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# Open Geospatial Data - the GIS Lab experience

## UCT Open Data Day 2019

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Nicholas Lindenberg & Thomas Slingsby

GIS Consultant & GIS Officer

The GIS Lab | Digital Library Services, UCT Libraries

University of Cape Town



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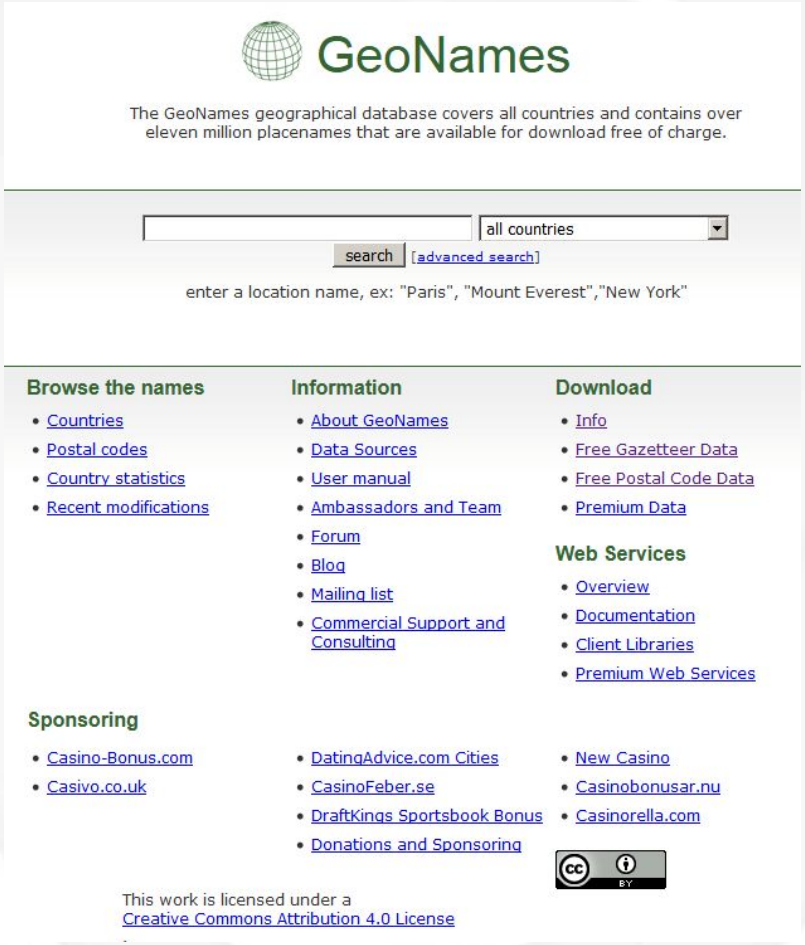
1. Thank You For The Data
2. The Benefits of Open Geospatial Data
3. Cost of Opening Access to GeoSpatial Data
4. Portals | Trapdoors | Barriers

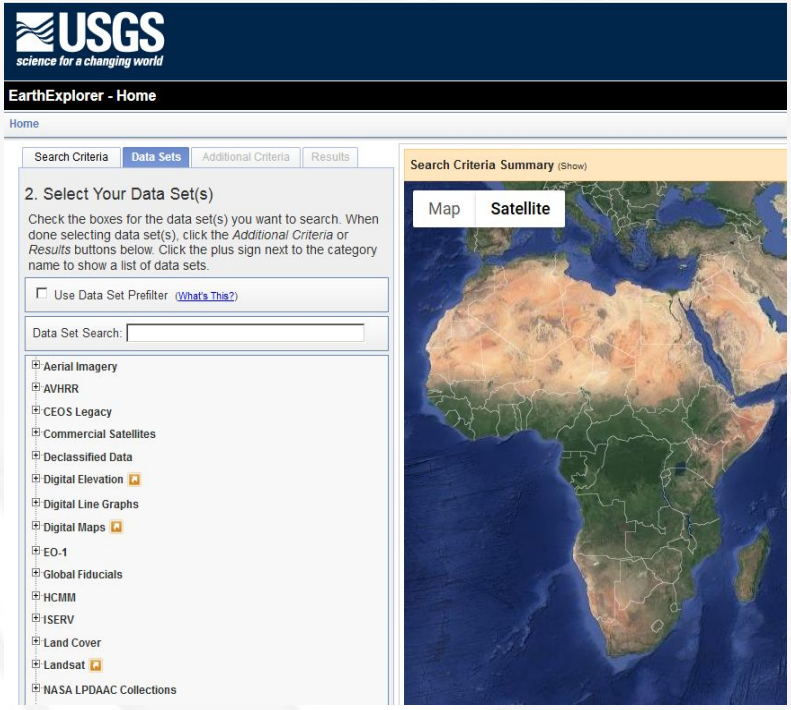
# Thank You For The Data

- Geospatial research at UCT owes an enormous debt of gratitude to Open Data providers.
- Chief amongst them the United States government who led the way by opening unrestricted global access to many spatial datasets.



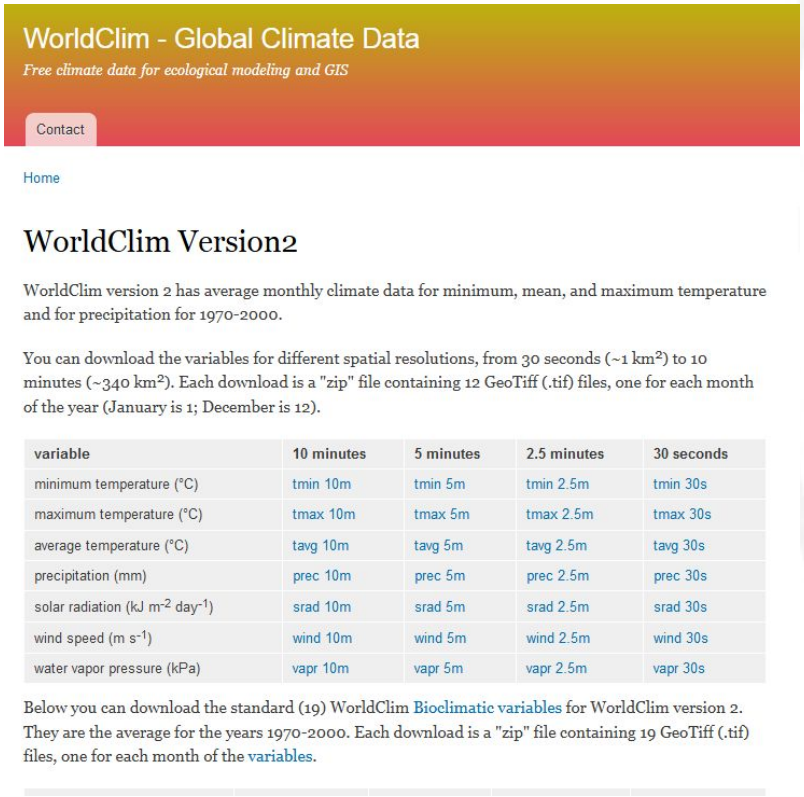
# Thank You For The Data

NASA and the JPL provide remotely sensed images (LandSat, MODIS) and topographic information (ETOPO, SRTM).

# Thank You For The Data

As online access grew easier, NGO's were able to run projects that supplemented existing government public data.



WorldClim - Global Climate Data

*Free climate data for ecological modeling and GIS*

Contact

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## WorldClim Version2

WorldClim version 2 has average monthly climate data for minimum, mean, and maximum temperature and for precipitation for 1970-2000.

You can download the variables for different spatial resolutions, from 30 seconds (~1 km²) to 10 minutes (~340 km²). Each download is a "zip" file containing 12 GeoTiff (.tif) files, one for each month of the year (January is 1; December is 12).

| variable | 10 minutes | 5 minutes | 2.5 minutes | 30 seconds |
|---|---|---|---|---|
| minimum temperature (°C) | tmin 10m | tmin 5m | tmin 2.5m | tmin 30s |
| maximum temperature (°C) | tmax 10m | tmax 5m | tmax 2.5m | tmax 30s |
| average temperature (°C) | tavg 10m | tavg 5m | tavg 2.5m | tavg 30s |
| precipitation (mm) | prec 10m | prec 5m | prec 2.5m | prec 30s |
| solar radiation (kJ m$^{-2}$ day$^{-1}$) | srad 10m | srad 5m | srad 2.5m | srad 30s |
| wind speed (m s$^{-1}$) | wind 10m | wind 5m | wind 2.5m | wind 30s |
| water vapor pressure (kPa) | vapr 10m | vapr 5m | vapr 2.5m | vapr 30s |

Below you can download the standard (19) WorldClim Bioclimatic variables for WorldClim version 2. They are the average for the years 1970-2000. Each download is a "zip" file containing 19 GeoTiff (.tif) files, one for each month of the variables.

Natural Earth

Free vector and raster map data at 1:10m, 1:50m, and 1:110m scales

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Map Gallery

Bathymetry

Natural Earth is a public domain map dataset available at 1:10m, 1:50m, and 1:110 million scales. Featuring tightly integrated vector and raster data, with Natural Earth you can make a variety of visually pleasing, well-crafted maps with cartography or GIS software.

Natural Earth was built through a collaboration of many volunteers and is supported by NACIS (North American Cartographic Information Society), and is free for use in any type of project (see our Terms of Use page for more information).

Get the Data

Sacramento

San Francisco

50m-admin-0-countries_area (242 areas selected)

| COUNTRYNAM | SCALERANK | FEATURECLA | SOVE |
|---|---|---|---|
| Afghanistan | 1.00000000000 | Countries | Afghanis |
| Aland | 3.00000000000 | Countries | Finland |
| Albania | 1.00000000000 | Countries | Albania |
| Algeria | 1.00000000000 | Countries | Algeria |

**Convenience**

Natural Earth solves a problem: finding suitable data for making small-scale maps. In a time when the web is awash in geospatial data, cartographers are forced to waste

**Neatness Counts**

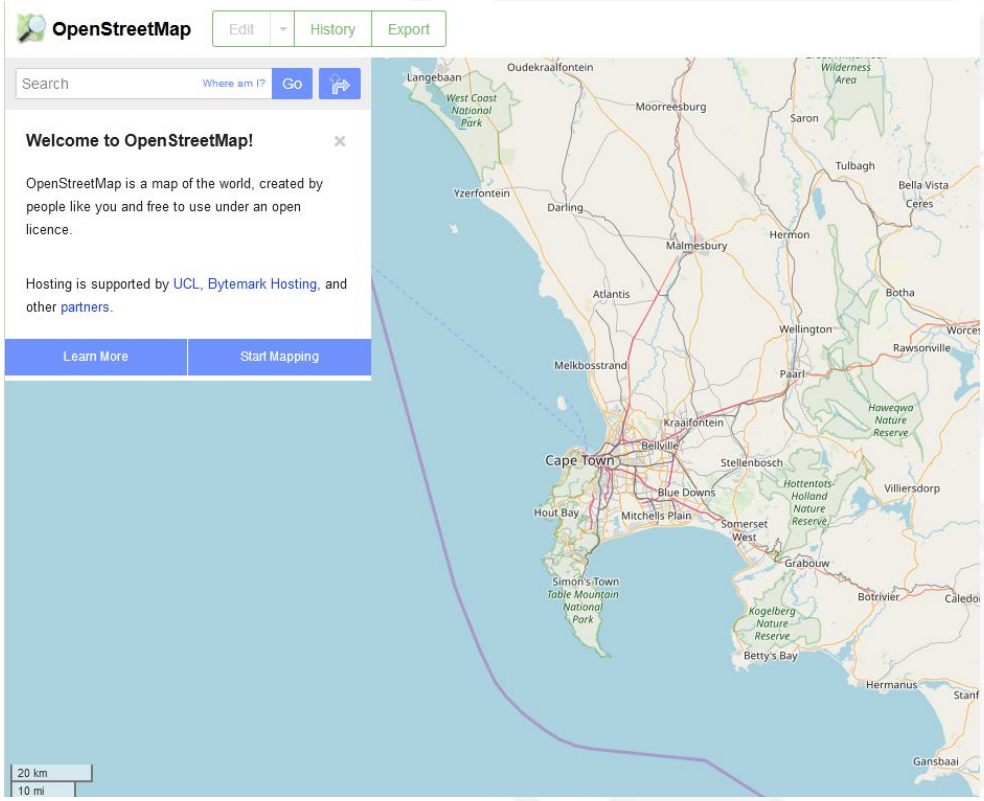
The carefully generalized linework maintains consistent, recognizable geographic shapes at 1:10m, 1:50m, and 1:110m scales. Natural Earth was built from the ground up so you will

**GIS Attributes**

Natural Earth, however, is more than just a collection of pretty lines. The data attributes are equally important for mapmaking. Most data contain embedded feature names, which are

# Thank You For The Data

Or, alternatively, provided crowd sourced data



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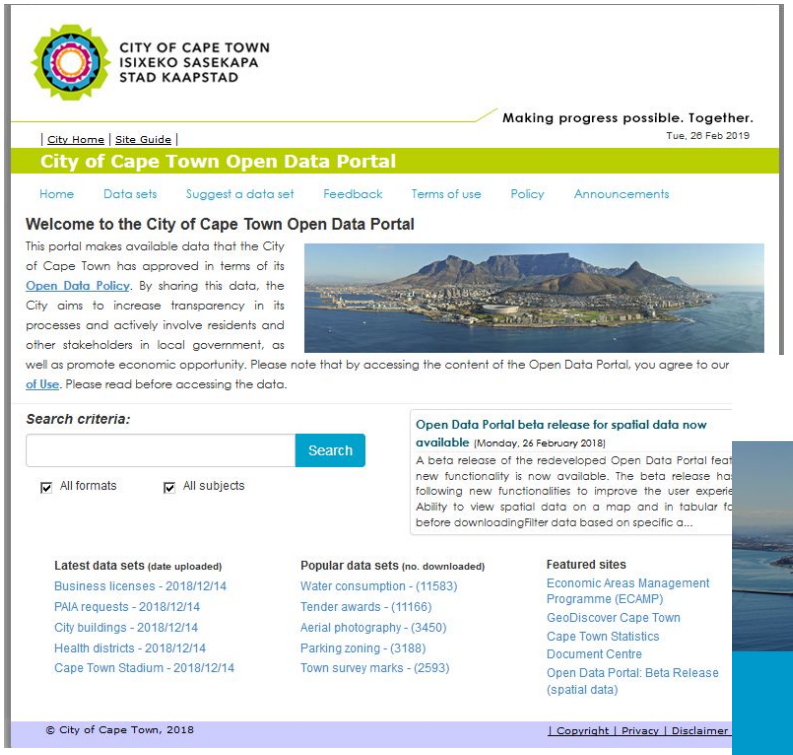
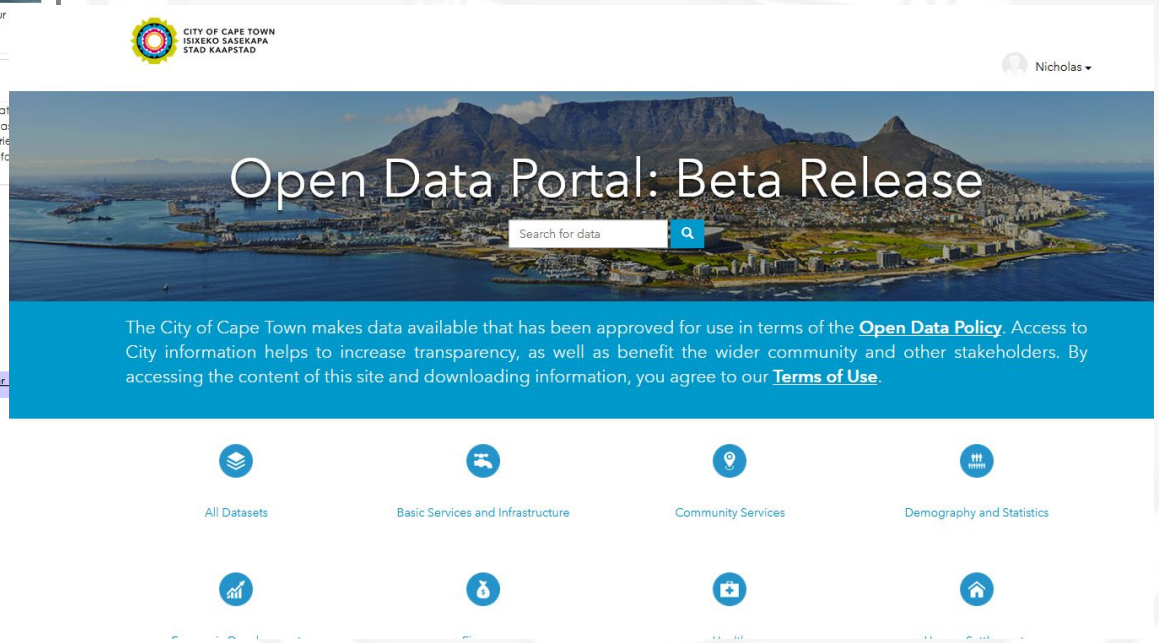
# Thank You For The Data




The UCT GIS Lab would like to specifically thank the City of Cape Town for their Open Data Portals



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# The Benefits of Open Geospatial Data

Before the geospatial access revolution of the the 1990's, when the World Wide Web exploded and available bandwidth vastly increased, the bulk of a UCT GIS project's time budget was spent

- on creating the data necessary to perform a single analysis, or
- waiting on physical transfer media to be shipped or mailed across the planet from governments or corporations that research funds had bought.

# The Benefits of Open Geospatial Data

As a result

- the projects undertaken tended to cover either a small area in high detail or a larger area at a very coarse resolution
- User-created datasets were rarely made available to other researchers
- Restrictive licensing and proprietary (expensive) software formats further limited the use of created or derived products.

# The Benefits of Open Geospatial Data

Today users are spoiled for choice for datasets

- Geospatial project requirements shifted from creating data to finding data, which is a massive time saving
- The new challenge lies in determining the most suitable dataset to use
- There is benefit to locally updated, curated dataset lists and clean datasets created by topic specialists and GIS Librarians

# The Benefits of Open Geospatial Data

As a result more time can be spent doing analysis

- This means that more projects can be undertaken
- on a wider variety of topic
- in more detail
- across larger areas

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# The Cost of Opening Access to Geospatial Data

- Geospatial Data size varies, it can be Small Data, Large Data or Big Data
- Direct & Indirect Costs
- The Privacy Problem (data scrubbing and manipulation)

# The Cost of Opening Access to Geospatial Data

## Direct Costs

- Hardware
- Software
- Bandwidth
- Staffing
- Workflow Integration
- Maintenance & Development
- Ensuring Privacy

After The Cost(s) of Geospatial Open Data, Johnson, et al, 2017, https://onlinelibrary.wiley.com/doi/full/10.1111/tgis.12283

# The Cost of Opening Access to Geospatial Data

## Indirect Costs

- Citizen Participation Challenges
  - Spatial & Technical Literacy required to use geospatial data.
- Uneven Provision of Geographic Coverage & Interoperability
  - Data poverty skews analyses toward places that have data, which may disadvantage areas unable to provide equivalent detail in useful formats for researchers.

After The Cost(s) of Geospatial Open Data, Johnson, et al, 2017, https://onlinelibrary.wiley.com/doi/full/10.1111/tgis.12283

# The Cost of Opening Access to Geospatial Data

## Indirect Costs

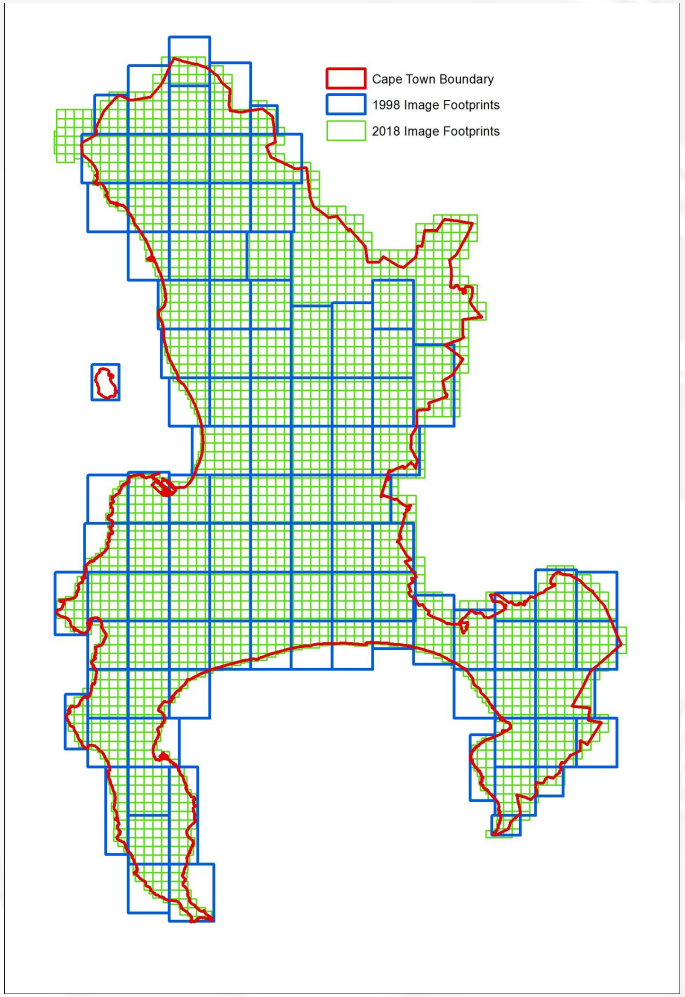
- Subsidising Private Sector Activity
  - Empowering private sector businesses to mediate citizen access to government systems such as deeds searches, zoning lookups, online application for passports, fine payments at the expense of the individual citizen.

- Corporate Influence & Capture of Efforts
  - Focus of effort on ‘profitable’ datasets at the expense of comprehensive or limited use but still important datasets.
  - Using formats that are widely useful not tailored specifically for corporate workflows

After The Cost(s) of Geospatial Open Data, Johnson, et al, 2017, https://onlinelibrary.wiley.com/doi/full/10.1111/tgis.12283

# The Cost of Opening Access to Geospatial Data

- The GIS Lab has obtained a copy of the City of Cape Town's basic data annually since 2002
- The city of CT is an area roughly 100km x 50km in extent (2,500 Km²)
- The baseline vector datasets (roads, suburbs, property boundaries, etc) have grown from 1GB in 2002 to 1.5GB in 2018 and changed file format for a total of GB
- The aerial imagery storage size has increased from 5GB in 1998 at 25cm resolution to 67GB in 2018 at 8cm resolution for a total of 720GB of imagery for the City of Cape Town.
- All imagery is in highly compressed, proprietary image formats (50x compression)
- LIDAR data is also available for 2013 (339GB), 2015 (100GB), 2017 (288GB) and 2018 (338GB) for a total of 1TB.



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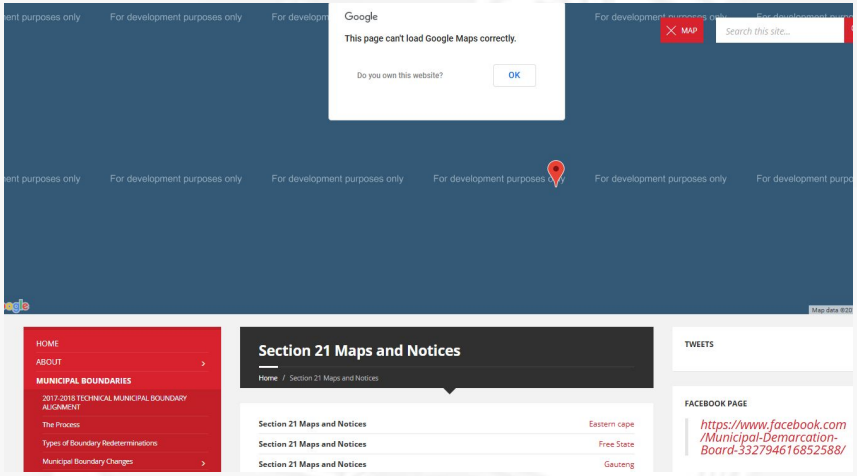
# Portals - Trapdoors - Barriers

## Trapdoors - Dormant Portals

- Dormant portals become direct barriers to data access
  - Fall out of date
  - Format & Interface decay
  - Clutter search results with dead links
  - Awareness of the data drops

- Dormant portals indirectly become barriers to data access as the hosting organisation may
  - Deem that it has done its due diligence
  - Decide that as no one is using the dead datasets, no further projects can be justified



# Portals - Trapdoors - Barriers

## Portal Barriers

- Geospatial Literacy
- Web Maps vs Data Portals

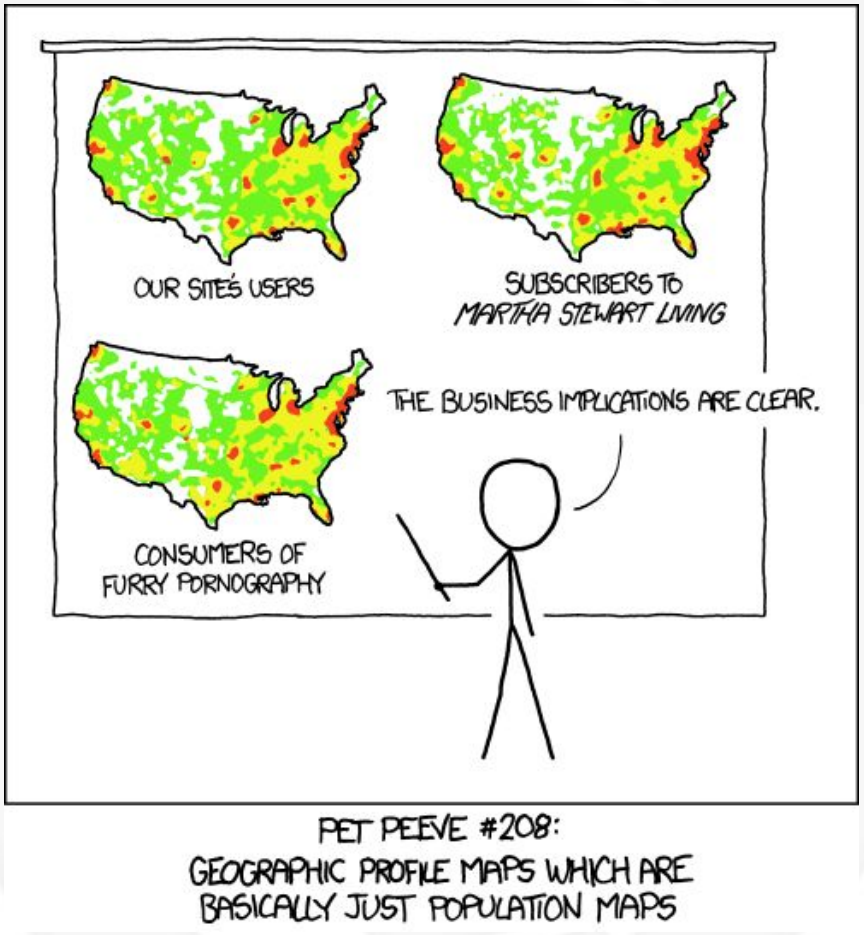



**Image from xkcd - https://xkcd.com/1138/**

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- **xkcd**: Randall Munroe, https://xkcd.com/1138/, https://xkcd.com/2116/

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- City Maps Viewer https://citymaps.capetown.gov.za/EGISViewer/
- City of Cape Town ArcGIS Open Data Portal https://odp-cctegis.opendata.arcgis.com/
- City of Cape Town Original Open Data Portal https://web1.capetown.gov.za/web1/OpenDataPortal/Default
- Digital Chart of the World https://worldmap.harvard.edu/data/geonode:Digital_Chart_of_the_World
- EarthExplorer https://earthexplorer.usgs.gov/
- ESRI Open Data https://www.esri.com/en-us/arcgis/open-vision/standards/open-data
- ETOPO https://www.ngdc.noaa.gov/mgg/global/
- Geonames https://www.geonames.org/
- Google General Transit Feed https://developers.google.com/transit/
- JPL https://www.jpl.nasa.gov/
- LP DAAC https://lpdaac.usgs.gov/dataset_discovery
- Municipal Demarcation Board ArcGIS Portal https://dataportal-mdb-sa.opendata.arcgis.com/datasets?source=Municipal%20Demarcation%20Board&t=2011
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- Natural Earth https://www.naturalearthdata.com/
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- Open StreetMap https://www.openstreetmap.org/#map=9/-33.8647/18.9377
- SRTM http://srtm.csi.cgiar.org/
- UNEP GRID http://www.grid.unep.ch/index.php?lang=en
- United Nations http://www.un.org/en/
- US Census https://www.census.gov/
- USGNS https://geonames.usgs.gov/
- World Bank https://www.worldbank.org/
- World Health Organisation https://www.who.int/
- WorldCLIM http://www.worldclim.org/

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