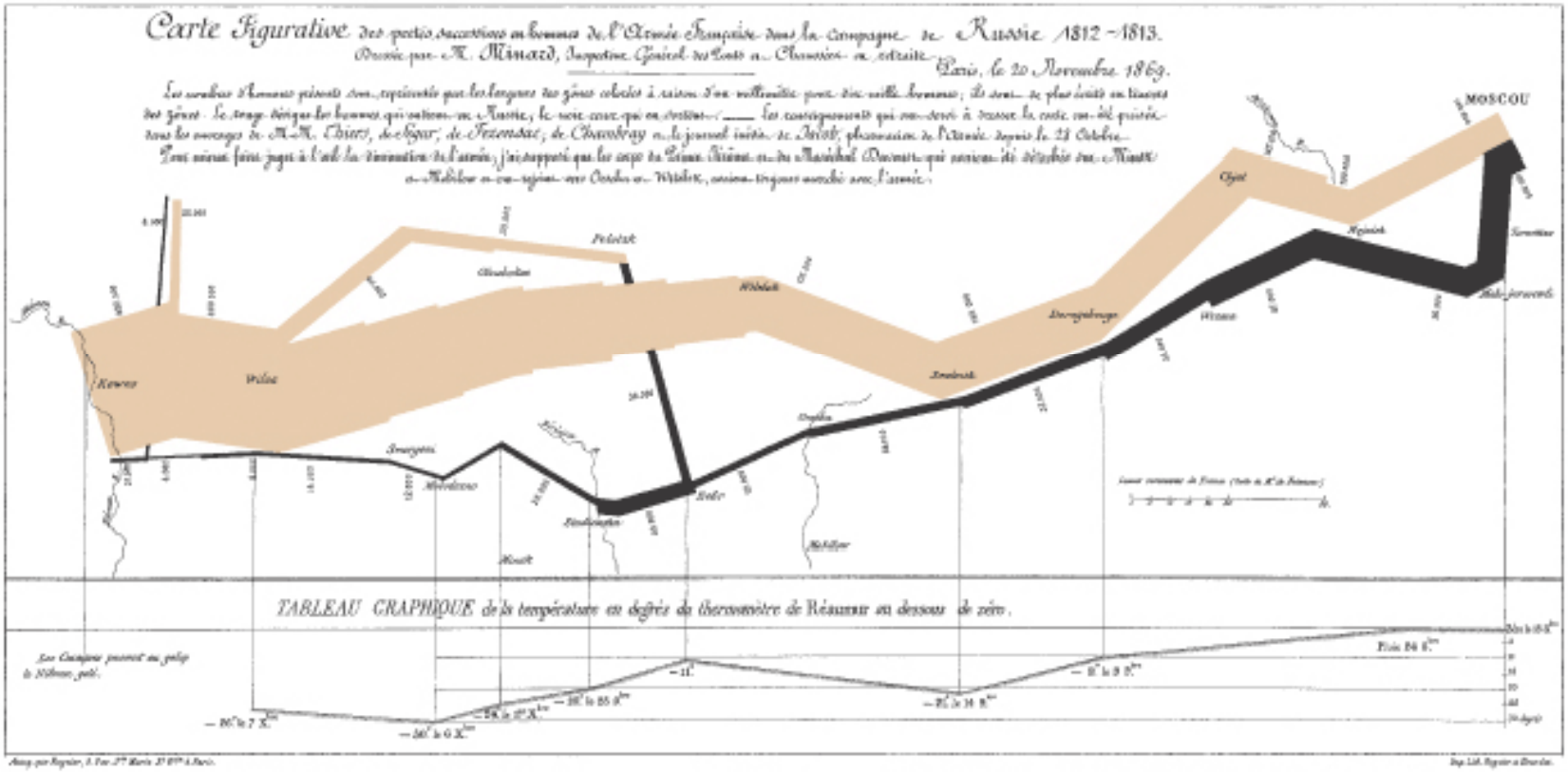
Delivery of Data Visualization for The Census Bureau: Why and How

Jeremy S. Wu, Ph. D.

Suitland, MD
February 22, 2011

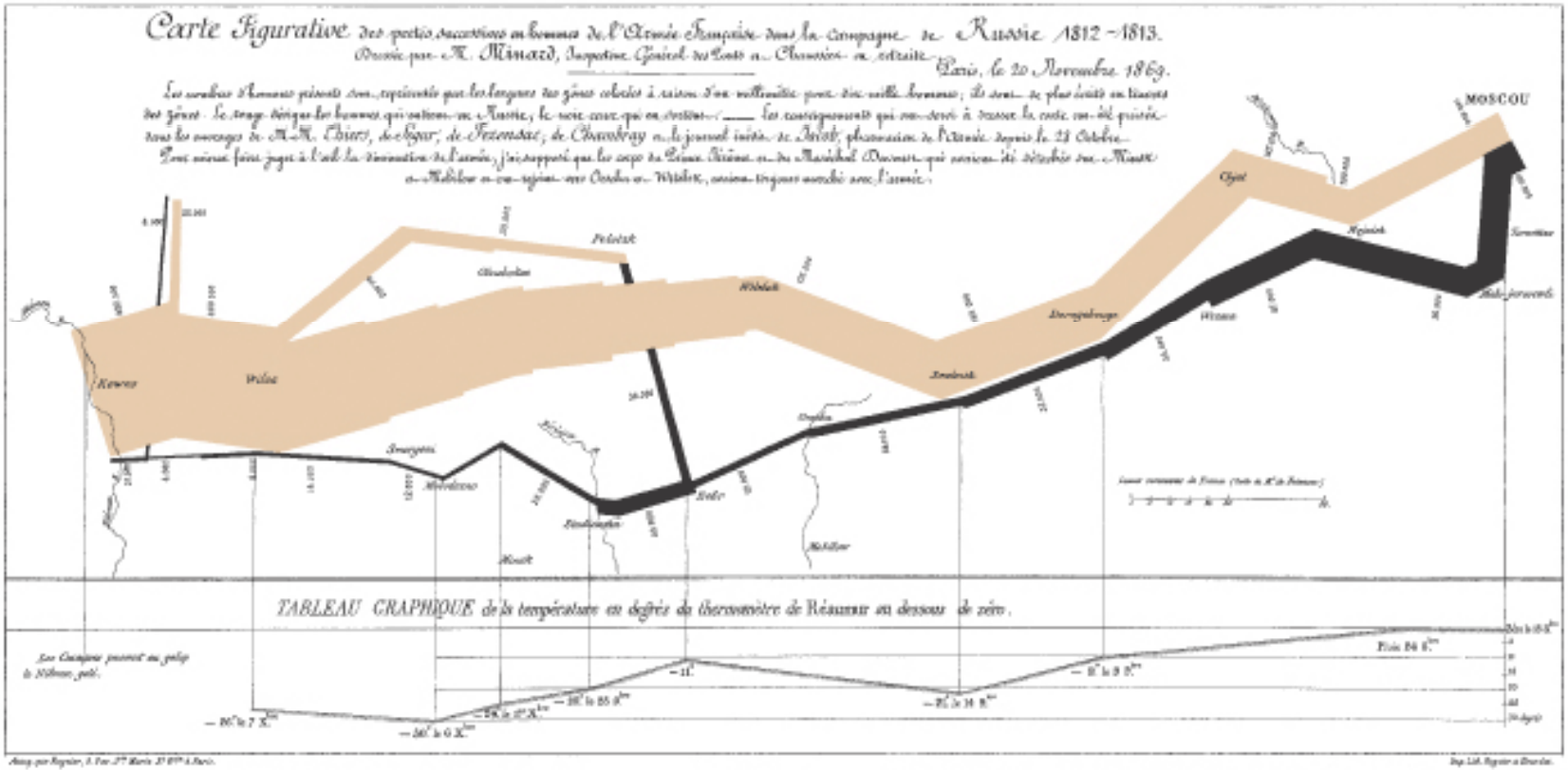
Charles Joseph Minard – 1869

“Perhaps the best statistical graphic ever drawn”



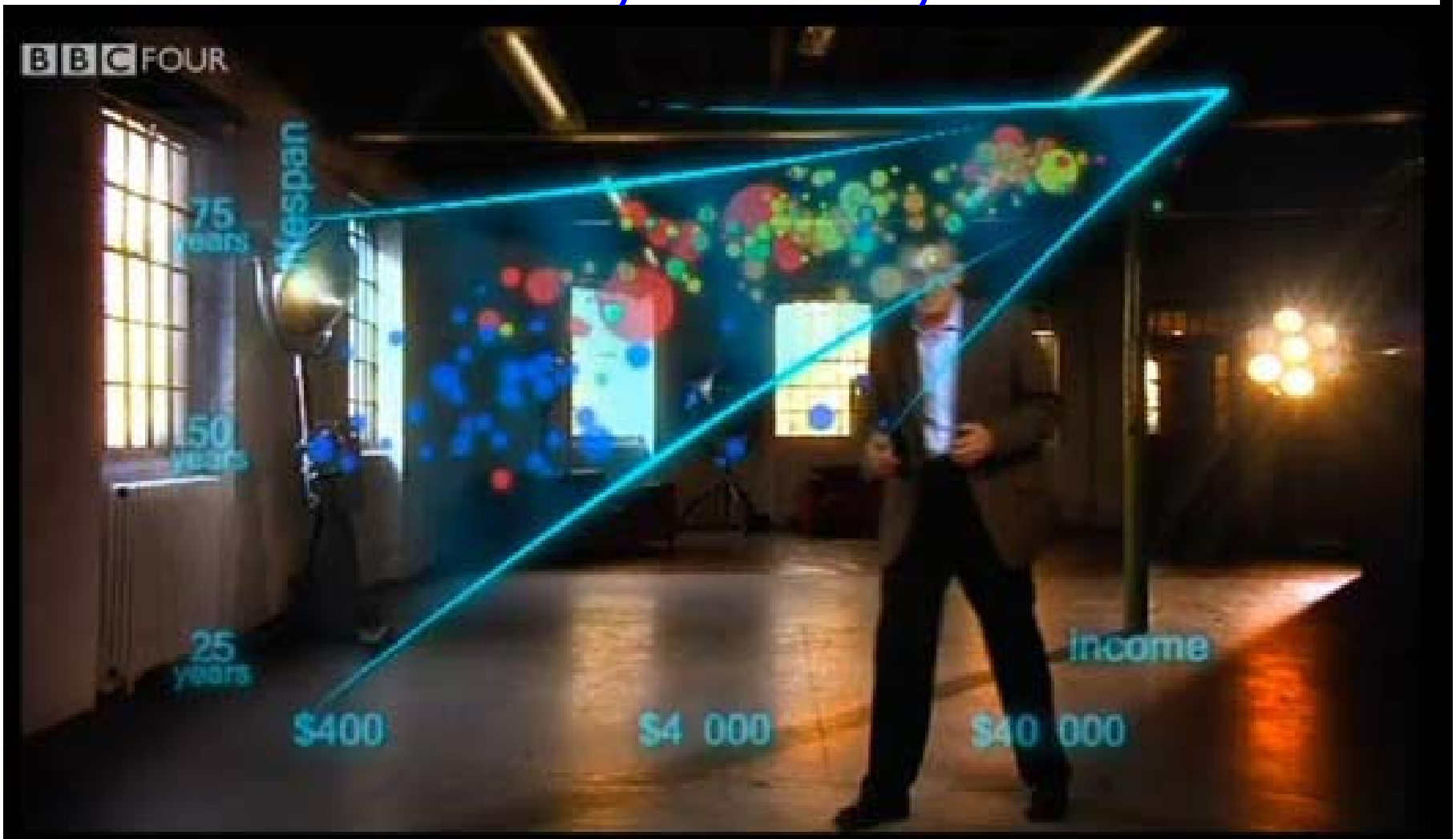
POSTER: NAPOLEON'S MARCH

Probably the best statistical graphic ever drawn, this map by Charles Joseph Minard portrays the losses suffered by Napoleon's army in the Russian campaign of 1812. Beginning at the Polish-Russian border, the thick band shows the size of the army at each position. The path of Napoleon's retreat from Moscow in the bitterly cold winter is depicted by the dark lower band, which is tied to temperature and time scales. Exquisitely printed in two colors on fine archival paper, 22" by 15". Minard's sources. Minard's biography.


Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812–1813.
Dressée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite.
Paris, le 20 Novembre 1869.
MOSCOU
Kowno
Wilna
Smorgoni
Minsk
Molodetno
Polotsk
Chodoubine
Studienka
Borisow
Orscha
Wiasma
Dorogobouge
Smolensk
Gjatz
Mojaisk
Moskowa
Malo-jaroweslaw
Wilna
Kowno
Gumbinen
Moskowa
Wiasma
Gjatz
Mojaisk
Malo-jaroweslaw
TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.
Les Cercles pointillés au galop de Nélaton, gelé.
Fixée 24 8.bre
−11°
−21° le 14 8.bre
−9° le 9 9.bre
−30° le 0 X.bre
−24° le 17 X.bre
−30° le 55 8.bre
−30° le 7 X.bre
Ney
Eblé
Mortier
Victor
Oudinot
Davoust
Poniatowski
Junot
Prince Eugène
Prince Poniatowski
Prince Eugène
Prince Poniatowski
Prince Eugène
Prince Poniatowski

Hans Rosling – 2010

“200 Countries; 200Years; 4 Minutes”



http://www.youtube.com/watch?v=jbkSRLYSojo

Anything In Common?

- Large amount of data shown in limited space and time
- There is a story to tell
- Modern technology and media can help

What is Data Visualization?

- Study of visual representation of data
  - Statistics +
  - Computer Science +
  - Data Mining

- Goal is to communicate information clearly and effectively through graphical means

Why is Data Visualization Important to LEHD?

White House	
Open Government Initiative	http://www.whitehouse.gov/open

Department of Commerce	
Open Government Plan	http://open.commerce.gov/

Census Bureau / LEHD	
Implementation of LEHD Program LED Visualization Plan	http://open.commerce.gov/iii-transparency

The Open Government Initiative

The Open Government Plan

MONDAY, FEBRUARY 7, 2011

COMMERCE.GOV | SITE FEEDBACK

COMMERCE.GOV/OPEN
UNITED STATES DEPARTMENT OF COMMERCE

TRANSPARENCY · PARTICIPATION · COLLABORATION

Home | Data Sets | FOIA | Open Government Plan | Propose Your Ideas | SEARCH | Search this site

SEE THE PLAN

YOUR IDEAS IN ACTION

OPEN GOVERNMENT AT COMMERCE

President's Obama's first executive action was to sign the Memorandum on Transparency and Open Government, which sought to bridge the gap between the American people and their government.

This website, launched in response to the subsequent Open Government Directive, aims to document the U.S. Department of Commerce's efforts to become more open, participatory and collaborative.

LATEST NEWS

Evaluating Commerce's Open Government Plan Version 1.1

Submitted on July 1, 2010 - 1:51pm

Categories: Department of Commerce | open government plan | open government website

The Commerce Open Government team was recently asked to assess just how well we answered the core questions of the Open Government Directive with the Open Government Plan we released earlier this month. The table below establishes "grades" for each of the major components of our Open Government Plan and the overall result. These grades were decided by looking at the 30 distinct questions/requirements laid out in the

OPEN GOVERNMENT TEAM

Scott B. Quehl
Chief Financial Officer and Assistant Secretary for Administration,
Head of Open Government Working Group
open@doc.gov

Jonathan R. Cantor
Chief Privacy Officer and Director of Open Government

The Census Bureau Projects

Projects to Increase Transparency by Publishing High-Value Information

Operating Unit	Project
Census Bureau	Launching 2010 Census.Gov Site
	Improving the Census Bureau's History Web Site
	Publicizing the Statistical Abstract of the United States Initiative
	Improving Access to Economic Programs
	Improving Access to Central Indicator Data Repository
	Instituting Data User Notifications
	Publishing Automated Export Systems Best Practices Online
	Implementing Local Employment Dynamics Program
	Improving Local Employment Dynamics Data Visualization
	Modernizing Business HelpSite
	Re-engineering State and Local Governments Statistical Programs and Improving Data Presentations
	Adding Web-based Learning Tools to Improve Access to Economic Programs

LED: Data Visualization Plan

Local Employment Dynamics — All About Jobs

August 5, 2010

Data visualization tools have emerged since 2007 as important new ways to present statistical information to make it more understandable for data users. In 2006 the Local Employment Dynamics (LED) partnership pioneered a data visualization effort with the first release of its web-based OnTheMap tool, which graphically illustrates the relationship between jobs and workplaces on user-defined maps. Today, unlocking public access to government data is considered a critical component of the President's Open Government Initiative.[1]

Improving LED Data Visualization is one of 12 projects undertaken by the U.S. Census Bureau to increase government transparency by publishing high-value information. This project is part of the U.S. Department of Commerce's 2010 Open Government Plan[2] to improve understanding and use of Census Bureau data.

The LED data visualization plan describes the LED partnership, and outlines the basic LED data and products, operating principles, and LED's short-term plan of action for implementing the appropriate data visualization tools in a rapidly changing environment.

In particular, the 2010-2011 LED data visualization plan includes three primary components:

1. Implementing data visualization tools to illuminate the Quarterly Workforce Indicator time series data,[3] which describe the dynamics of local employment.

2. Enhancing OnTheMap[4] with expanded content and features to describe the dynamics of job and worker locations, as well as developing derivative products for custom use.

3. Exploring existing or new tools for a third LED data line on the dynamics of job-to-job flows, and improving the interoperability between LED data lines.

Important Considerations

- Purpose, Relevance, and Utility
- Data
  - Time Series vs Point-in-Time
  - Categorical vs Continuous Measurements
  - Quantity vs Quality
- Visualization
  - Custom Design vs Commercial-Off-The-Shelf
  - Cost vs Control
  - Simplicity vs Complexity

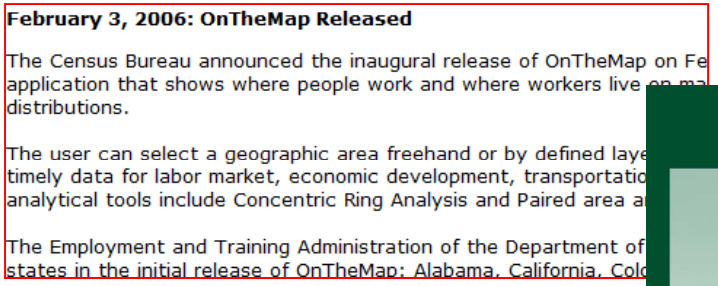
The LED Infrastructure and Products

Longitudinal National Frame of Jobs

- Dynamics of Local Employment: Quarterly Workforce Indicators
- Dynamics of Job/Worker Locations: OnTheMap™
- Dynamics of Job-to-Job Flows

OnTheMap's Brief History

- 2006 OnTheMap Version 1 released

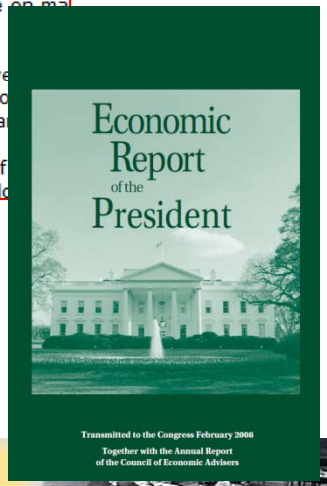

February 3, 2006: OnTheMap Released

The Census Bureau announced the inaugural release of OnTheMap on Fe
application that shows where people work and where workers live on ma
distributions.

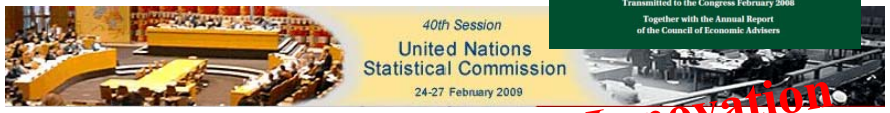
The user can select a geographic area freehand or by defined laye
timely data for labor market, economic development, transportatio
analytical tools include Concentric Ring Analysis and Paired area a

The Employment and Training Administration of the Department of
states in the initial release of OnTheMap: Alabama, California, Colo

- 2008 Economic Report of the President



- 2009 UN Statistical Commission recognition



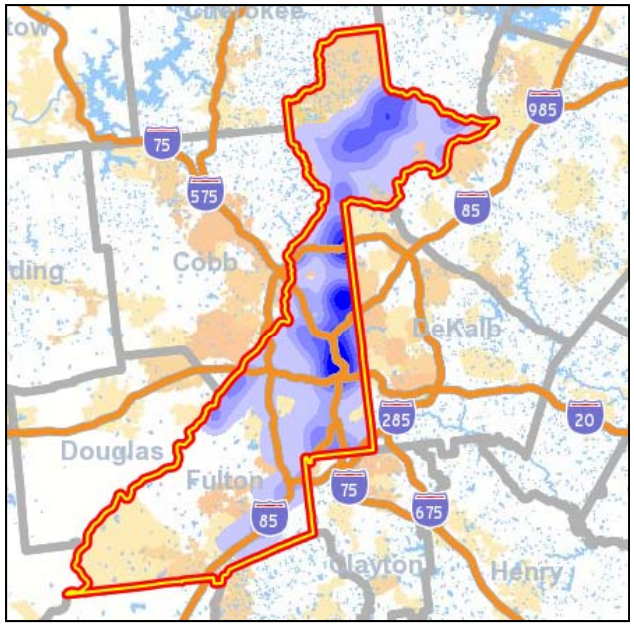
A Major U.S. Statistical Innovation

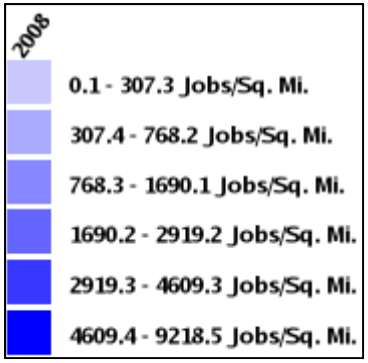
- 2010 U.S. Department of Commerce Gold Medal winner; Version 5 released

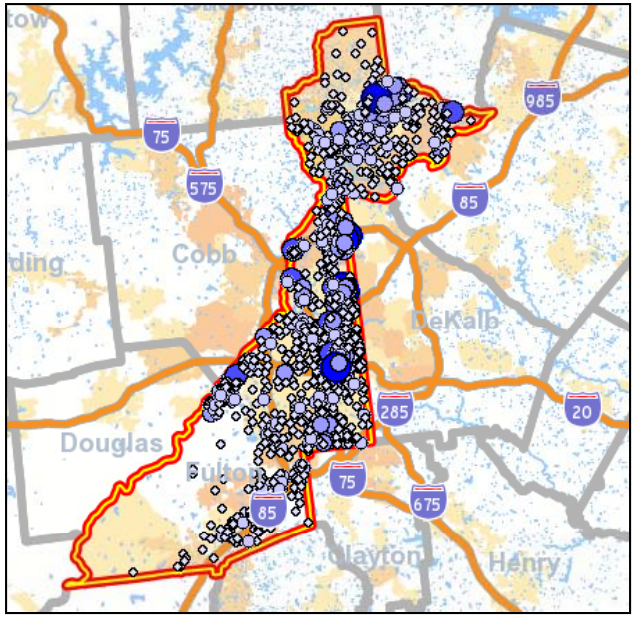
Where workers work in Fulton County, Georgia

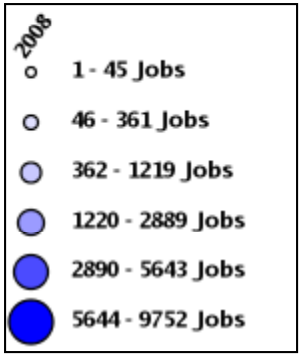
Other selectable defined layers

- Places (Cities, CDPs, etc.)
- **Counties**
- County Subdivisions
- Metropolitan/Micropolitan Areas (CBSA)
- States
- Workforce Investment Areas (WIA)
- WIRED Regions (Gen. 1)
- WIRED Regions (Gen. 2)
- WIRED Regions (Gen. 3)
- ZIP Codes (ZCTA)
- 110th U.S. Congressional Districts
- Block Groups
- Census Tracts
- Traffic Analysis Zones (TAZ)
- Unified/Elementary School Districts
- Secondary School Districts
- State Legislative Districts (Upper)
- State Legislative Districts (Lower)
- Military Bases
- Tribal Lands
- Tribal Subdivisions
- Alaska Native Regional Corp. (ANRC)

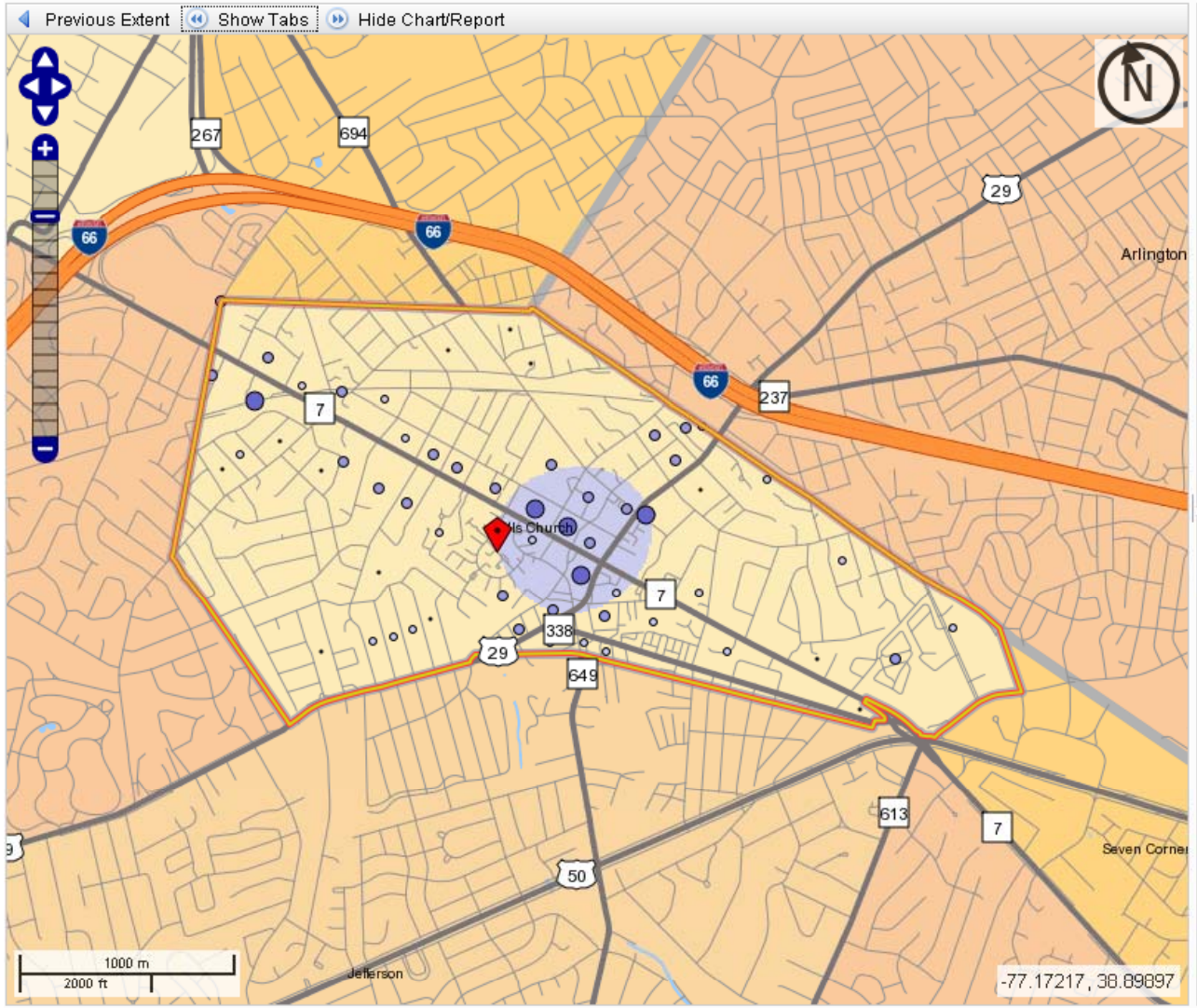


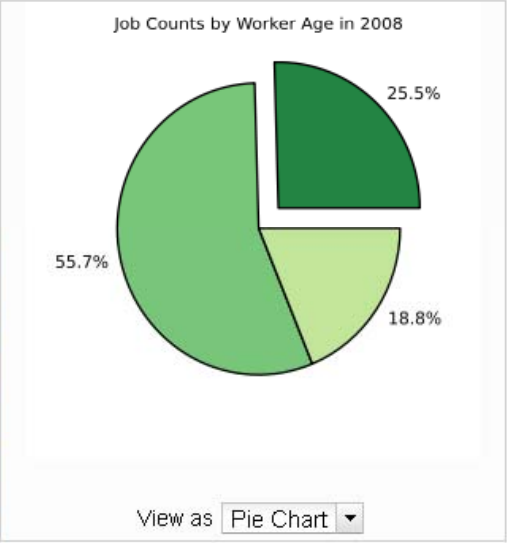






Where Workers Age 29 or Younger Worked in Falls Church, Virginia, in 2008

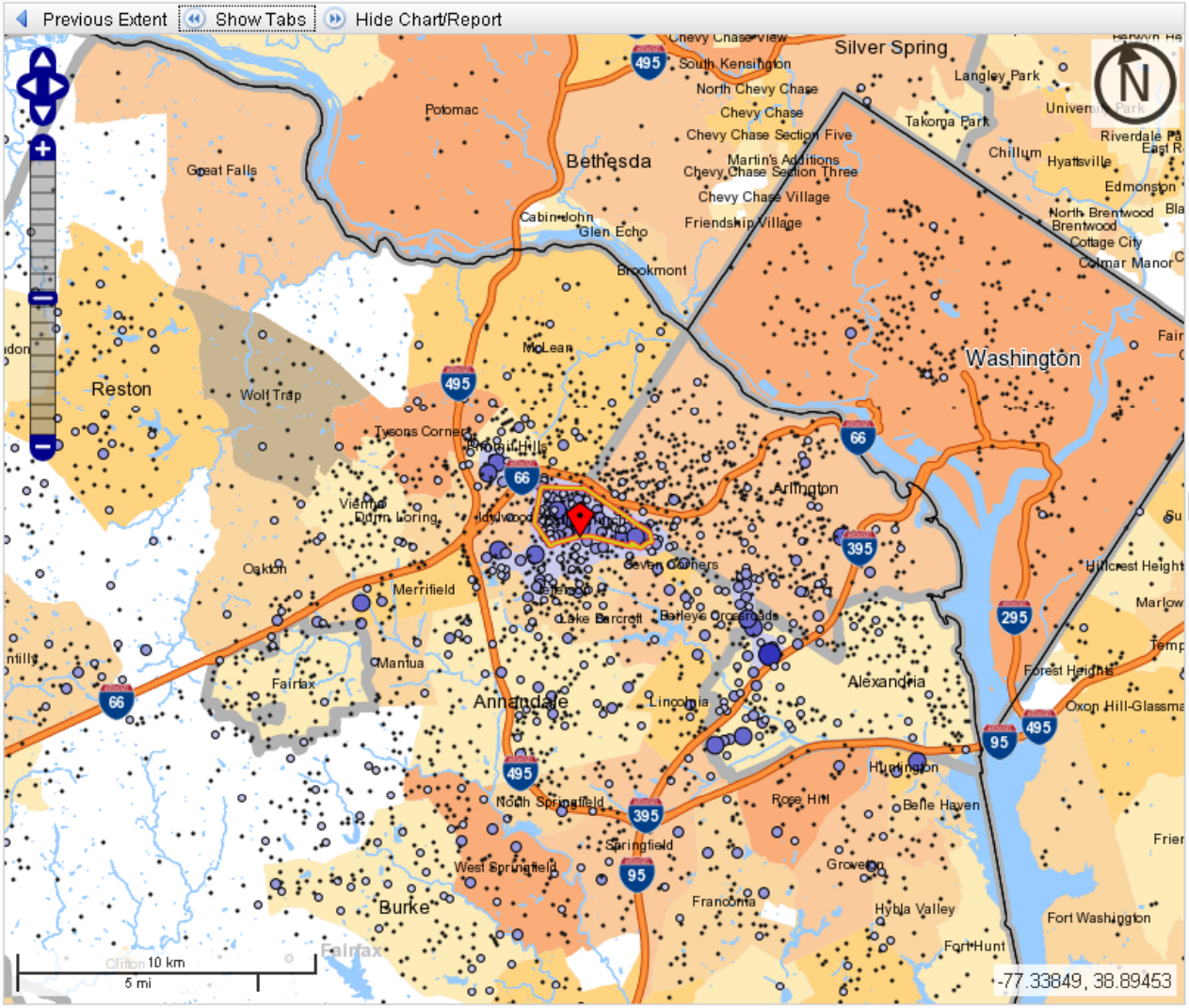


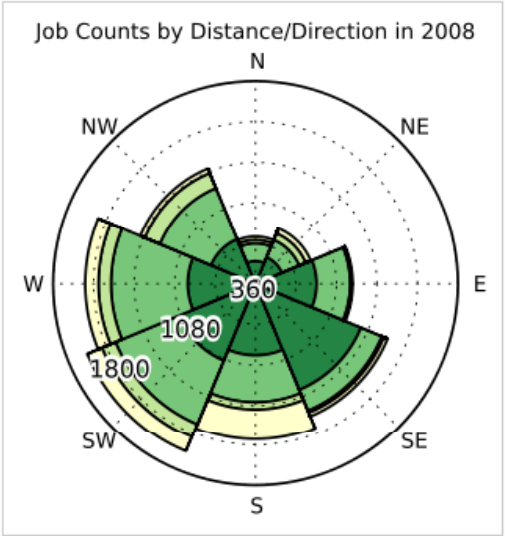


Job Counts by Worker Age

	2008 Count	2008 Share
Total Primary Jobs	8,715	100.0%
Age 29 or younger	2,218	25.5%
Age 30 to 54	4,858	55.7%
Age 55 or older	1,639	18.8%

Where People Working in Falls Church, Virginia, Lived in 2008 and Radar Chart





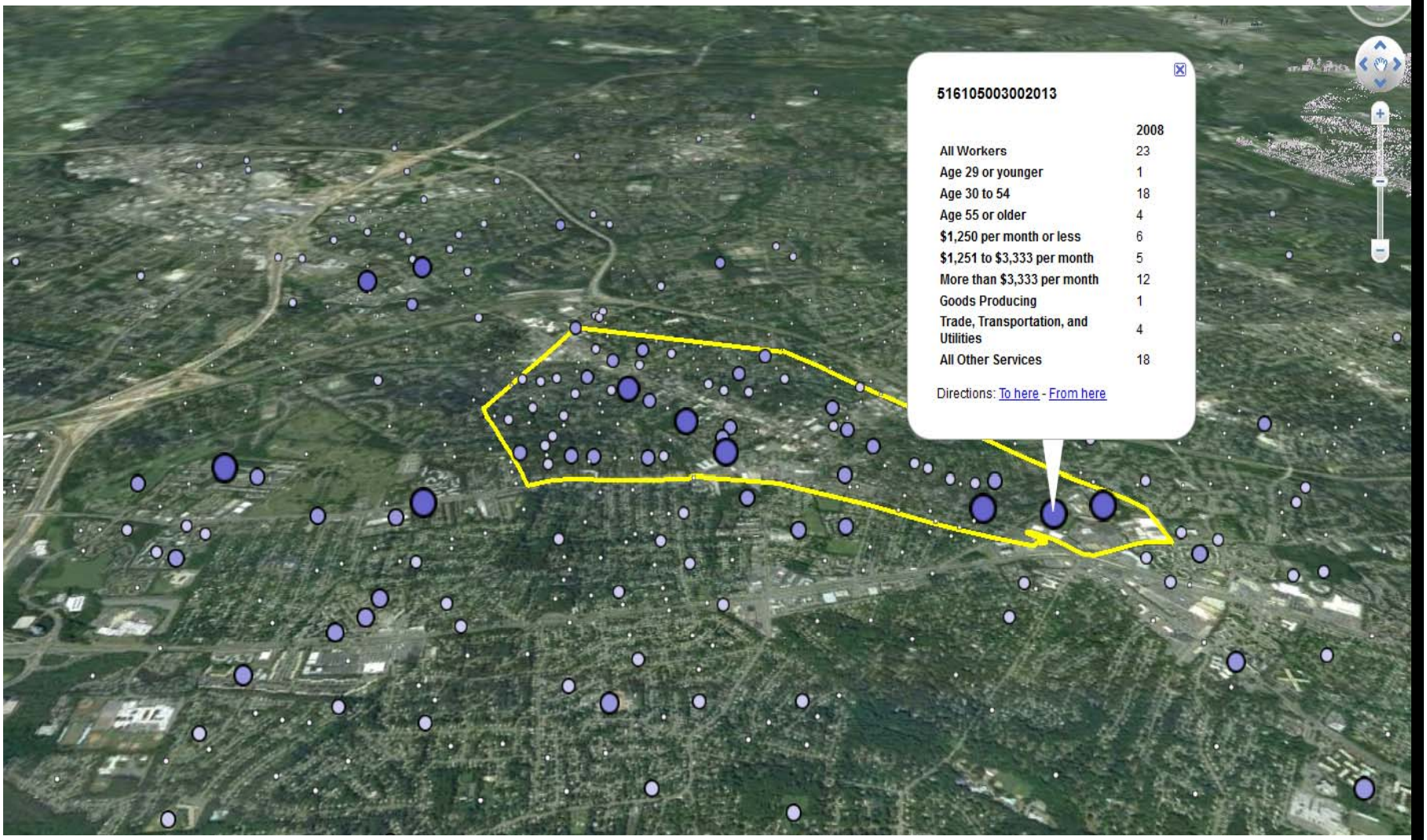
Jobs by Distance - Work Census Block to Home Census Block

	2008 Count	2008 Share
Total Primary Jobs	8,715	100.0%
Less than 10 miles	4,412	50.6%
10 to 24 miles	3,026	34.7%
25 to 50 miles	580	6.7%
Greater than 50 miles	697	8.0%

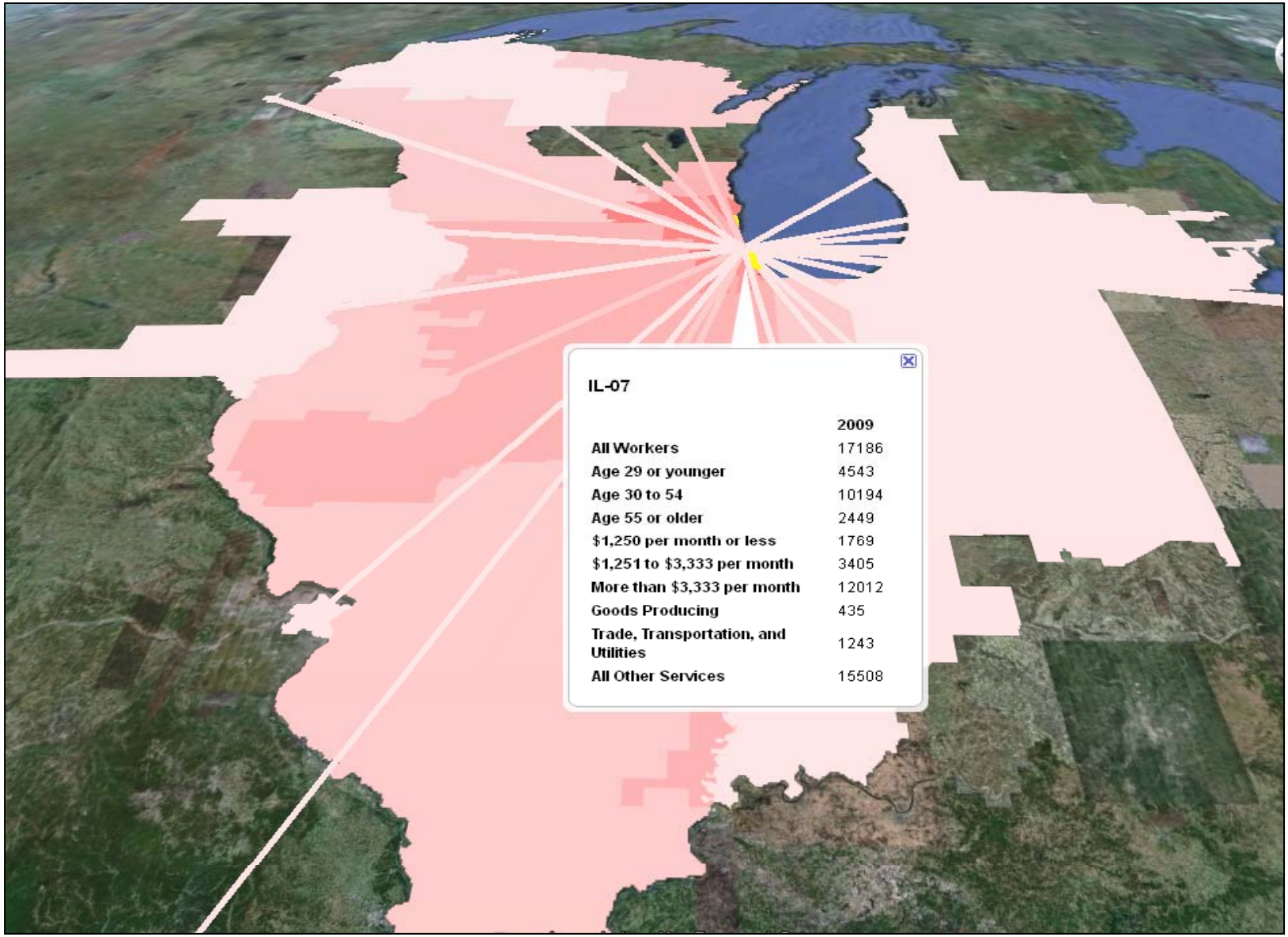
U S C E N S U S B U R E A U
Helping You Make Informed Decisions

Home | Census 2000 | Subjects A to Z | FAQs | Search | Data Tools | Catalog | Quality | Privacy Policy | Policies | Contact Us
Source: U.S.Census Bureau, Center for Economic Studies | e-mail: ces.local.employment.dynamics@census.gov

Interoperability with Google Earth

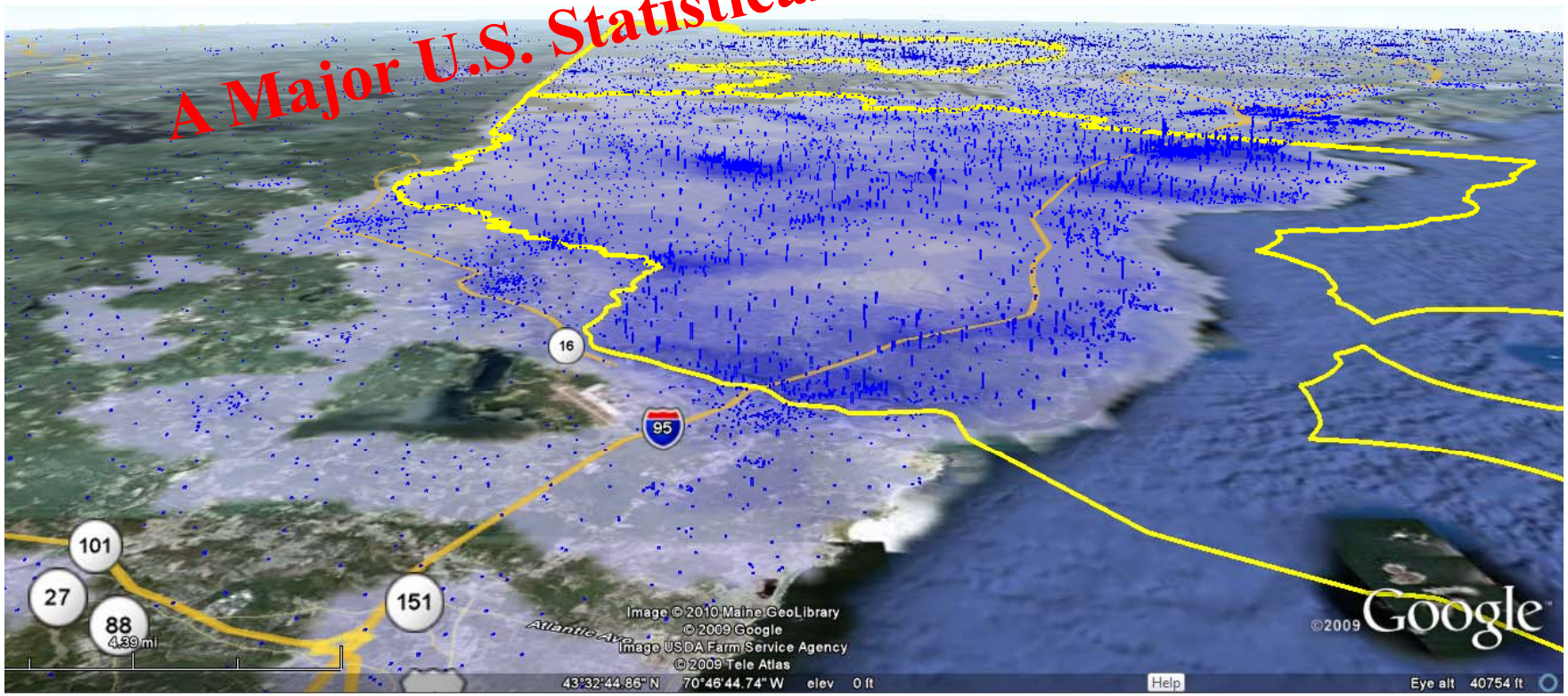


Interoperability with Google Earth



OnTheMap: An Innovative Mapping and Reporting Tool

A Major U.S. Statistical Innovation



A Spinoff Product for Emergency Management

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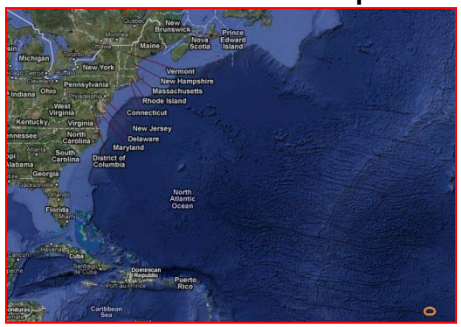

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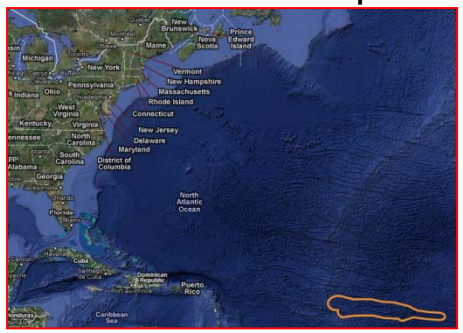

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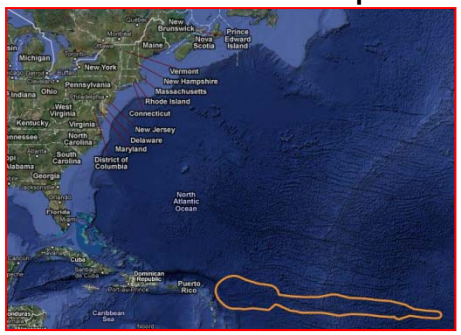

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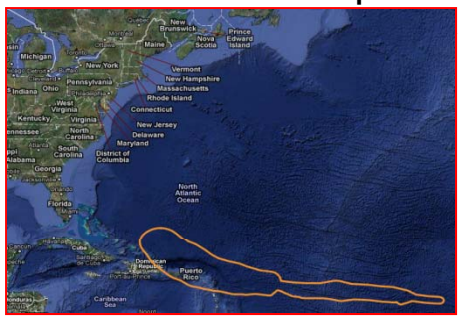


9/2/2010 4:35 pm

9/3/2010 4:40 pm

U.S. Jobs Within Storm Wind Swath

Tropical Storm EARL	Jobs
Total	584,828
Jobs by State, County, Place	
Delaware	8,980
Maryland	22,482
Virginia	553,366
Jobs by Characteristics	
Jobs by Worker Age	
Jobs by Worker Earnings	
Jobs by Industry Type (2-digit NAICS)	

9/4/2010 4:40 pm

U.S. Jobs Within Storm Wind Swath

Tropical Storm EARL	Jobs
Total	590,136
Jobs by State, County, Place	
Delaware	8,980
Maine	4,501
Maryland	22,482
Rhode Island	807
Virginia	553,366
Jobs by Characteristics	
Jobs by Worker Age	
Jobs by Worker Earnings	
Jobs by Industry Type (2-digit NAICS)	

Leveraging COTS: Google Public Data Explorer

Local Employment Dynamics for the State of Maine

› **All data**
By Age Group
By County
By Gender
By Industry
By Metro
By WIA

US Census LED Quarterly Workforce Indicator report. Prepared by the US Census Bureau LED Program/Google based on data downloaded from the US Census Bureau LED Program.

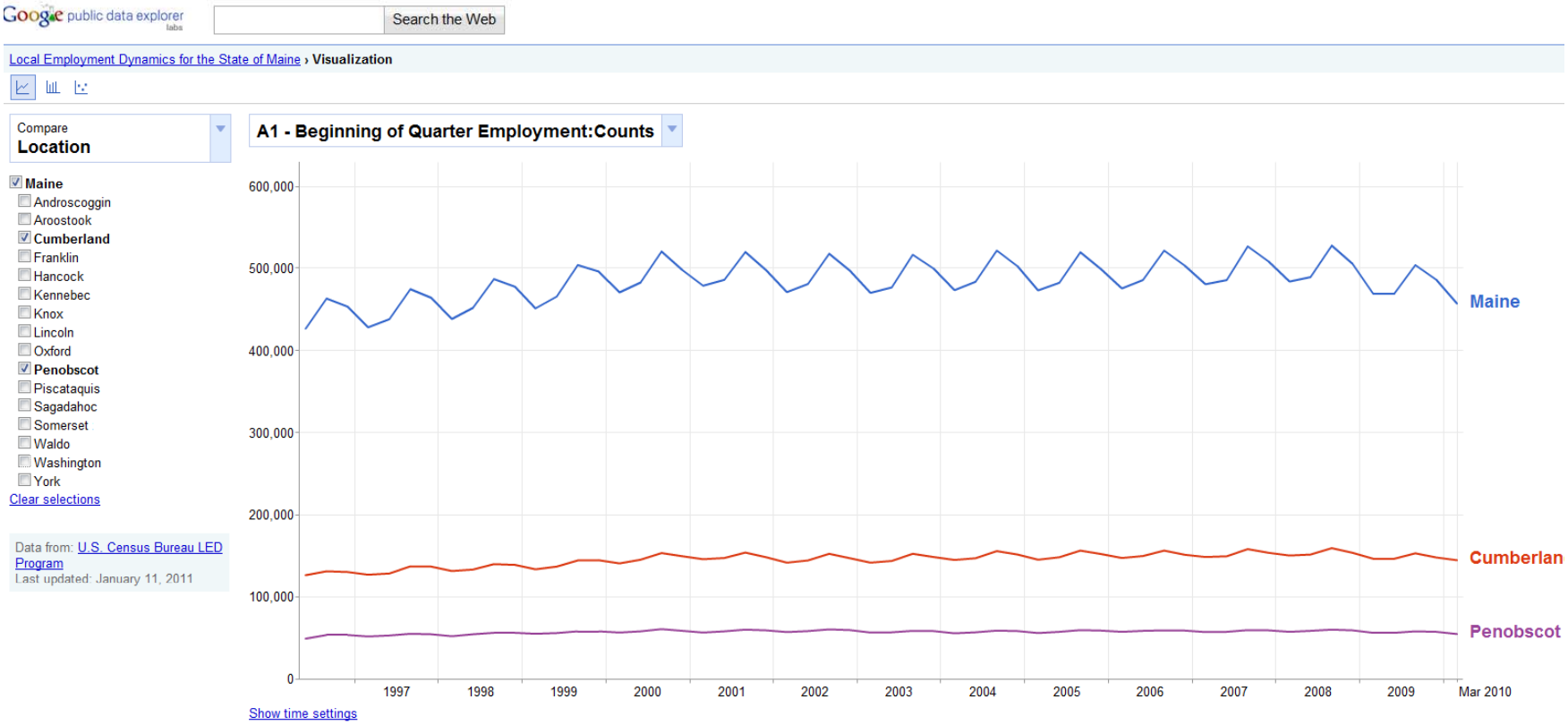
Data from U.S. Census Bureau LED Program - Last updated: January 11, 2011

Data

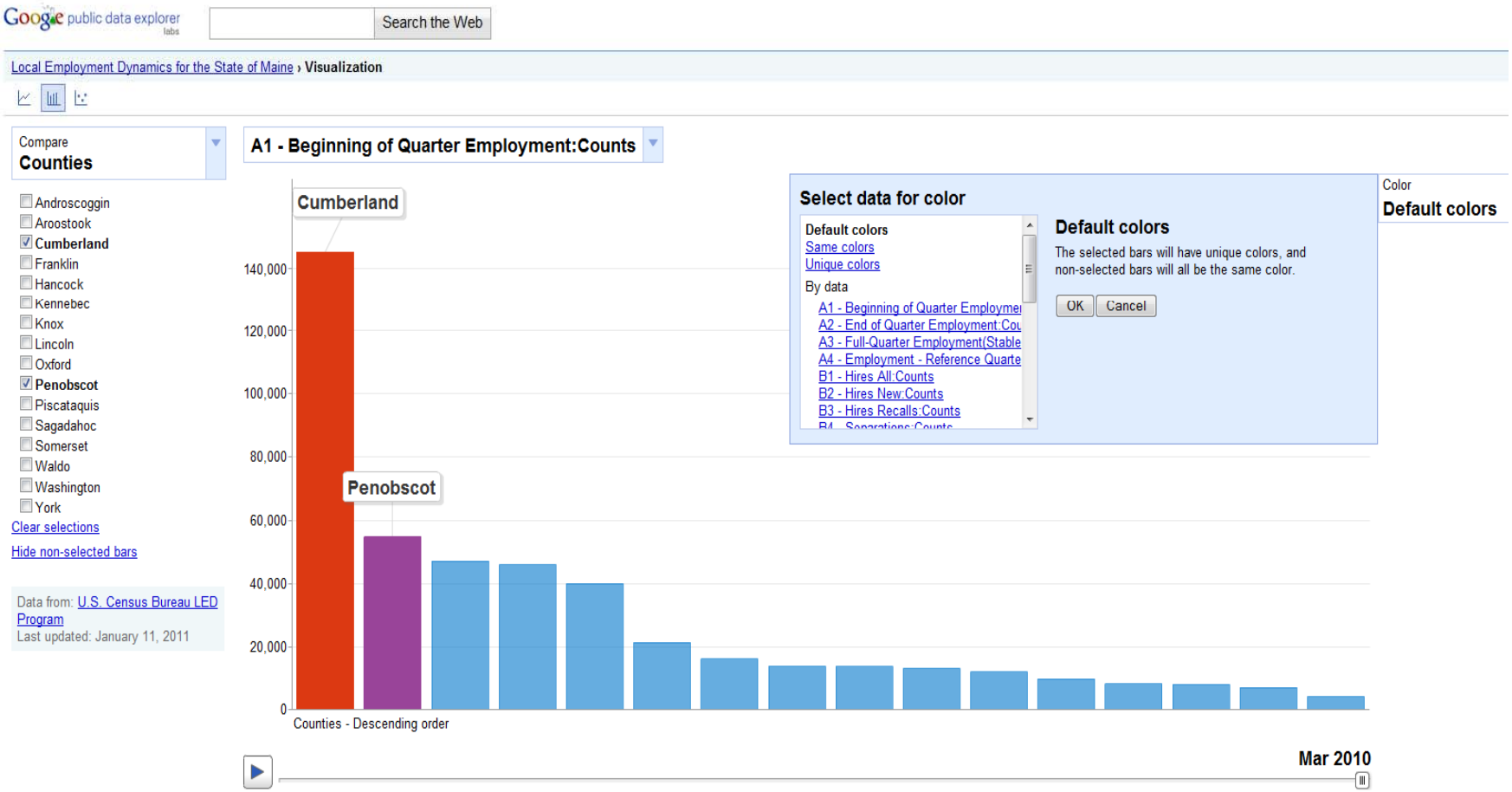
A1 - Beginning of Quarter Employment:Counts - - -
A2 - End of Quarter Employment:Counts - - -
A3 - Full-Quarter Employment(Stable):Counts - - -
A4 - Employment - Reference Quarter:Counts - - -
B1 - Hires All:Counts - - -
B2 - Hires New:Counts - - -
B3 - Hires Recalls:Counts - - -
B4 - Separations:Counts - - -
B5 - Hires All (Stable):Counts - - -
B6 - Hires New (Stable):Counts - - -
B7 - Separations (Stable):Counts - - -
B8 - Turnover (Stable):Ratio - - -
C1 - Firm Job Gains:Counts - - -
C2 - Firm Job Loss:Counts - - -
C3 - Firm Job Change:Net Change - - -
C4 - Firm Job Gains (Stable):Counts - - -
C5 - Firm Job Loss (Stable):Counts - - -
C6 - Firm Job Change (Stable):Net Change - - -
D1 - Full-Quarter Employment (Stable): Average Monthly Earnings - - -
D2 - End of Quarter Employment: Average Monthly Earnings - - -
D3 - Hires All (Stable): Average Monthly Earnings - - -
D4 - Hires New (Stable): Average Monthly Earnings - - -
D5 - Separations (Stable): Average Monthly Earnings - - -
D6 - Hires All: Average Change-in Monthly Earnings - - -

Google public data explorer labs

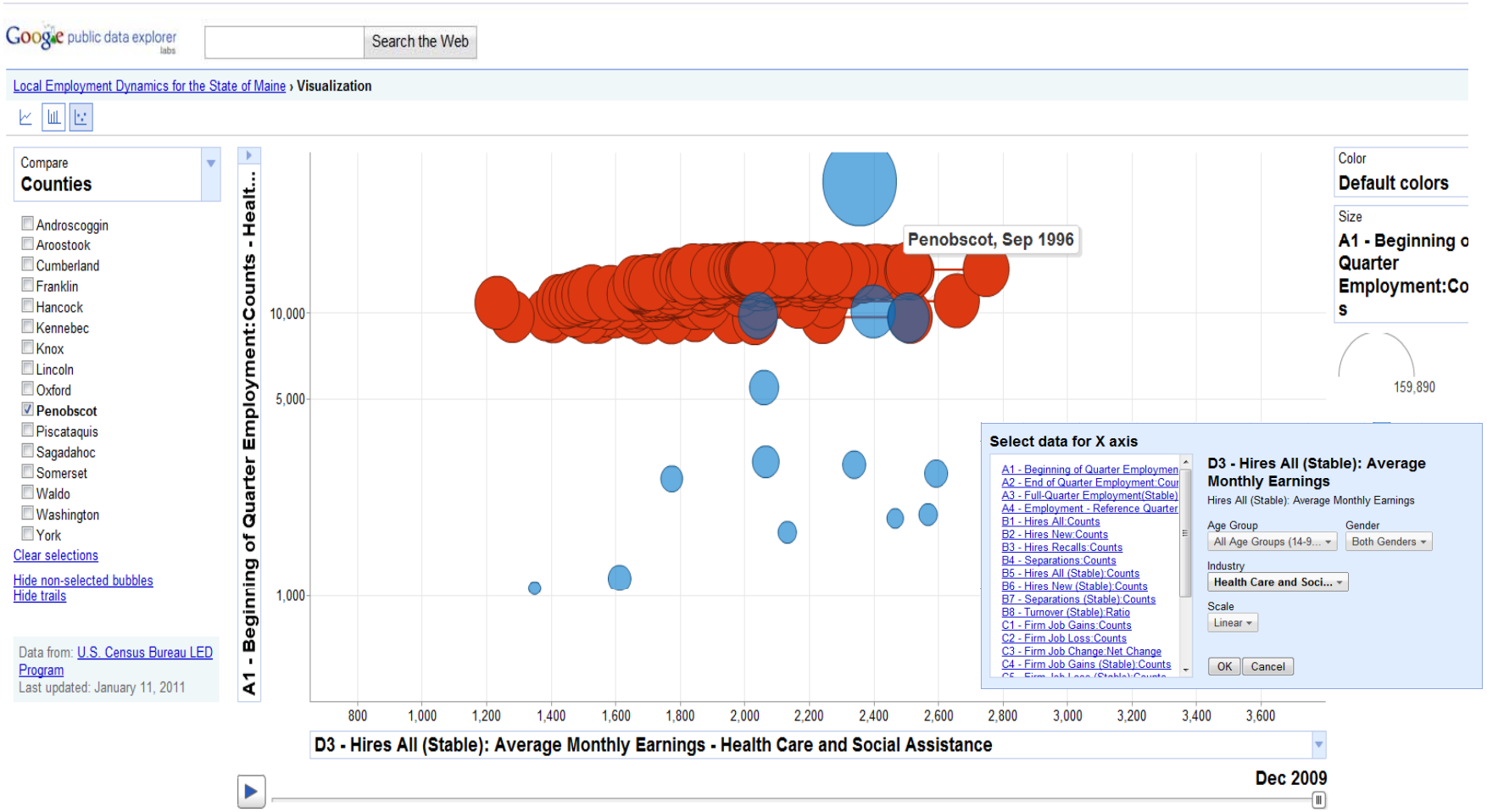
Google Line Charts



Google Bar Charts



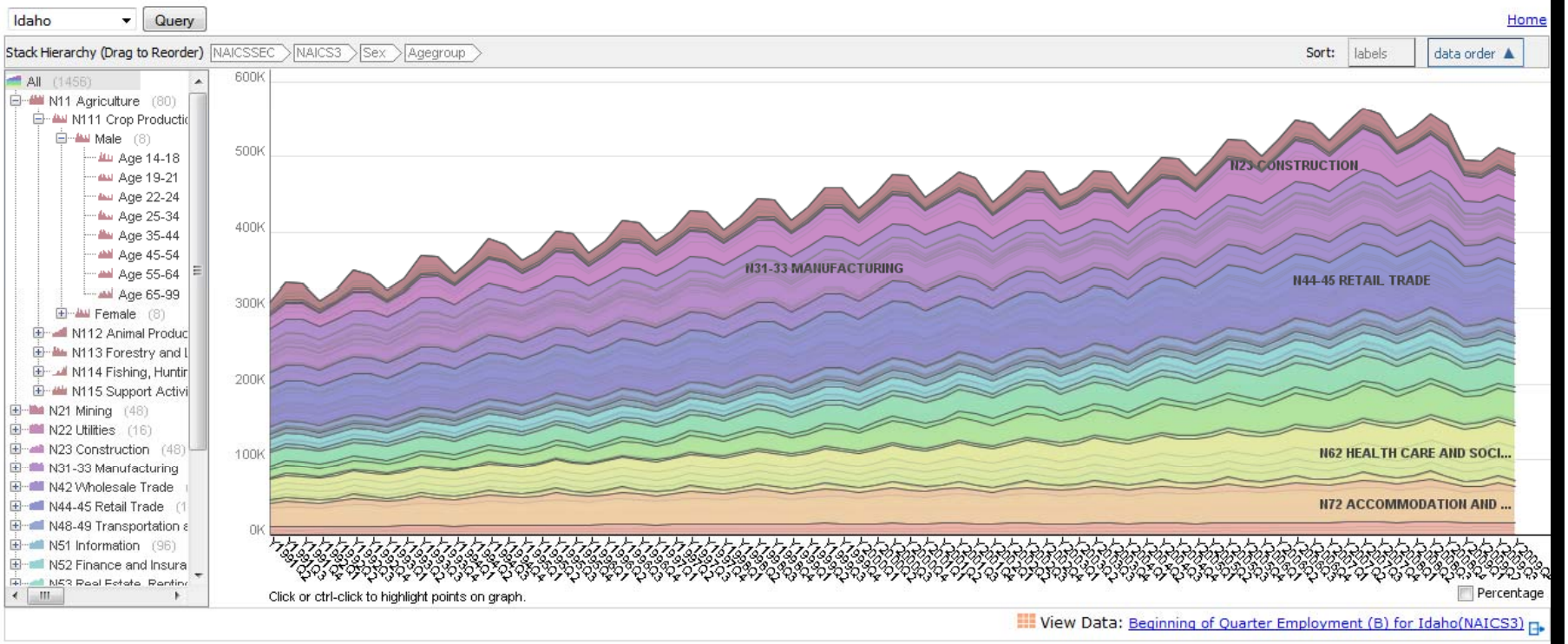
Google Motion Charts



Leveraging COTS: IBM Many Eyes

Many Eyes on Local Employment Dynamics: Beginning of Quarter Employment

The LED Many Eyes service uses the Quarterly Workforce Indicators (QWI) data. The data can be viewed in accessible tables in conformance with Section 508 regulations by clicking the ***view data*** link in the lower right hand corner of the graph. It can be directly downloaded from the Cornell Virtual RDC.



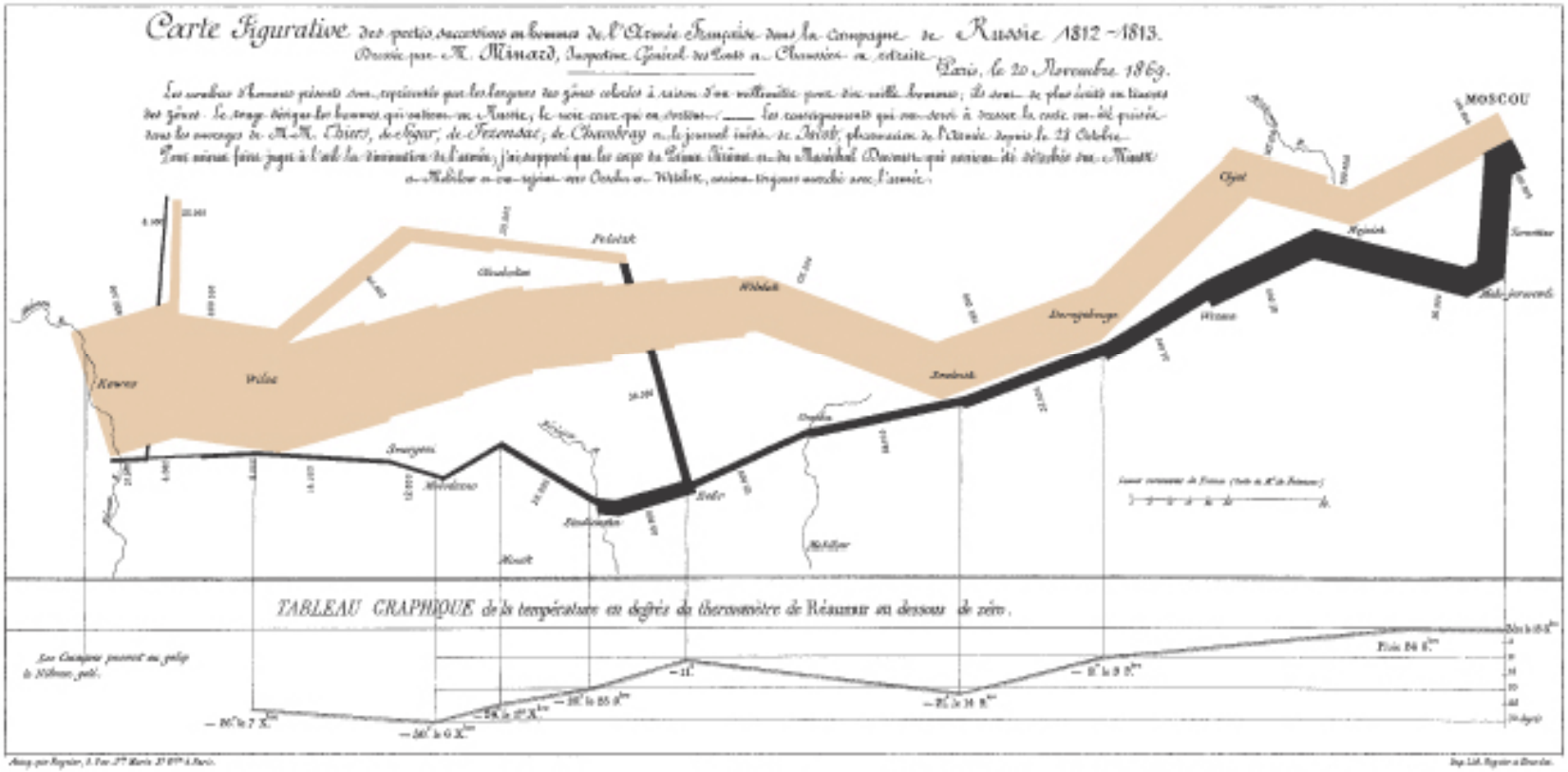
Stack graphs are built from the Beginning of Quarter Employment for each sex and age group within the 3-digit NAICS categories in the statewide LED data, as reported on QWI Online. Due to rounding and cell suppression applied at this level, the employment at higher levels of aggregation, such as total employment for 3-digit NAICS industries or within the 2-digit NAICS sector, may differ from employment reported on QWI Online.

The Next Steps

- Real-time automated applications
- Increased animation
- Location based services - mobile devices
- API/Web services
- New features such as population pyramid
- Multi-dimensional displays
- Cloud computing
- Collaborations on the next frontier

Great as It Was

This cannot be the best statistical graphic ever drawn



Contact Us

Comments/Suggestions

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Jeremy.S.Wu@census.gov

Local Employment Dynamics Website

http://lehd.did.census.gov

Join the Listserv

Lehd-general@lists.census.gov

Lehd-onthemap@lists.census.gov