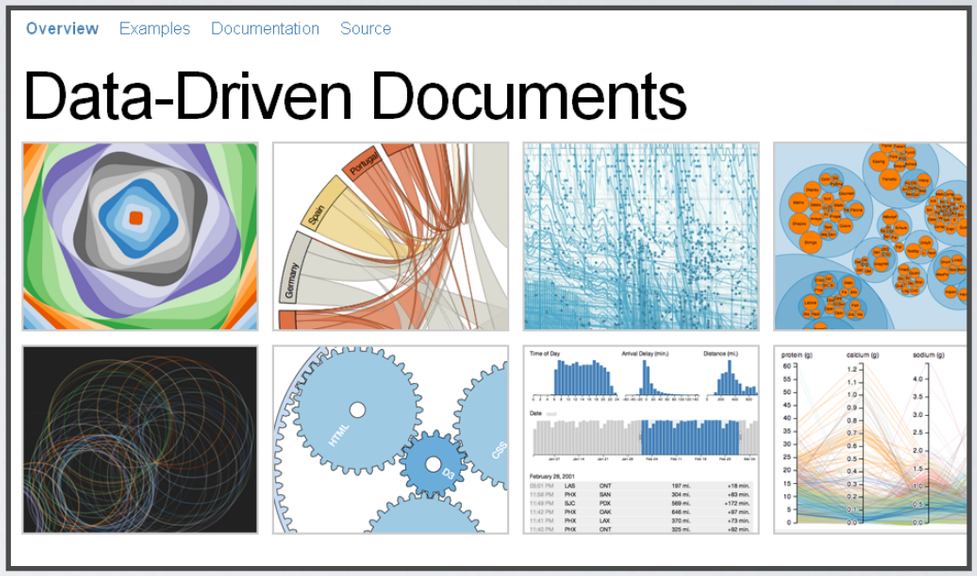
1 Supported
2 Known Work-around
3 Requires Hack
4 Not Possible

part III. diary study

Leaflet

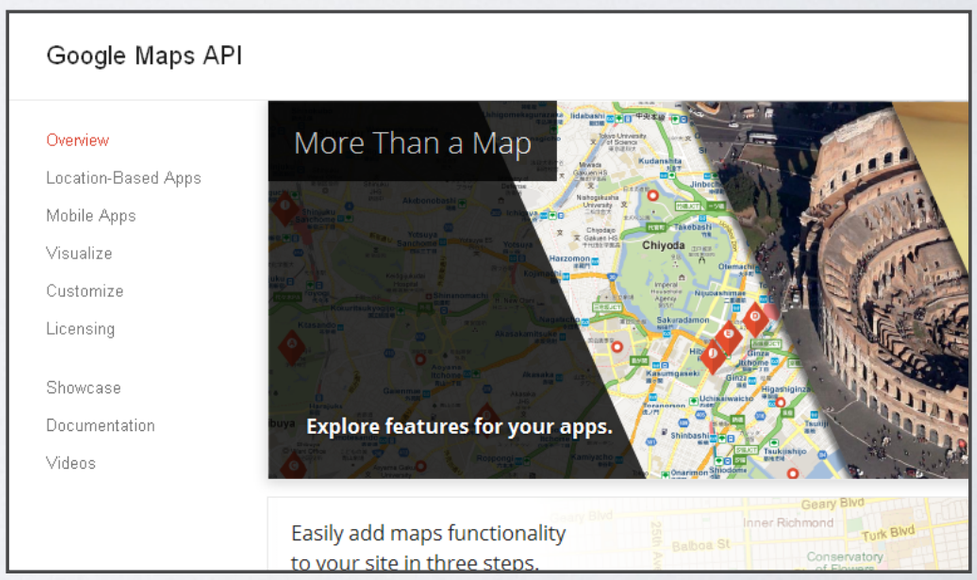


D3



OpenLayers

Google Maps API



Tools and workflow of making a Polymap

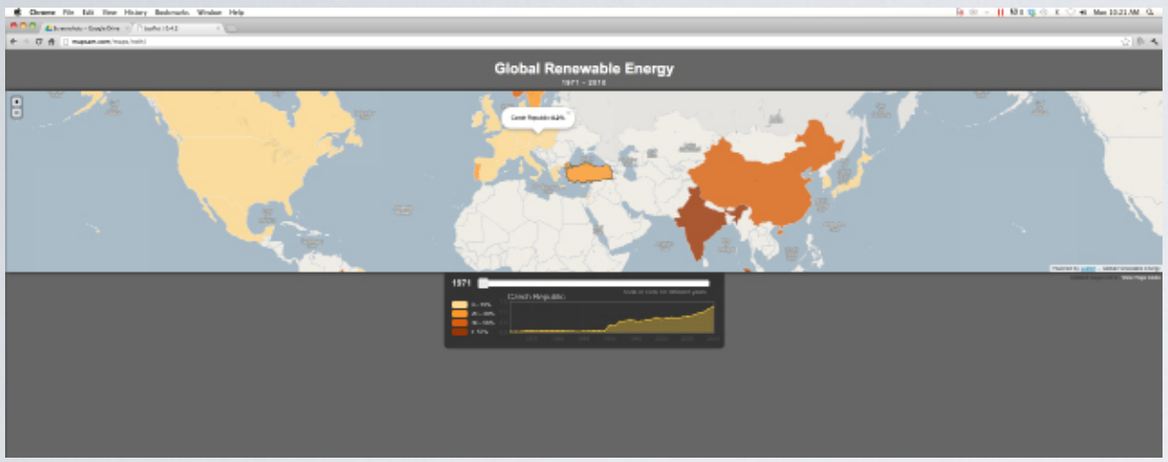
required {

} optional {

}

part III. diary study

Leaflet



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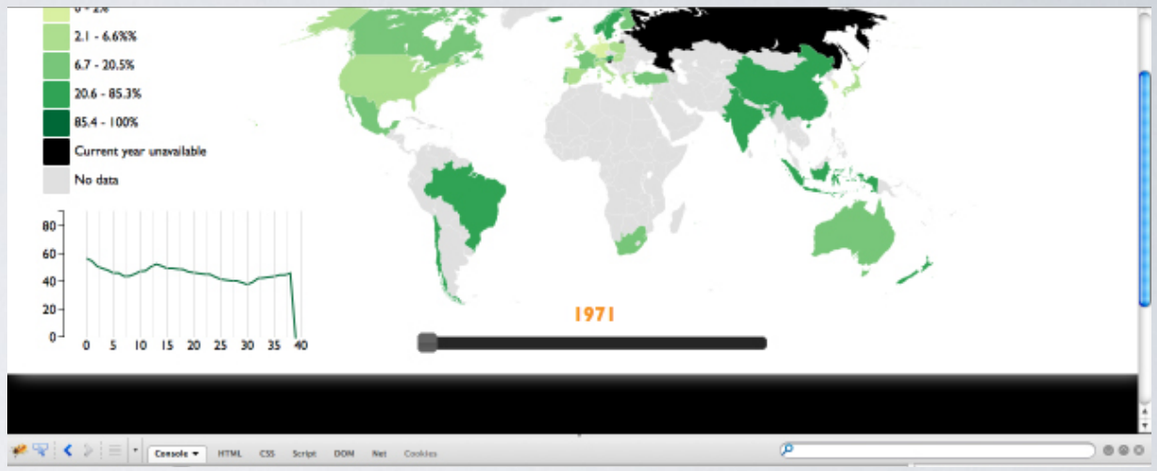
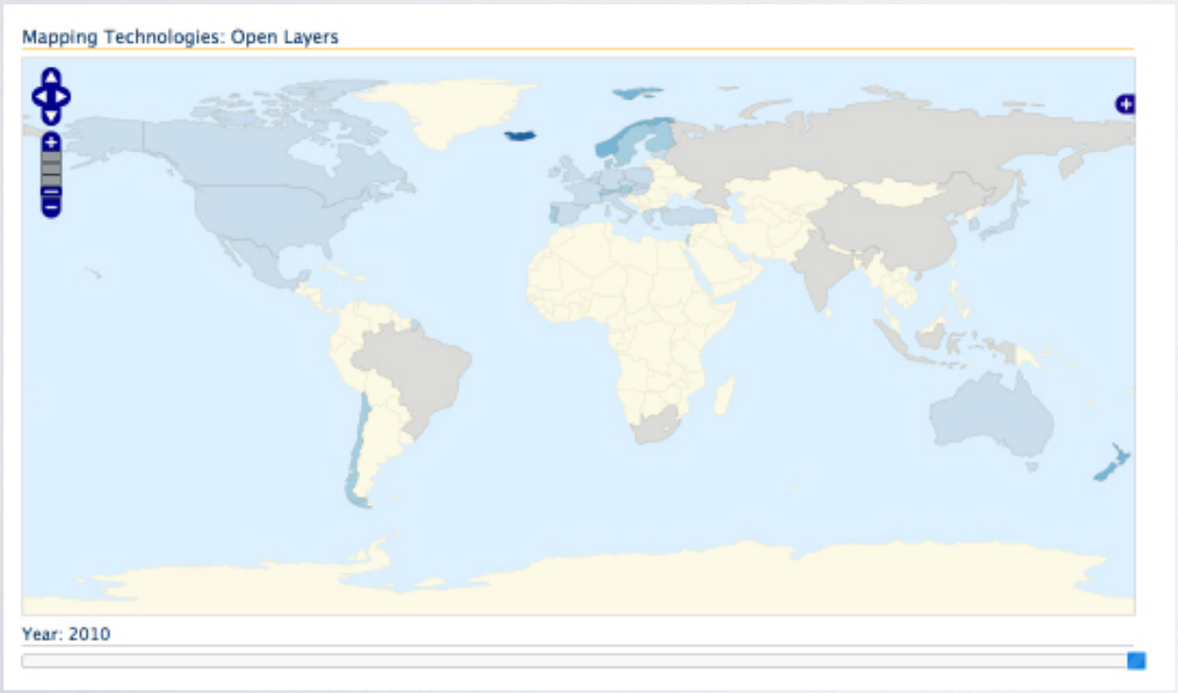
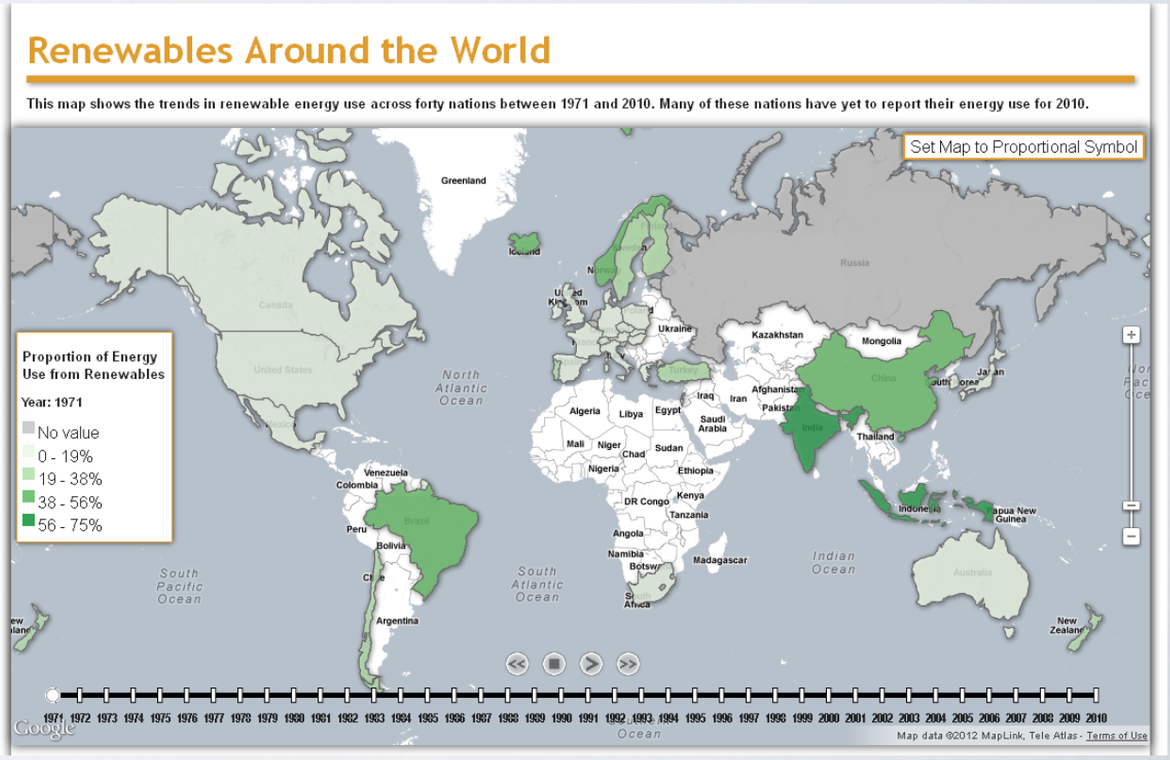


OpenLayers



Google Maps API



part III. diary study

REPRESENTATION

map types: support each of the following map types; follow all associated conventions

- **classed choropleth** (visual variable = color hue+value)
- **graduated symbol** (visual variable = size)

animation: animate the map over the included time periods

typography: label map features following typographic conventions; labels may be suppressed at the global zoom level

classification: use an equal interval classification scheme for both the choropleth and graduated symbol map

legend: dynamically (re)draw the map legend to match the displayed map type

highlighting: include a highlighted variant of each map feature to indicate selection

information graphic: include a line graph showing the signature of a selected country in comparison to the United States and the median value for the year

visual hierarchy: style the basemap to produce a strong visual hierarchy

storytelling: provide a title and supplementary text to introduce the subject/purpose

cartographic design aesthetics: customize the look and feel of the map

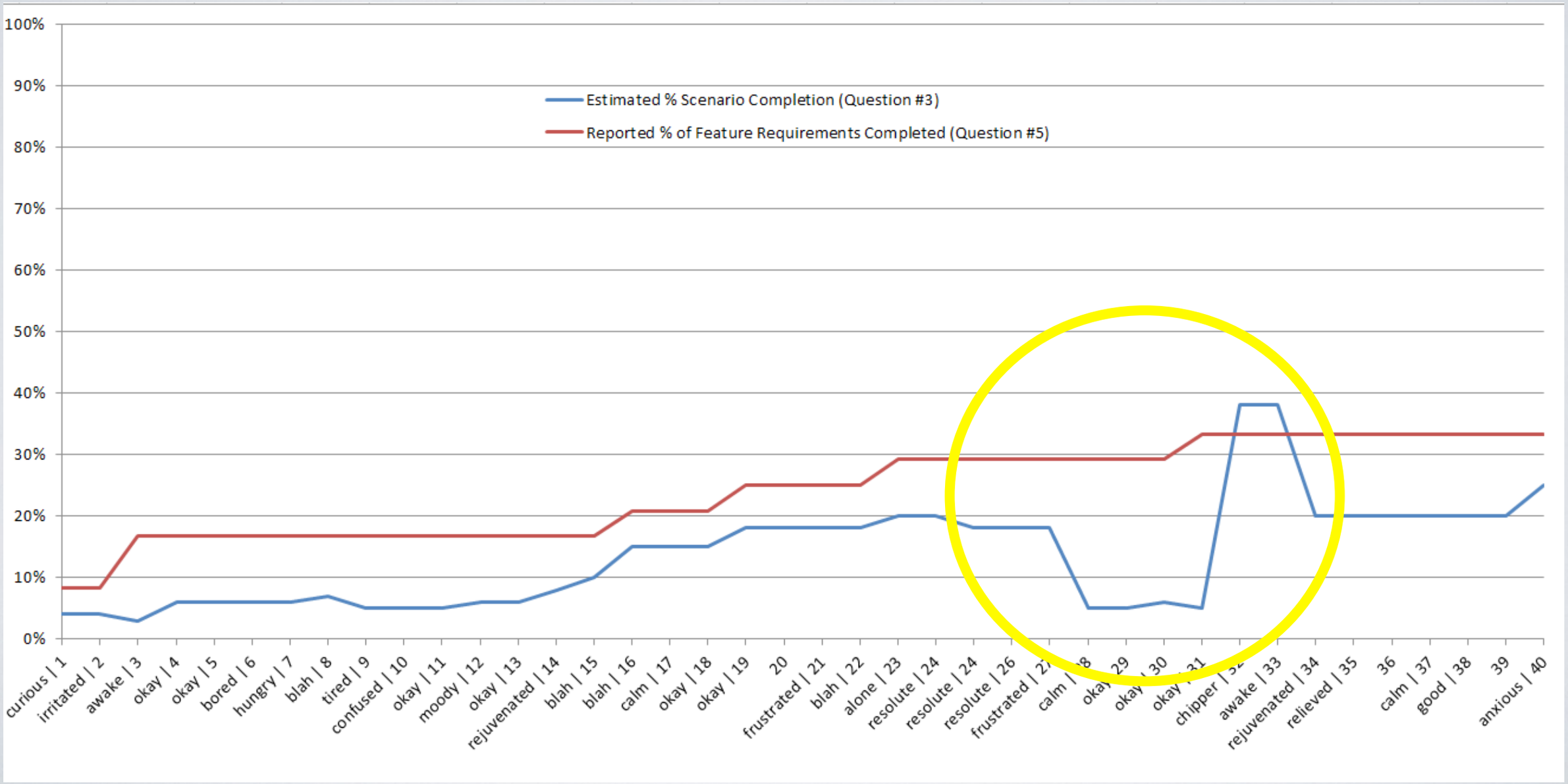
part III. diary study

INTERACTION

reexpress: change the displayed map type between choropleth and graduated symbol
sequence: include standard VCR controls (play, stop, step, back) to control the animation
resymbolize: change the number of classes used for the choropleth or graduated symbol map; allow the user to range from 3 to 20
overlay: toggle between a vector map and aerial image basemap
reproject: set the map projection to an equal area
pan: change the geographic center of the map
zoom: change the scale and resolution (of labels) of the map
filter: filter the map according to the attribute range using a two-thumb slider; matching map features should become highlighted
search: allow the user to search for a specific country; matching map features should become highlighted
retrieve: highlight a probed map feature and activate an associated information window with details about the feature
calculate: dynamically calculate deviation of a map feature from median (i.e., percentile) and include in the information window upon retrieve
link: coordinate retrieve with the line graph to show the selected map feature in context with the United States and the median
interface design aesthetics: customize the look and feel of the interface

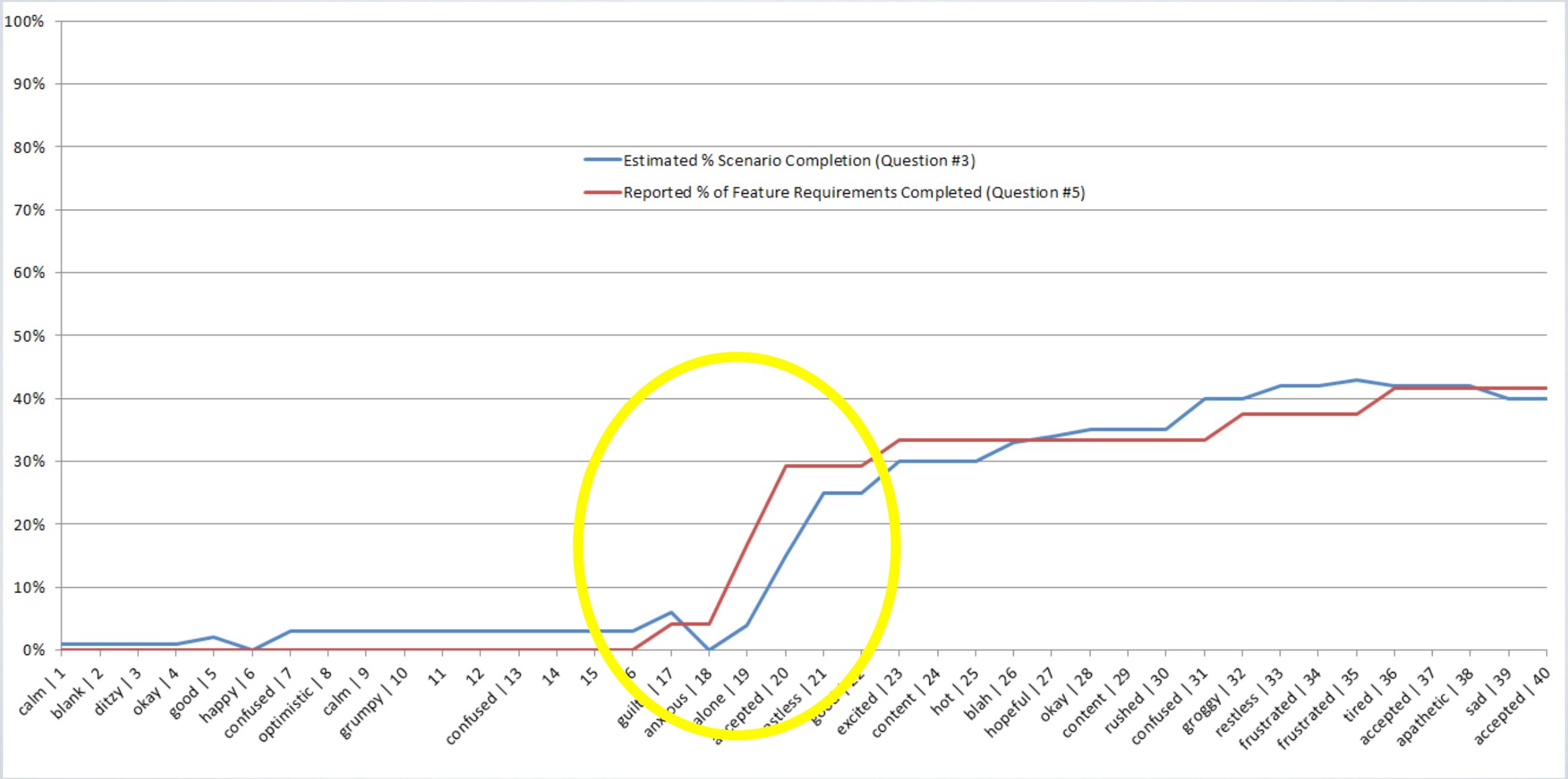
part III. diary study

* refactoring the Google Maps API



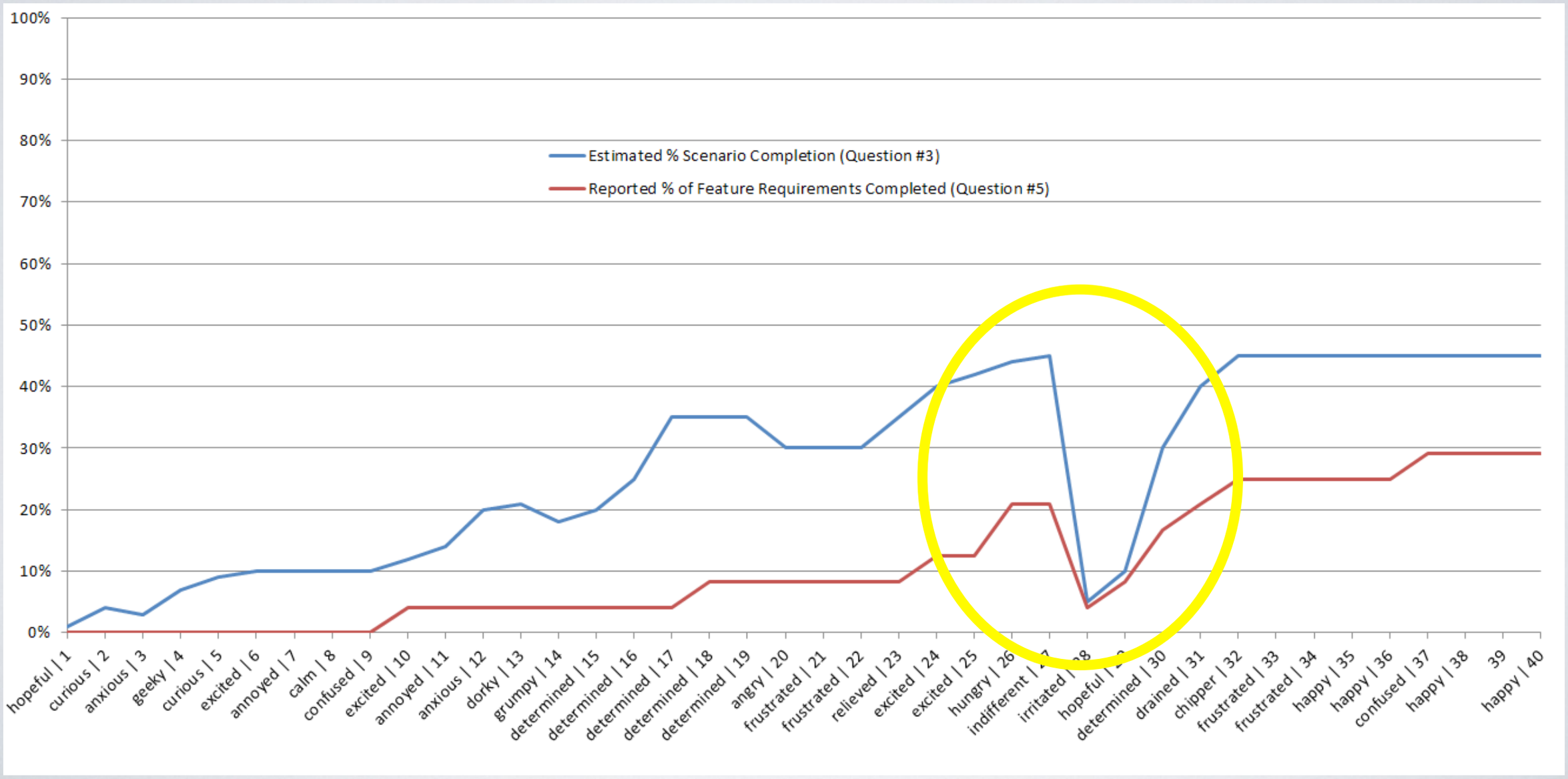
part III. diary study

* quick progress with OpenLayers Symbology but then a steady plateau



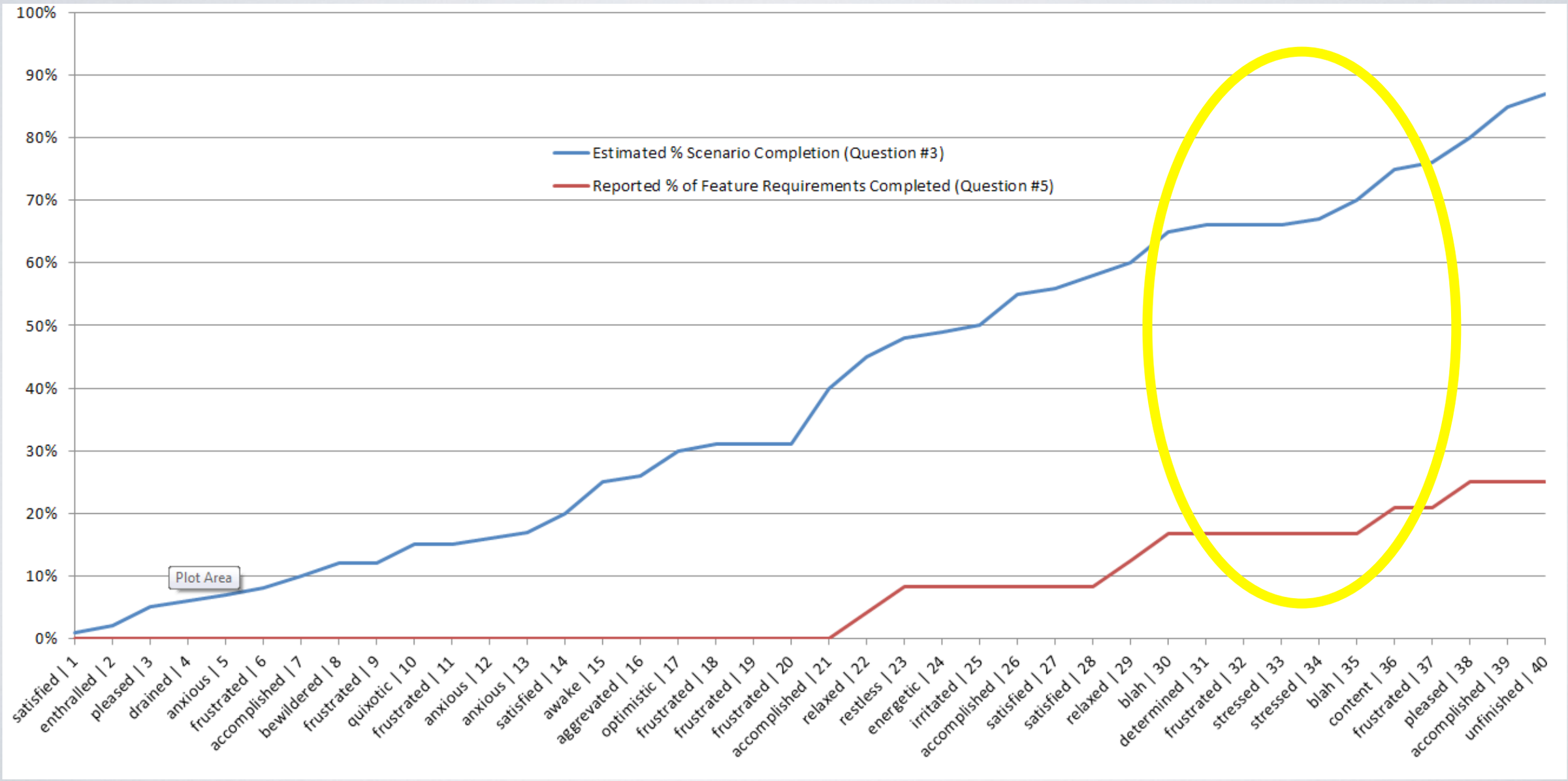
part III. diary study

* a new release of Leaflet version 0.4!



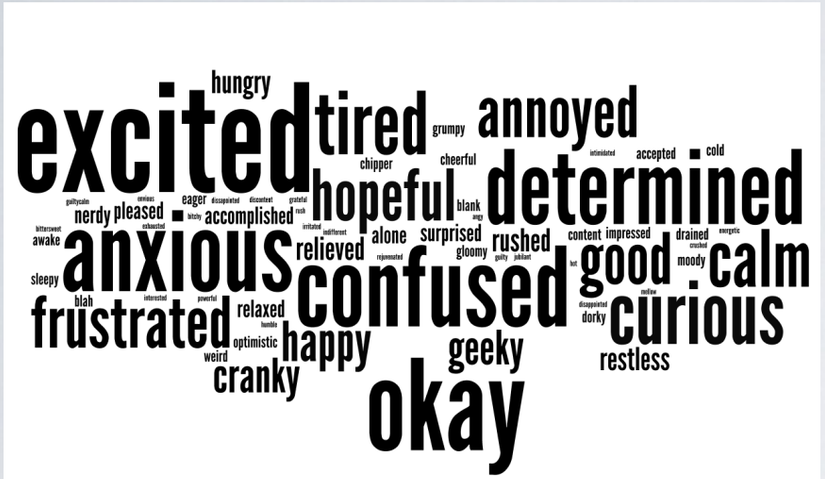
part III. diary study

* drastic discrepancies between estimated and reported feature requirements completed

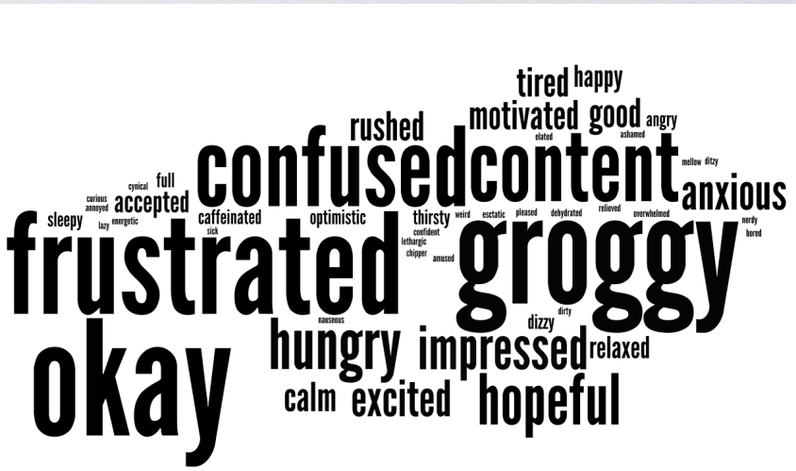


part III. diary study

Leaflet

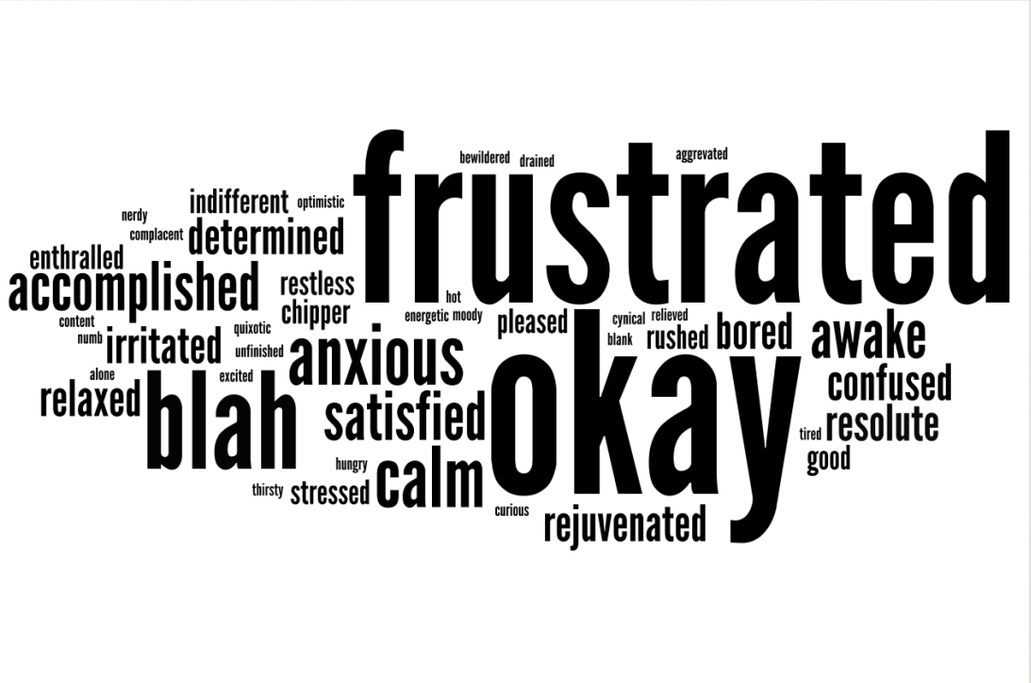


D3

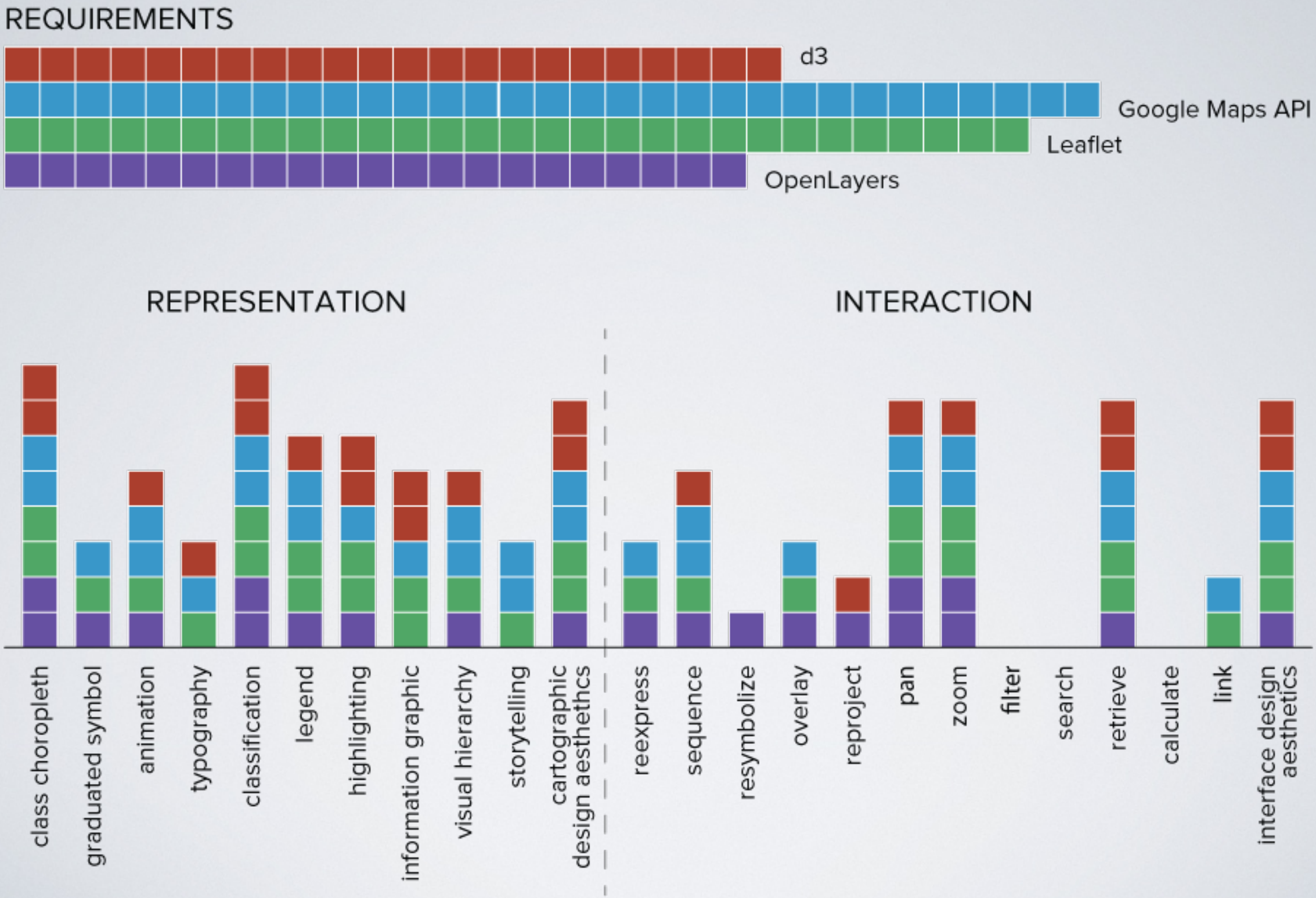


OpenLayers

Google Maps API



part III. diary study



conclusions and reflections

Q#4 can we cope with **change**?

Q#3 how do we **teach** these tools?

Q#2 what are web maps and **what is web mapping**?

Q#1 **which technologies** or tool(s) should we use for web mapping?

conclusions and reflections

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we cope
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conclusions and reflections

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thank you

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D3 satellite projection by @mbostock