

Open Spatial Data Science in the B.C. Public Service

Andy Teucher & Stephanie Hazlitt

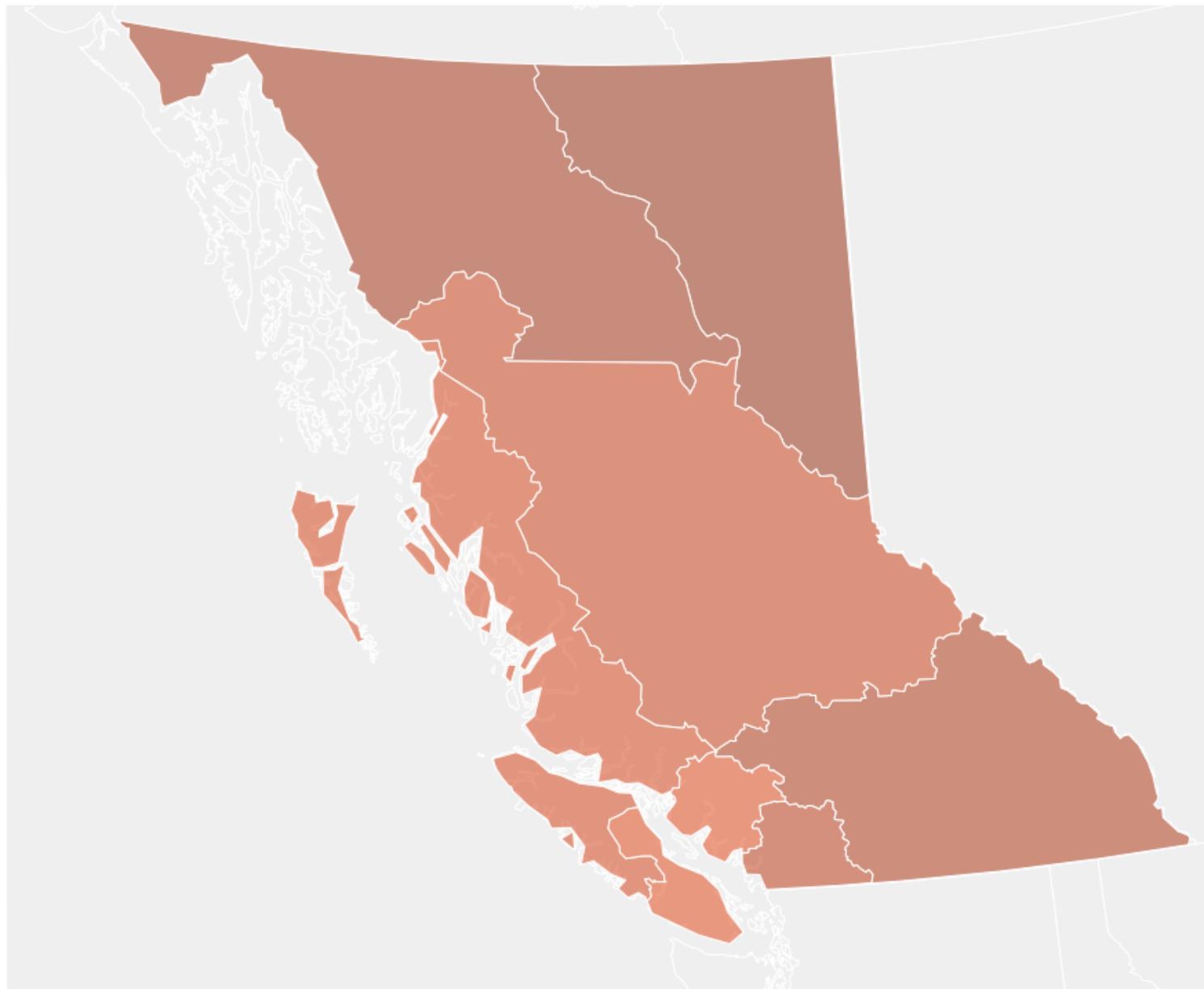
2018/11/05



BRITISH
COLUMBIA

Ministry of
Environment and
Climate Change Strategy





Geographic Data & Services

B.C.'s investment in [Spatial Data Infrastructure](#) provides government agencies, businesses and citizens with direct access to authoritative, geographic data through a wide variety of web applications and services.

Popular Topics

iMapBC

View and analyze hundreds of map data layers compiled from across the B.C. Government and other public sector agencies.

B.C. Physical Address Geocoder

The Geocoder can be used to resolve the physical locations and correct, standardized form of civic and non-civic addresses.

Topographic Map Viewer

The Topographic Map Viewer allows users to view and download PDF maps for free from a web browser.

Data Distribution Services

B.C. Government data can be downloaded for local use.

[Explore Within ▾](#)

Web-based Mapping

Visualize and analyze the wealth of B.C. geographic information using a variety of web-based map tools and map services.

[Explore Within ▾](#)

Location Services

A suite of web services that locate things such as civic addresses, areas of interests, place names and routes from point A to B.

[Explore Within ▾](#)

Topographic Data

Topographic data provides detail on British Columbia's terrain, elevation and land features. The topography of B.C. is used to create maps of the provincial landbase.

[Explore Within ▾](#)

Land Use

The Provincial Government develops, manages and maintains the fundamental datasets for determining land ownership, rights and jurisdiction in British Columbia.

Digital Imagery

Imagery provides a sense of the current state of a place, as well as a view into its past condition. Visual data is critical to measuring cumulative effects on the land of British Columbia.

B.C. Data Catalogue

Explore the B.C. Government's extensive collection of datasets, applications and web services.

[Go to the Data Catalogue](#)

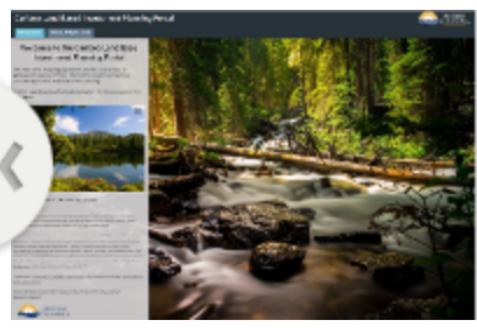
Data Management

Learn about three B.C. Government organizations that are instrumental to managing and sharing geographic data:

- [BC Stats](#)
- [DataBC](#)
- [GeoBC](#)

B.C.'s Map Hub is a collaborative place to explore, engage, innovate and communicate using the language of maps and data. Search for content, browse maps, ask questions and for government professionals - author content. We welcome feedback. Please [email your comments](#) to us!

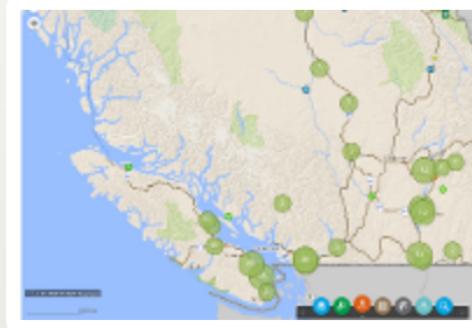
Featured Content and Other Services



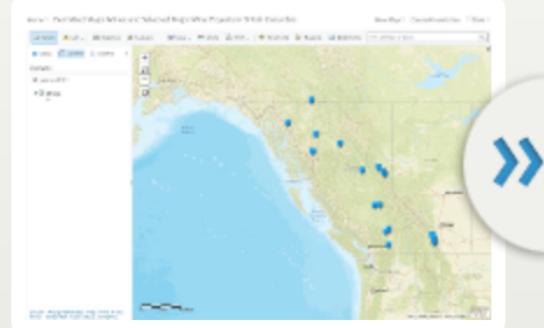
Cariboo Land Based Investment Planning Portal



Surface Water Monitoring Sites



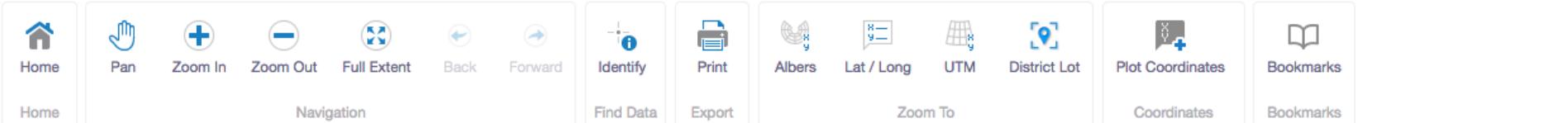
Groundwater Level Data Interactive Web Application



Permitted Major Mines and Selected Major Mine Projects

Make a map, share your data, collaborate with others:

- check out the [help documentation](#);
- watch some of the [introductory videos](#);
- find more data in the [B.C. Data Catalogue](#).



Home Navigation

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Navigation

Home

Welcome to iMapBC

iMapBC exists so you can access and explore thousands of digital map layers for British Columbia.

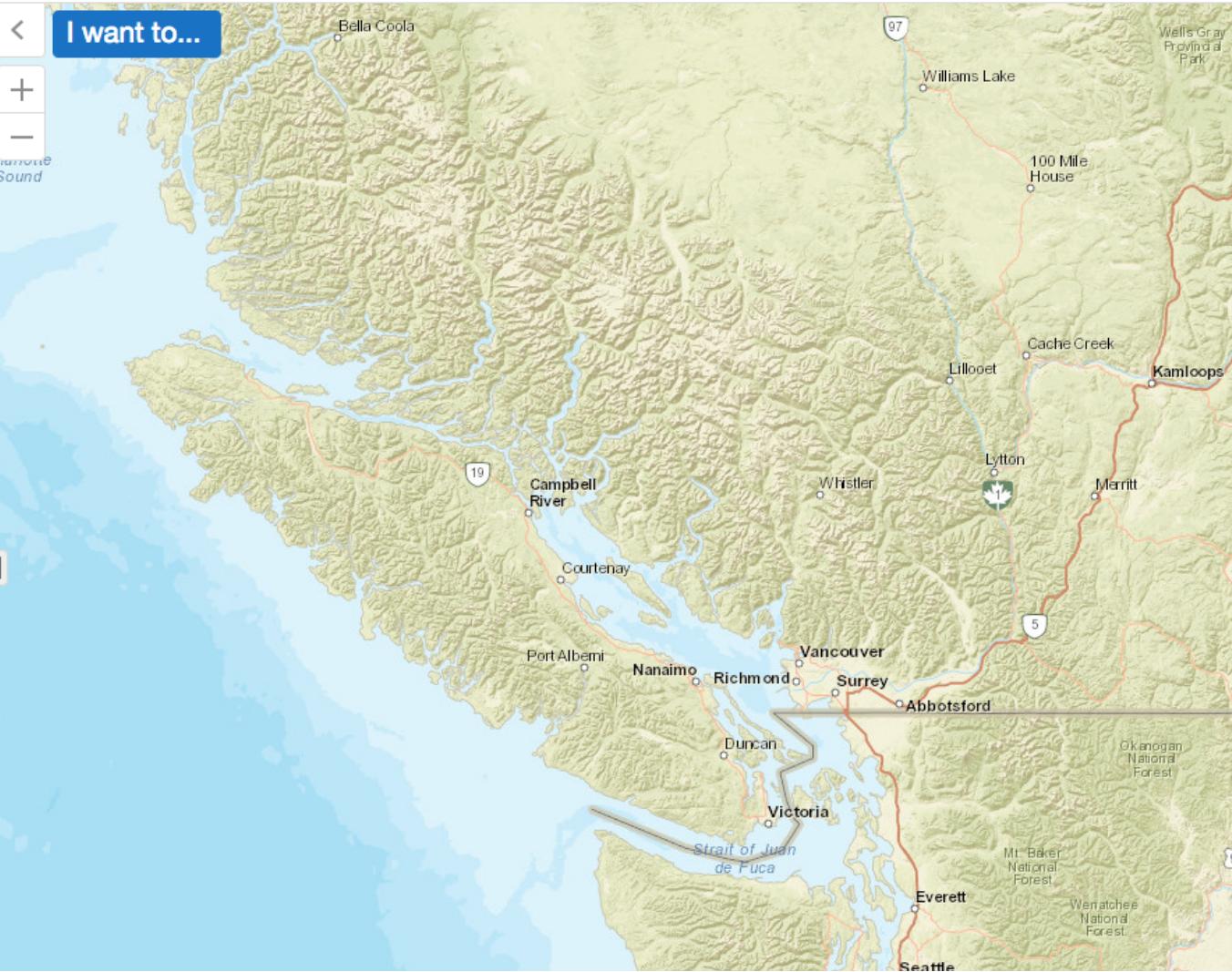
Build your map

Go to your area of interest, then add layers of map information that you'd like to visualize and explore. [Add layers now.](#)

Explore & Analyze

The **I want to...** menu provides access to step-by-step activities and features (via the toolbar) to help you explore and interact with your map.

[Learn more](#) about using iMapBC.





/ Datasets

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[Health and Safety](#) (71)

 2,021 datasets found**Order by**[Published Date](#)

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Soil Mapping Data Packages



Natural Resources

These Soil Mapping Data Packages include a Soil Map dataset which includes the equivalents to Soil Project Boundaries, Soil Survey Spatial View mapping polygons with...

Record Published: 2018-02-09

Record Last Modified: 2018-02-09

Accumulative AOS in the Omineca Region



Natural Resources

Multi year aerial accumulative aerial overview for spruce beetle infestations This data is used in the Spruce Beetle Attack in the Omineca Region application. A description of...

Record Published: 2018-01-11

Record Last Modified: 2018-01-11

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This organization

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Province of British Columbia

Where Ideas Work

Canada

<https://github.com/bcg...>

angelika.ehlers@gov.bc....

[Repositories 252](#) [People 231](#) [Teams 40](#) [Projects 1](#)

Pinned repositories

[BC-Policy-Framework-For-GitHub](#)

Policy information for BC Government employees using GitHub

52

20

[Gov-2.0-Bootstrap-Skeleton](#)

An HTML5/CSS3/Bootstrap skeleton to accompany the gov.bc.ca. Developer's Guide.

HTML

7

6

Type: All ▾

Language: All ▾

[New](#)

1 result for repositories matching envreportbc

Clear filter

[EnvReportBC](#)

List of repositories administered by Environmental Reporting BC (www.gov.bc.ca/environmental-reporting-bc)

R 9 4 Updated on Nov 24, 2017



Top languages

R JavaScript HTML

Python Shell

Most used topics

Manage

hyperledger hyperledger-indy

verifiable-claims

Environmental Reporting BC

Air

Climate Change

Land & Forests

Plants & Animals

Sustainability

Water

Previous Reports & Indicators

About Environmental Reporting

Environmental Enforcement Reporting

Environmental Compliance Inspections Reporting

Environmental Reporting BC



Environmental Reporting BC provides access to scientific data and information about our environment and how it relates to British Columbians. This information comes in the form of indicators that examine the state and trends of different aspects of our environment.



Air



Climate Change



Land & Forests



Plants & Animals



Sustainability



Water

Through this website, you can find:

- Indicators (graphs, maps, and reports)
- Environmental data
- Related information and multimedia

These data and information products help British Columbians:

- Track environmental conditions and trends over time
- See the connections between the environment, human wellbeing, and the economy
- Make informed decisions
- Measure our progress towards sustainability

Are you looking for more environmental reporting products? We'd love to hear from you! Contact us the traditional way, or chat with us on [Twitter](#).

Latest Updates

- [Land Designations that Contribute to Conservation in B.C.](#)
- [Status of Fine Particulate Matter in B.C. \(2014-2016\)](#)
- [Status of Ground-Level Ozone in B.C. \(2014-2016\)](#)
- [Long-term Change in Timing & Volume of River Flow in B.C.](#)
- [Municipal Solid Waste Disposal in B.C. \(1990-2015\)](#)
- [Change in Snowpack in B.C. \(1950-2014\)](#)
- [Status of Air Quality Bylaws in B.C.](#)

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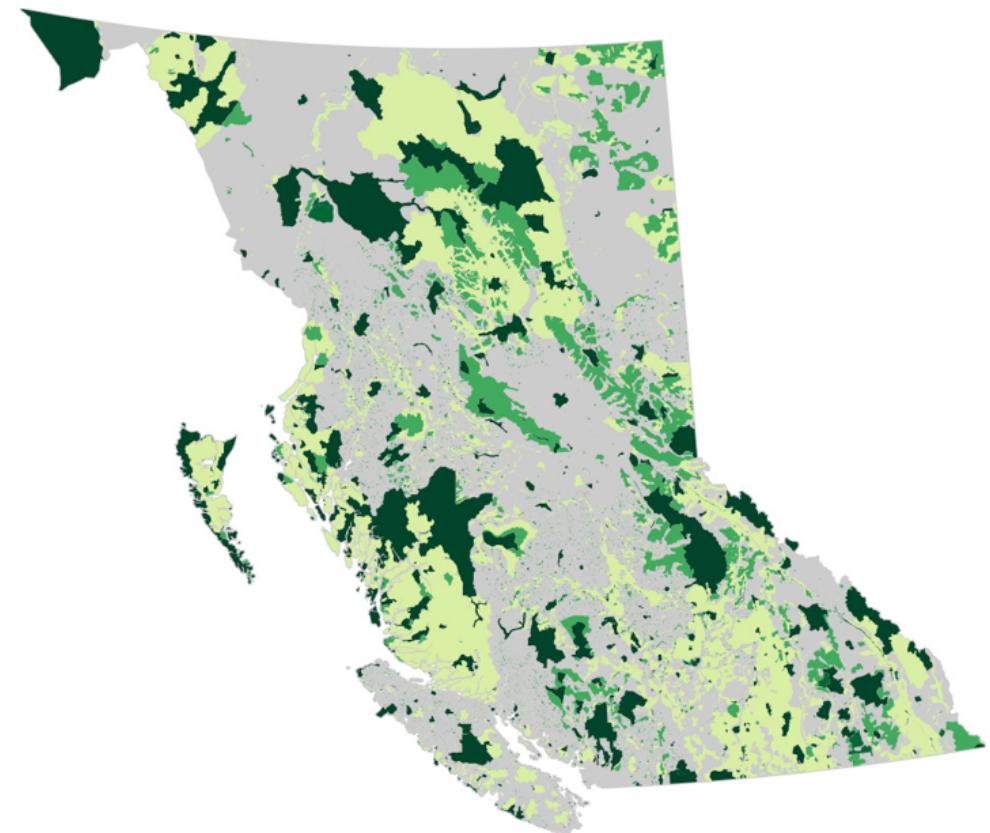
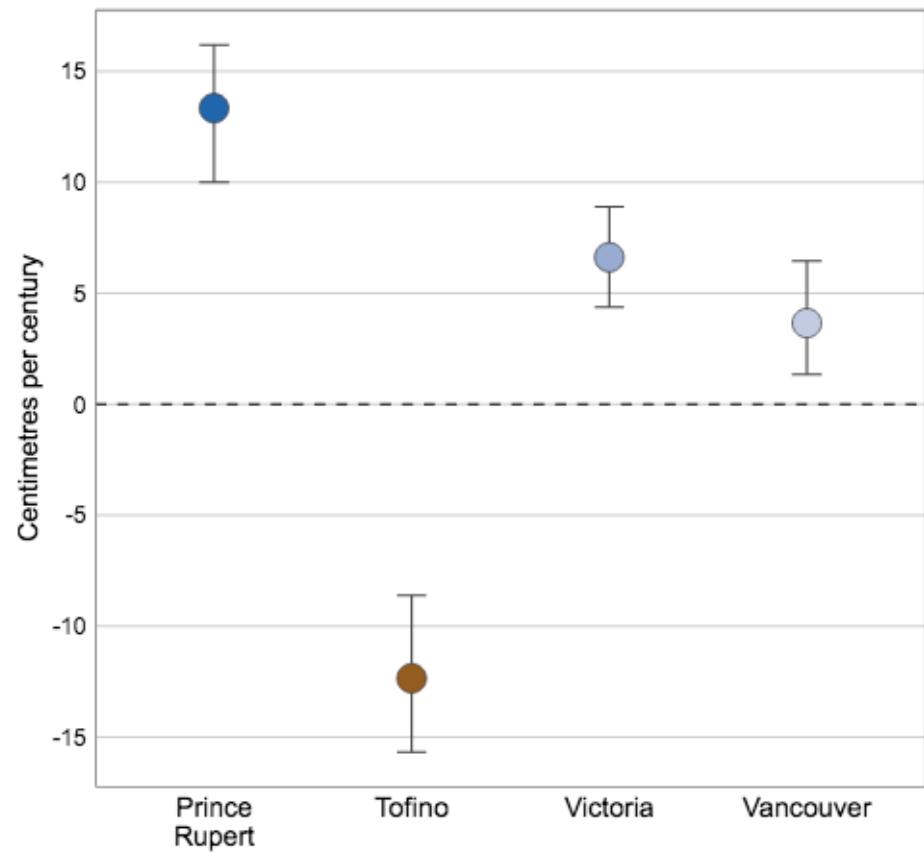


Environmental
Reporting BC

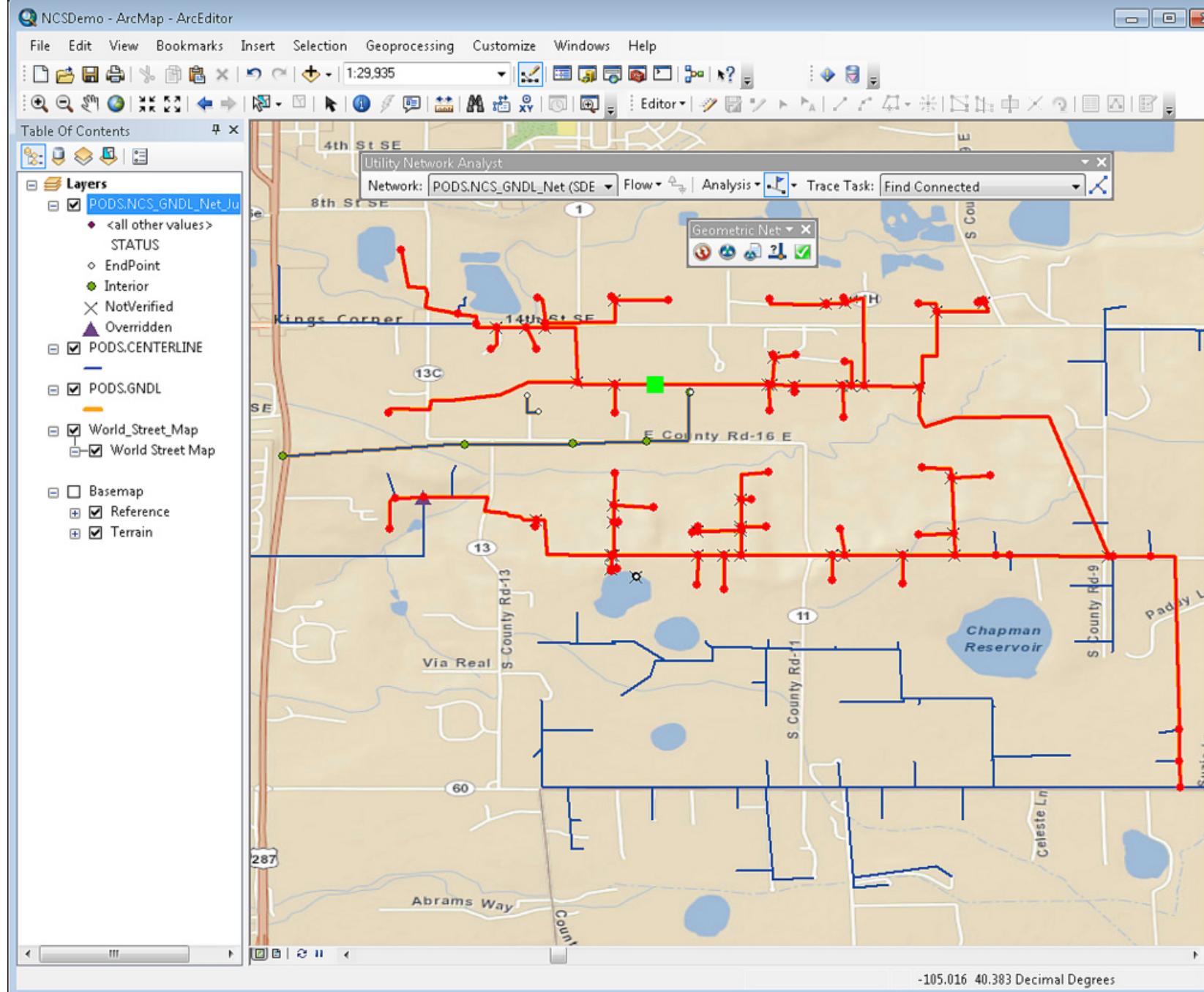
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	A	B	C	D	E	F	G
1	path	name	photographer	title	description	depicted_people	depicted_place
2	/Users/alih/Documents/Wikipedia/Hay Festival/photos/hayfestival-2016-Álvaro-Enrique-2.jpg	hayfestival-2016-Álvaro-Enrique-2.jpg	Andrew Lih (User:Fuzheado)	Hay Festival 2016 - Álvaro Enrique		Beatrix Potter	Hay Festival
3	/Users/alih/Documents/Wikipedia/Hay Festival/photos/hayfestival-2016-band.jpg	hayfestival-2016-band.jpg	Andrew Lih (User:Fuzheado)	Hay Festival 2016 - Band		Beatrix Potter	Hay Festival
4	/Users/alih/Documents/Wikipedia/Hay Festival/photos/hayfestival-2016-beatrix-potter-1.jpg	hayfestival-2016-beatrix-potter-1.jpg	Andrew Lih (User:Fuzheado)	Hay Festival 2016 - Beatrix Potter posing		Beatrix Potter	Hay Festival
5	/Users/alih/Documents/Wikipedia/Hay Festival/photos/hayfestival-2016-beatrix-potter-book.jpg	hayfestival-2016-beatrix-potter-book.jpg	Andrew Lih (User:Fuzheado)	Hay Festival 2016 - Beatrix Potter with book		Beatrix Potter	Hay Festival
6	/Users/alih/Documents/Wikipedia/Hay Festival/photos/hayfestival-2016-beatrix-potter-gesture.jpg	hayfestival-2016-beatrix-potter-gesture.jpg	Andrew Lih (User:Fuzheado)	Hay Festival 2016 - Beatrix Potter gesturing		Beatrix Potter	Hay Festival
7	/Users/alih/Documents/Wikipedia/Hay Festival/photos/hayfestival-2016-beatrix-potter-reading.jpg	hayfestival-2016-beatrix-potter-reading.jpg	Andrew Lih (User:Fuzheado)	Hay Festival 2016 - Beatrix Potter reading		Beatrix Potter	Hay Festival
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38	/Users/alih/Documents/Wikipedia/Hay Festival/photos/hayfestival-2016-flag1.jpg	hayfestival-2016-flag1.jpg	Andrew Lih (User:Fuzheado)				Hay Festival
39	/Users/alih/Documents/Wikipedia/Hay Festival/photos/hayfestival-2016-flag2.jpg	hayfestival-2016-flag2.jpg	Andrew Lih (User:Fuzheado)				Hay Festival
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45	/Users/alih/Documents/Wikipedia/Hay Festival/photos/hayfestival-2016-Goldsmith-Enrique-Vasquez.jpg	hayfestival-2016-Goldsmith-Enrique-Vasquez.jpg	Andrew Lih (User:Fuzheado)				Hay Festival
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47	/Users/alih/Documents/Wikipedia/Hay Festival/photos/hayfestival-2016-haysign-day.jpg	hayfestival-2016-haysign-day.jpg	Andrew Lih (User:Fuzheado)				Hay Festival



ARH150_northampton_master.mxd - ArcMap

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help 56% Editor Georeferencing

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Layers

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- northampton_city_bnd
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- Basemap
- World_Imagery

New Data Frame

- northampton_city_bnd
- Basemap
- World_Street_Map

1:300,000 11 12 13 14 15 16 17 18

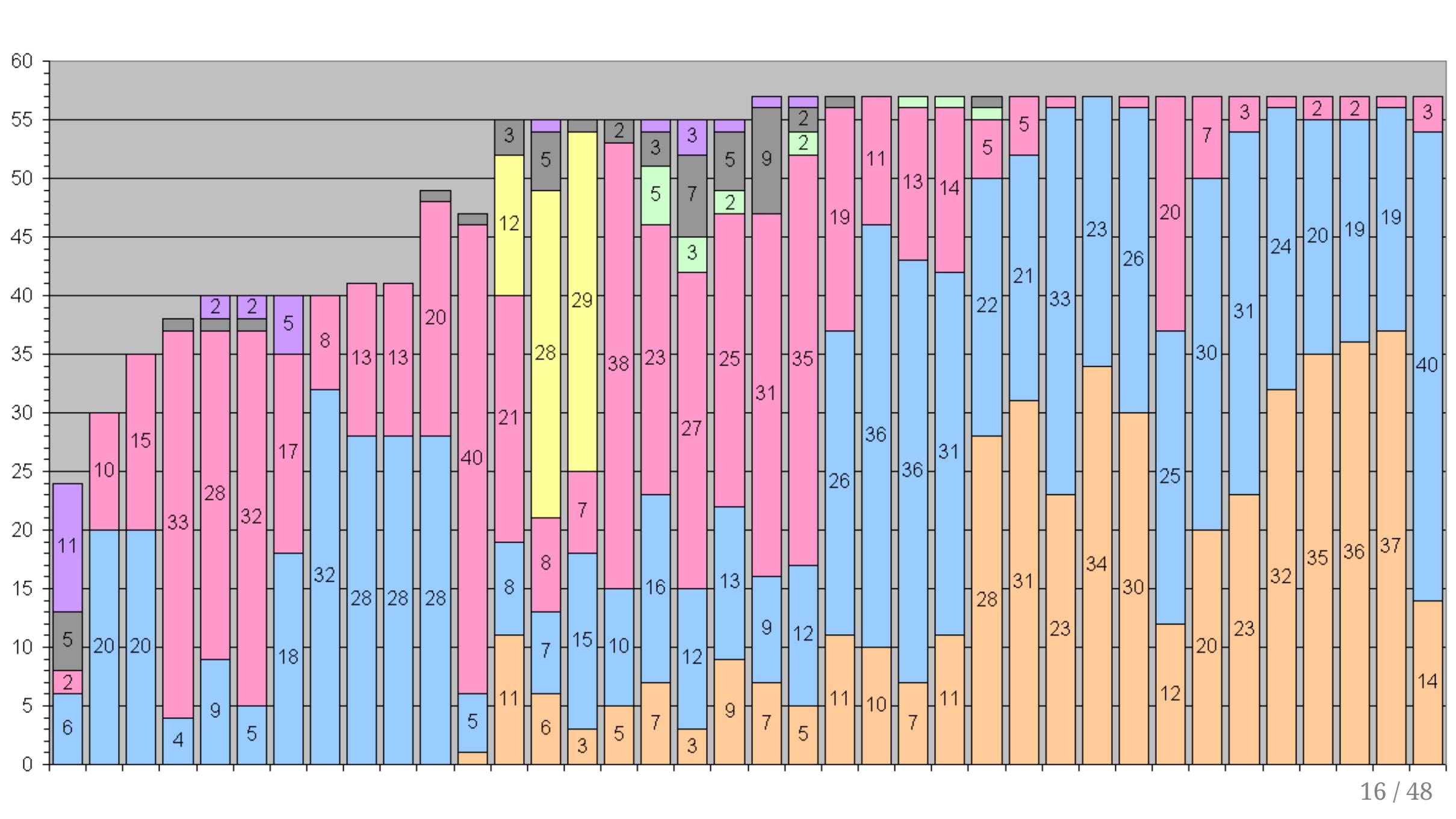
10 B I U A 15 / 48

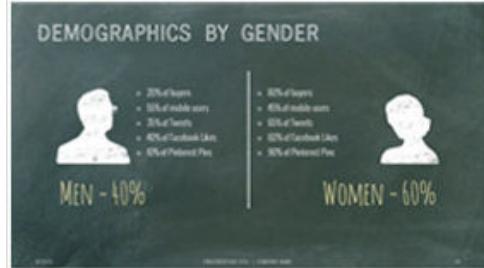
-8078357.509 5203945.511 Meters 3.22 0.52 Inches

The screenshot shows a detailed map of Northampton, Massachusetts, within a ArcMap software interface. The map includes a mix of land use and transportation data. Key features include:

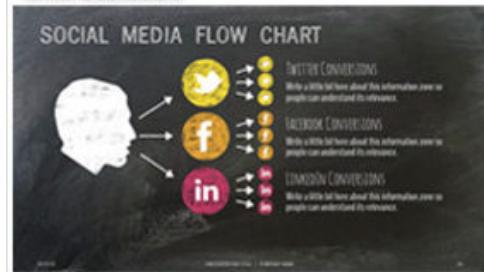
- Proposed Site:** Indicated by a large yellow polygon.
- Transportation:** Shown as a network of roads and highways, some highlighted in purple.
- Community Facilities:** Shown as small green and grey shapes.
- Utilities:** Shown as thin black lines.
- Crime Traffic and Census Statistics:** Shown as small blue and red dots.
- Natural Resources:** Shown as green areas.
- Smith College Campus:** Indicated by a yellow polygon.
- MHC Historic Inventory Areas:** Indicated by a yellow polygon.
- Basemap:** Shown as a light brown base map.
- World_Imagery:** Shown as a satellite view.

The map also includes a legend, a scale bar (1:300,000), and a coordinate display (-8078357.509, 5203945.511 Meters). The ArcMap interface features a toolbar with various tools and a table of contents on the left side.





Green Chalkboard



Dusty Chalkboard

TWO KEY IDEAS PRESENTED TOGETHER

Key Idea Number One

Go ahead and place your text about one of your ideas in this heavily box right here. Once I see this, people are eager to learn about this idea.

However, be careful how much text you add to this area when you are preparing a presentation that you will be giving here. People will not be able to read your text and listen to you simultaneously.

Key Idea Number Two

Put your text about the second of your ideas in this heavily box right here. Once I see this, people are eager to learn about this idea.

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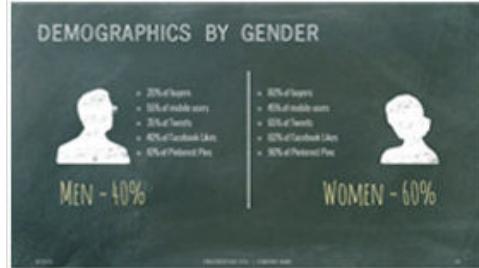
A VIDEO CASE STUDY

VIDEO TITLE: 2012

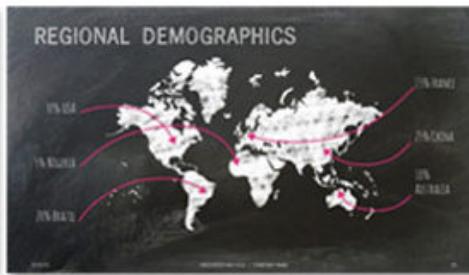
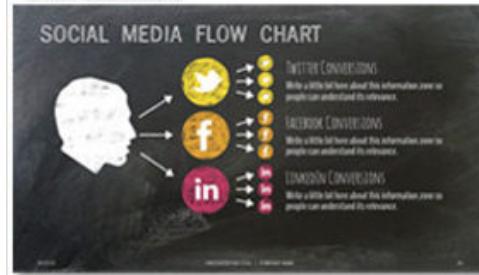
DIRECTOR AND PRODUCER:
SYNOPSIS

We are confident that you will find this video to be of ultimate entertainment and educational value. You will be grateful for the information presented in this video once you have sat through all 2 hours of its indefinitely long run time. Get your popcorn and prepare to play!

Black Chalkboard



Green Chalkboard



Dusty Chalkboard

TWO KEY IDEAS PRESENTED TOGETHER

KEY IDEA NUMBER ONE

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However, be careful how much text you add to this area when you are preparing a presentation that you will be giving here. People will not be able to read your text and listen to you simultaneously.

KEY IDEA NUMBER TWO

Put your text about the second of your ideas in this heavily box right here. Don't be shy, people are eager to learn about this idea.

Be very careful how much text you add to this area when you are preparing a presentation that you will be giving here. People will not be able to read your text and listen to you simultaneously.

A VIDEO CASE STUDY

VIDEO TITLE: 2012

DIRECTOR AND PRODUCER:
SYNOPSIS:

We are confident that you will find this video to be of ultimate entertainment and educational value. You will be grateful for the information presented in this video once you have sat through all 2 hours of its indefinitely long run time. Get your popcorn and get ready to play!

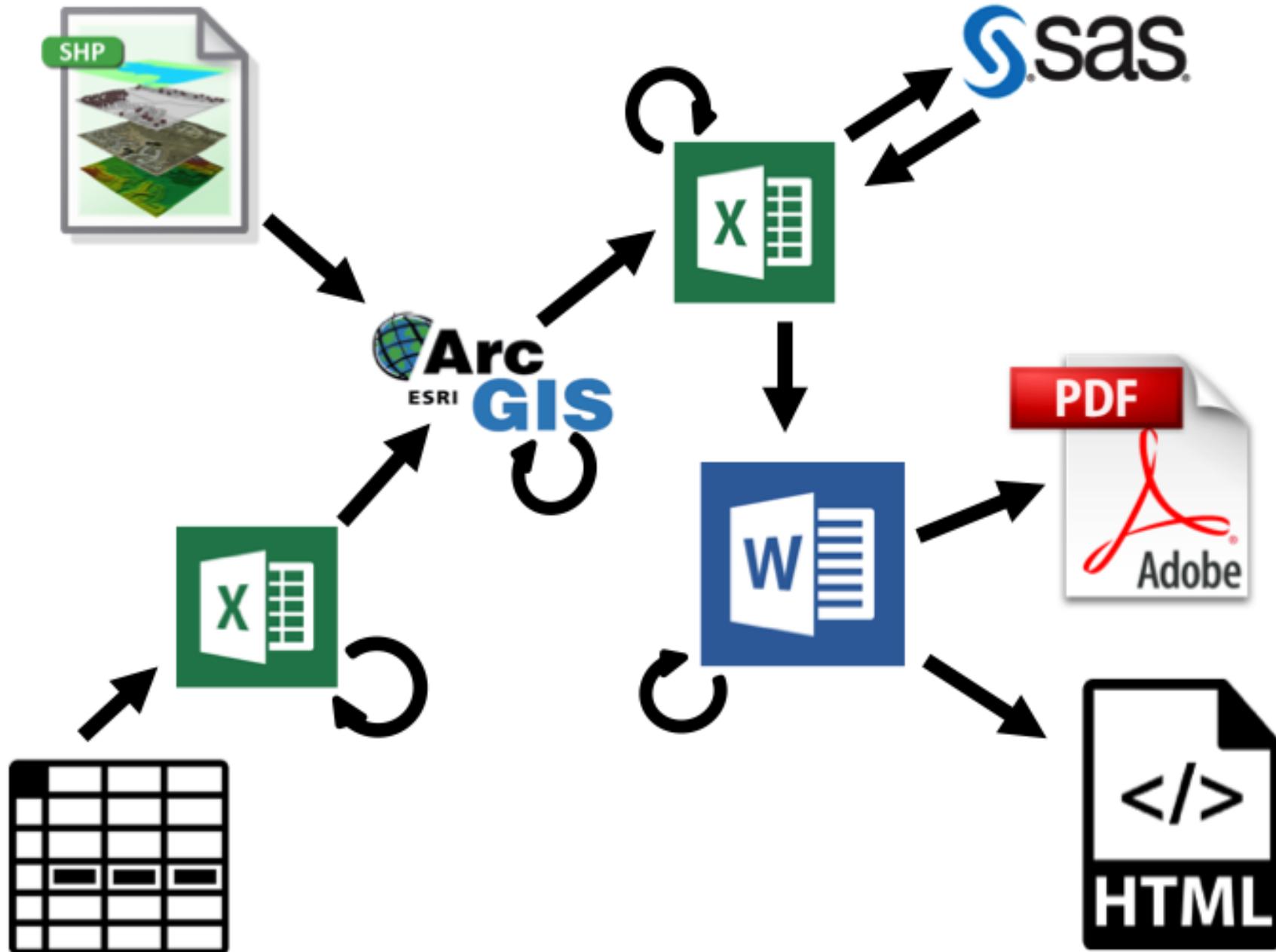
Black Chalkboard

"Thank you for your hard work,
this is exactly what we were
looking for!"

"But, I think I gave you the wrong version of shapefile #2. Oh, and that Excel spreadsheet has been updated."

"But, I think I gave you the wrong version of shapefile #2. Oh, and that Excel spreadsheet has been updated."





Open source programming language

Data analysis focus

Cross-platform



Efficiency





Trevor A. Branch

@TrevorABranch

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My rule of thumb: every analysis you do on a dataset will have to be redone 10–15 times before publication. Plan accordingly. #Rstats

3:28 PM - 29 Sep 2015

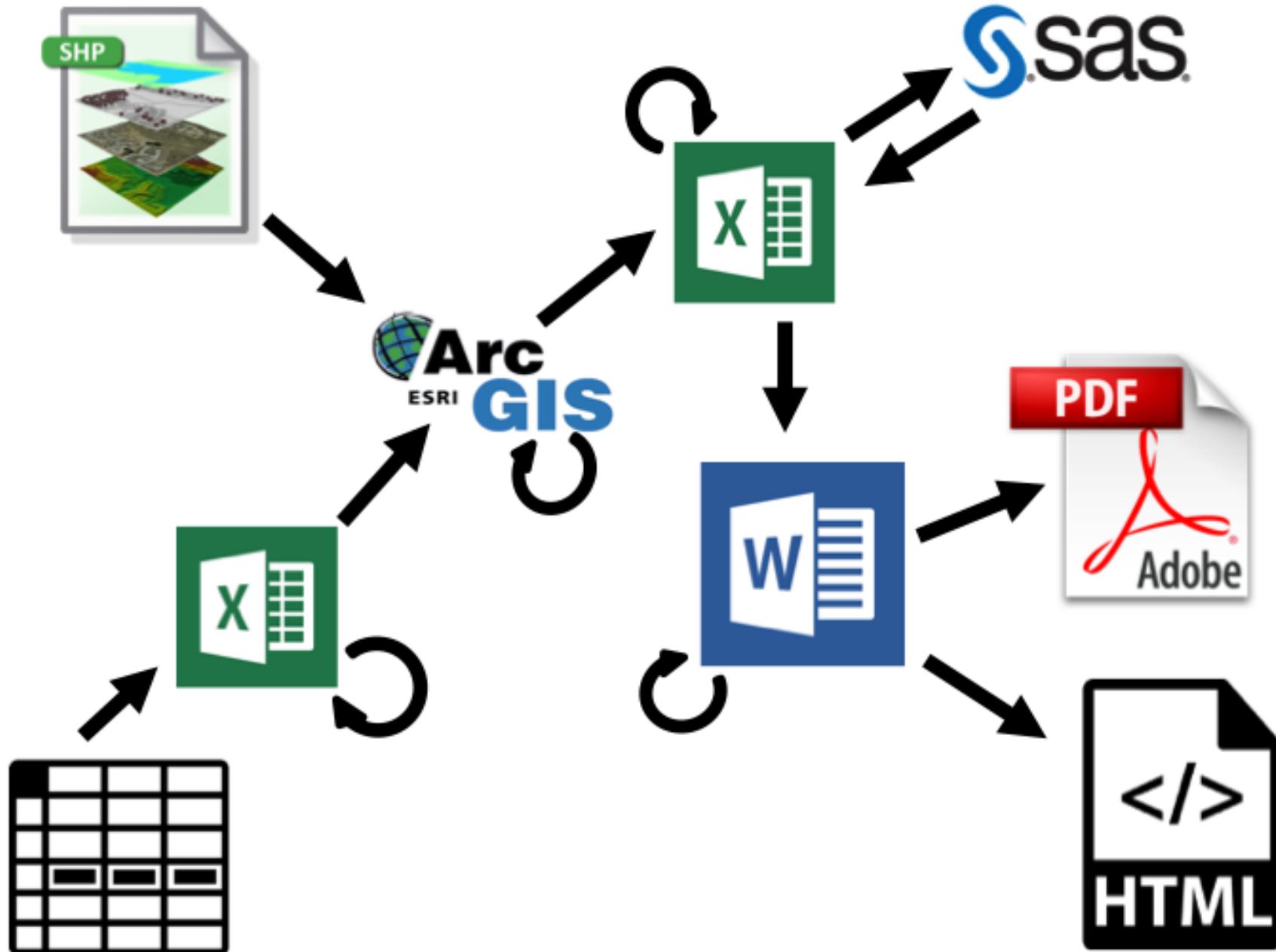
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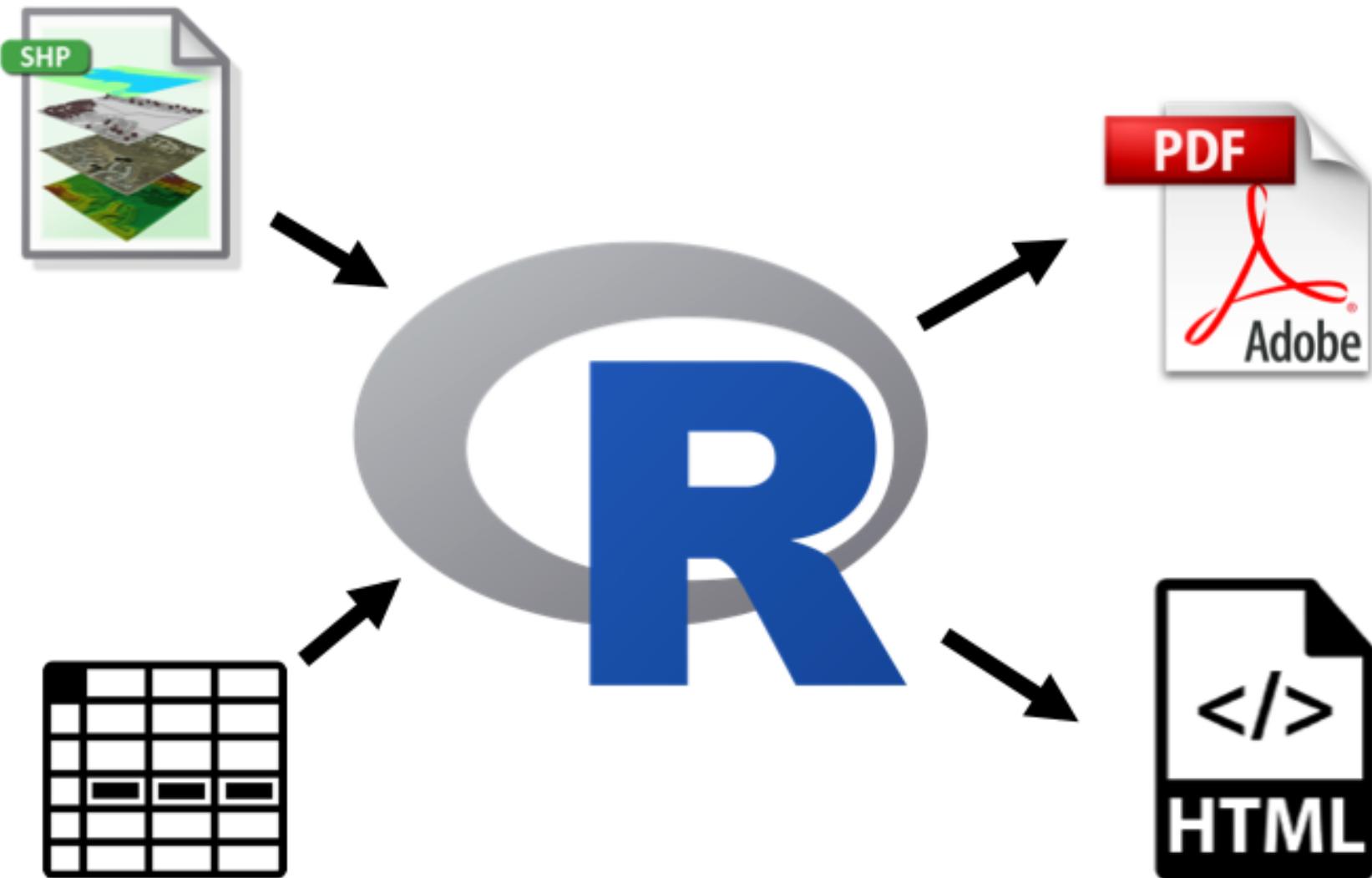


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Reproducibility



Reliability



Versatility

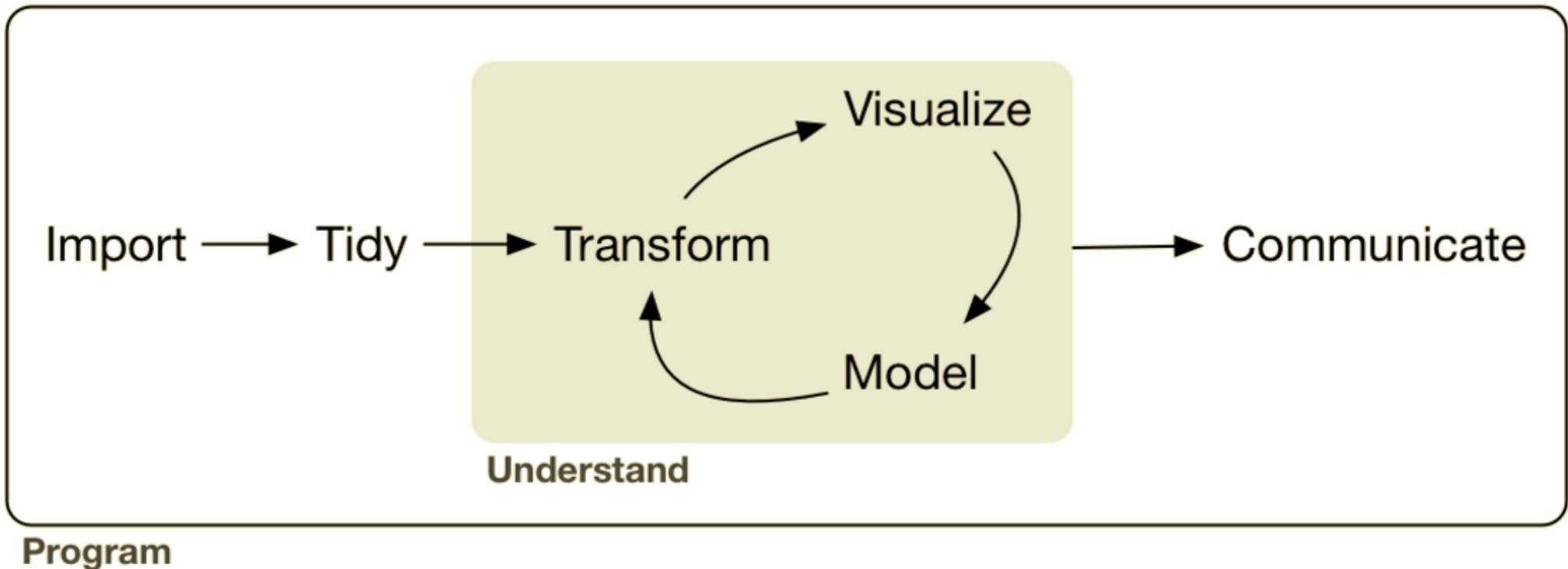


Community

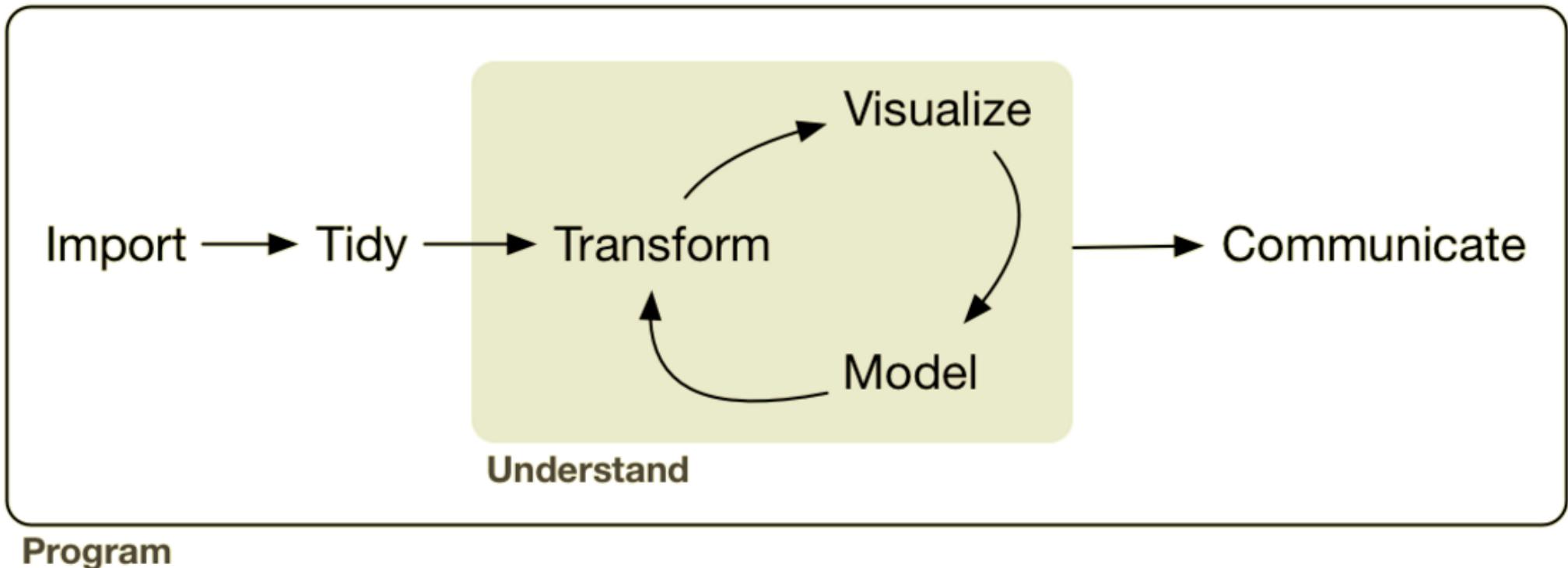
'Faces of R' by Maelle Salmon



Data Science



Geographical Data Science



Geographic Information Systems (GIS)

VS

Geographic Data Science (GDS)¹

Attribute	GIS	GDS
Home disciplines	Geography	Geography, Computing, Statistics
Software focus	Graphical User Interface	Code
Reproducibility	Minimal	Maximal

[1] Lovelace, Nowosad, and Muenchow: Geocomputation with R ([Table 1.1](#))



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Open Data

Welcome to the City of Victoria's Open Data Catalogue.

We will continue to add data to this page as it becomes available. Please review the City's [Open Data Licence](#).

Mapping data can also be downloaded from [VicMap](#), an interactive, multi-layered map.

Financial Data

Data Set	CSV	KML	SHP	Other	Date Added or Updated
Statement of Council remuneration and expenses paid - 2016	CSV				June 2017
Statement of employee remuneration and expenses paid - 2016	CSV				June 2017
Statement of grants paid - 2016	CSV				June 2017

Contact Info

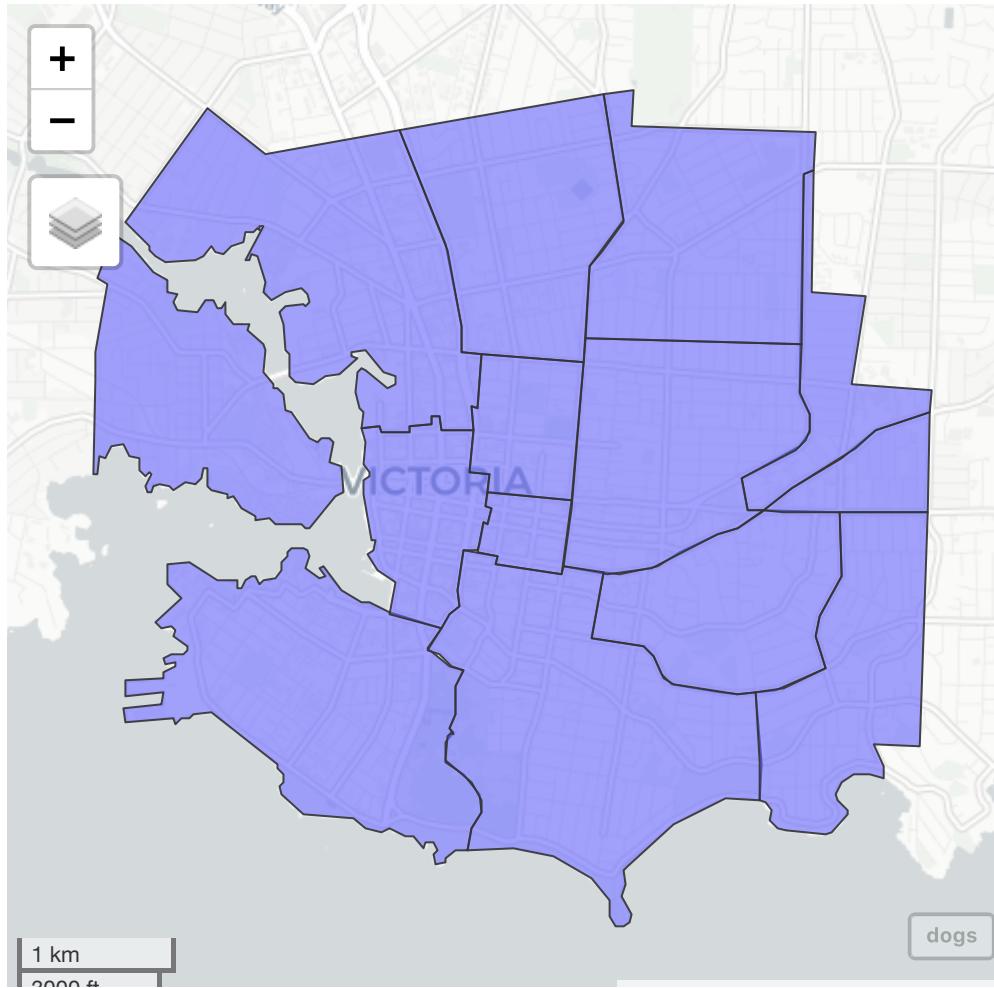
Email us to request data or report a problem

Related Links

[DataBC](#)[Government of Canada Open Data Portal](#)[VicMap](#)

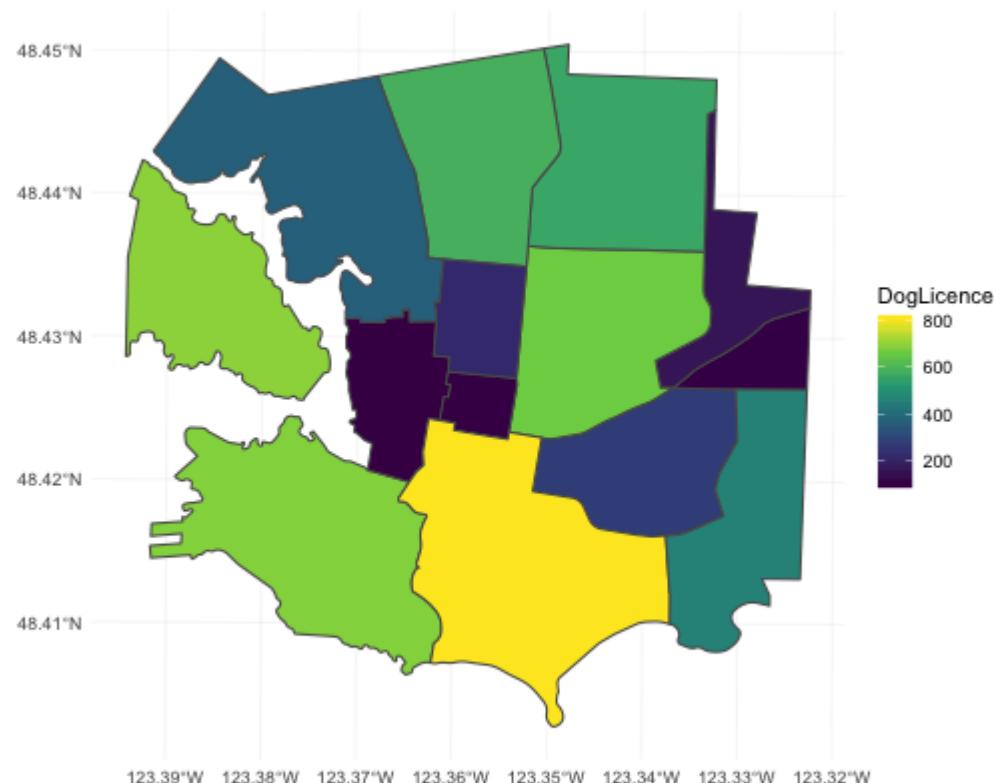


```
library(sf)
library(mapview)
dogs <- read_sf("data/dogs/DogsByNeighbourhood.shp")
mapview(dogs)
```



```
library(ggplot2)

ggplot() +
  geom_sf(data = dogs, aes(fill = DogLicence)) +
  scale_fill_viridis_c() + theme_minimal()
```

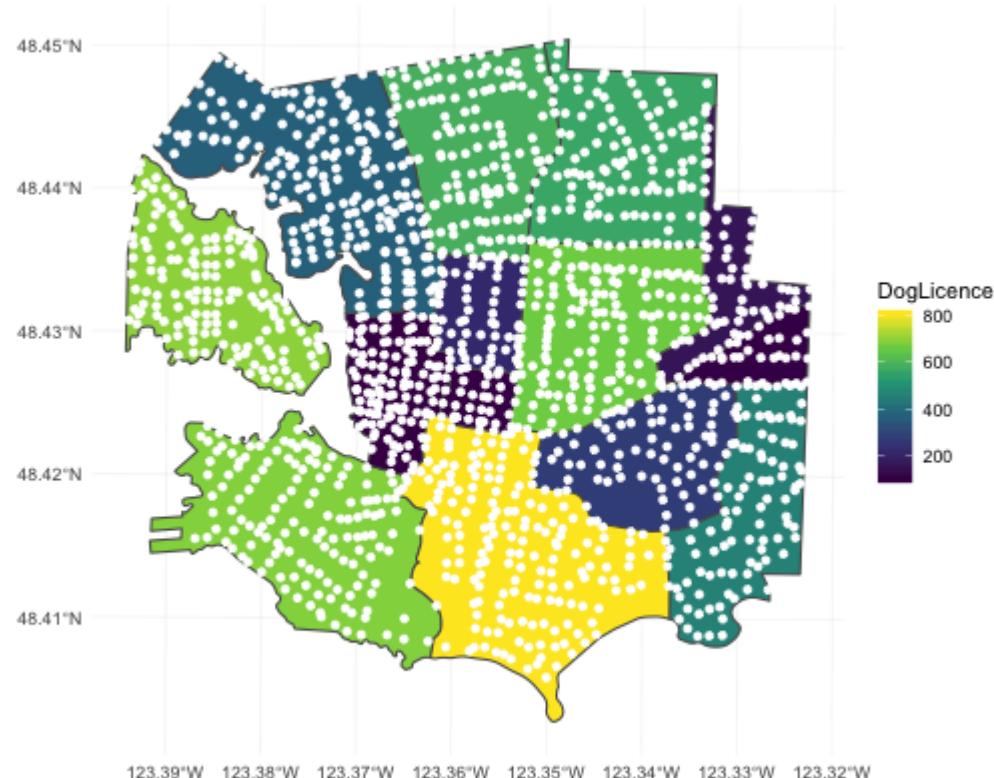




```
hydrants <- read_sf("data/hydrants/Hydrants.shp")  
  
ggplot() +  
  geom_sf(data = hydrants) +  
  theme_minimal()
```



```
hydrants <- st_intersection(hydrants, st_geometry(dogs))
ggplot() +
  geom_sf(data = dogs, aes(fill = DogLicence)) +
  geom_sf(data = hydrants, colour = "white") +
  scale_fill_viridis_c() + theme_minimal()
```



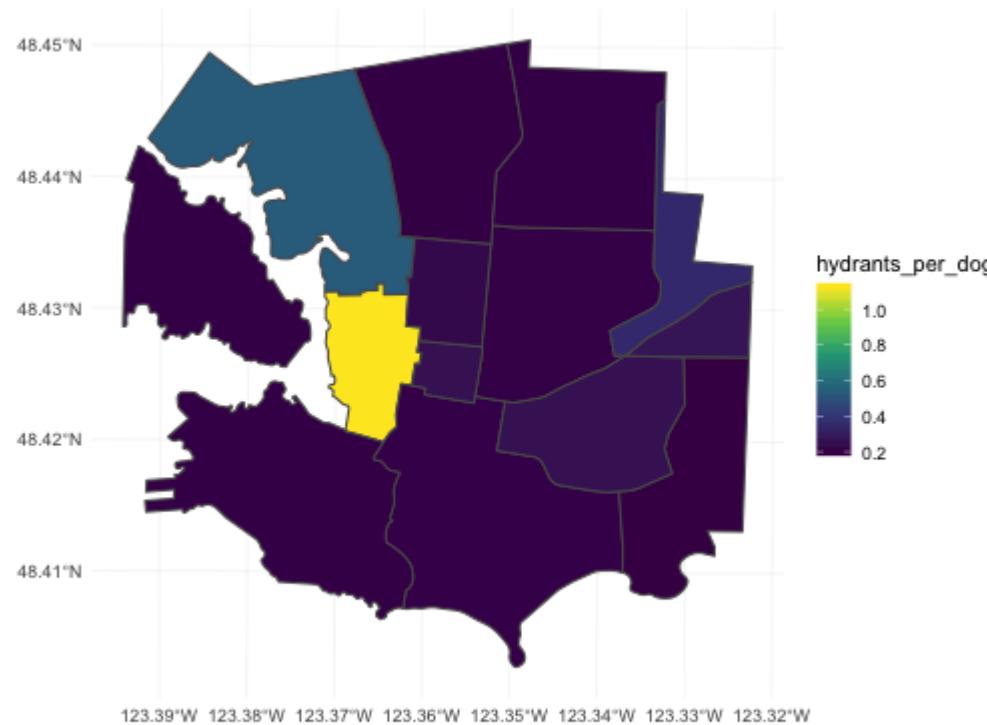
```

dogs_and_hydrants <- st_join(dogs, hydrants) %>%
  group_by(Neighbour) %>%
  summarize(licences = max(DogLicence),
            n_hydrants = length(unique(ID)),
            hydrants_per_dog = n_hydrants / licences)

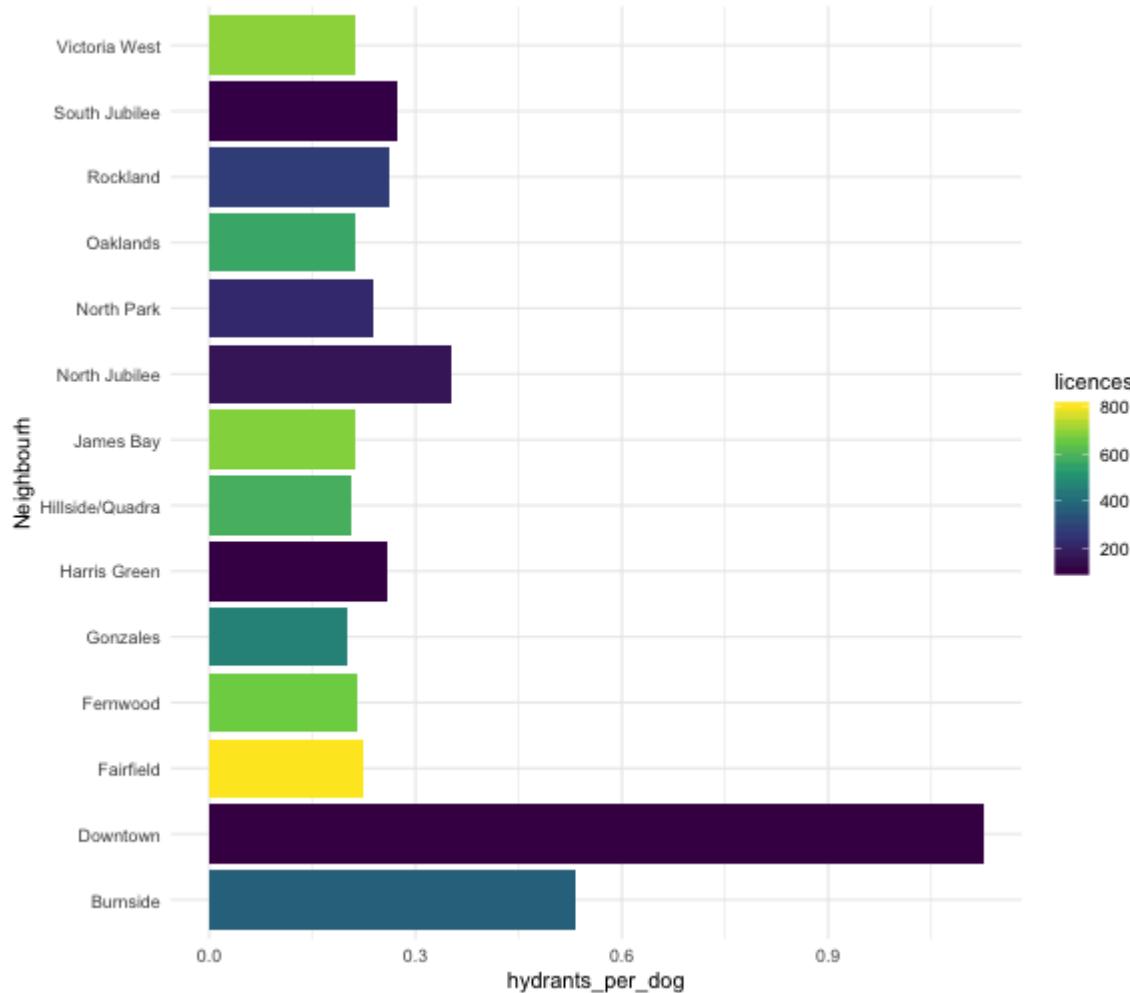
```

Neighbour	licences	n_hydrants	hydrants_per_dog
Burnside	366	195	0.5327869
Downtown	104	117	1.1250000
Fairfield	802	180	0.2244389
Fernwood	664	142	0.2138554
Gonzales	460	92	0.2000000
Harris Green	108	28	0.2592593
Hillside/Quadra	582	121	0.2079038
James Bay	684	145	0.2119883
North Jubilee	159	56	0.3522013
North Park	219	52	0.2374429
Oaklands	559	119	0.2128801
Rockland	276	72	0.2608696
South Jubilee	112	21	0.3743262

```
ggplot() +  
  geom_sf(data = dogs_and_hydrants, aes(fill = hydrants_per_dog)) +  
  scale_fill_viridis_c() + theme_minimal()
```



```
ggplot(dogs_and_hydrants, aes(x = Neighbour, y = hydrants_per_dog)) +  
  geom_col(aes(fill = licences)) + scale_fill_viridis_c() +  
  coord_flip() + theme_minimal()
```





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```
leaflet() %>%  
  addProviderTiles("Stamen.TonerLite") %>%  
  addAwesomeMarkers(lng = -123.2499699, lat = 49.260633,  
    label = paste0("<h3>", emoji("evergreen_tree"), "</h3>"),  
    labelOptions = labelOptions(noHide = TRUE))
```





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A The Recruitment Management System (RMS) will be replaced on March 26, 2018.
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Search tip: Some positions are offered in multiple locations across the province and will not show up when you search for one city or one location. To see a list of all job postings offered in multiple locations, please select "**Multiple Locations**" and check the posting content for more details on the various locations offered.

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BC Public Service - Job Opportunities

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Name	Org Code	Organizational Unit	Title	Telephone	E-mail
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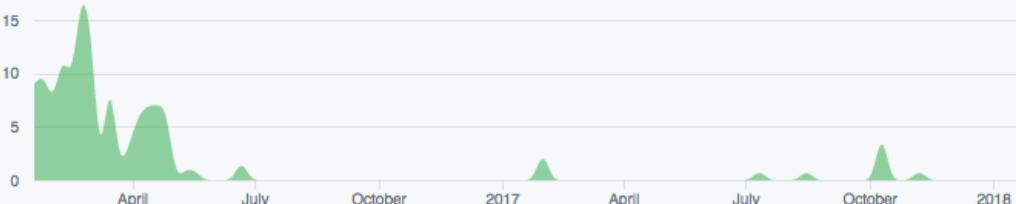
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Jan 31, 2016 – Feb 24, 2018

Contributions: Commits

Contributions to master, excluding merge commits



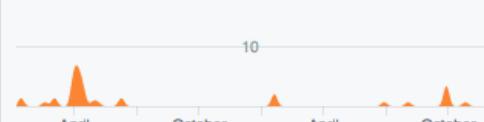
Janewyx

96 commits 1,404 ++ 704 --



stephhazlitt

38 commits 216 ++ 105 --



ateucher

3 commits 17 ++ 6 --



Us:

Twitter: @EnvReportBC, @andyteucher, @stephhazlitt

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Slides made with R and the `xaringan` package.