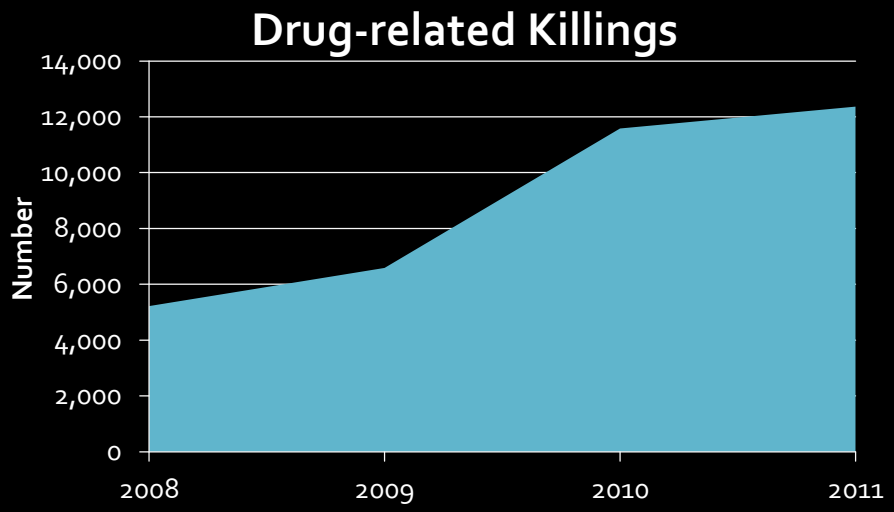
Scalable Vector Graphics (SVG) for Mapping



Drug-related Killings in Mexico

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Masters in Geographic Information Systems
Capstone Project
Advisor: Frank Hardisty
03/26/12

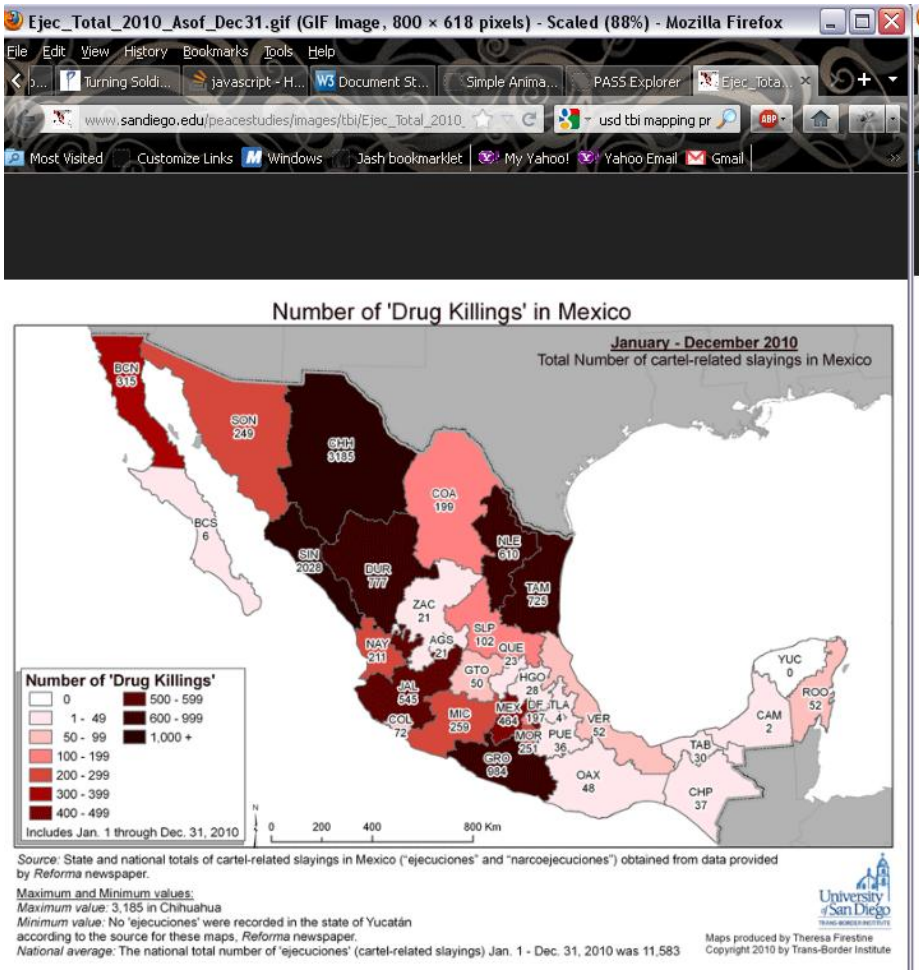
Motivation: A escalating issue

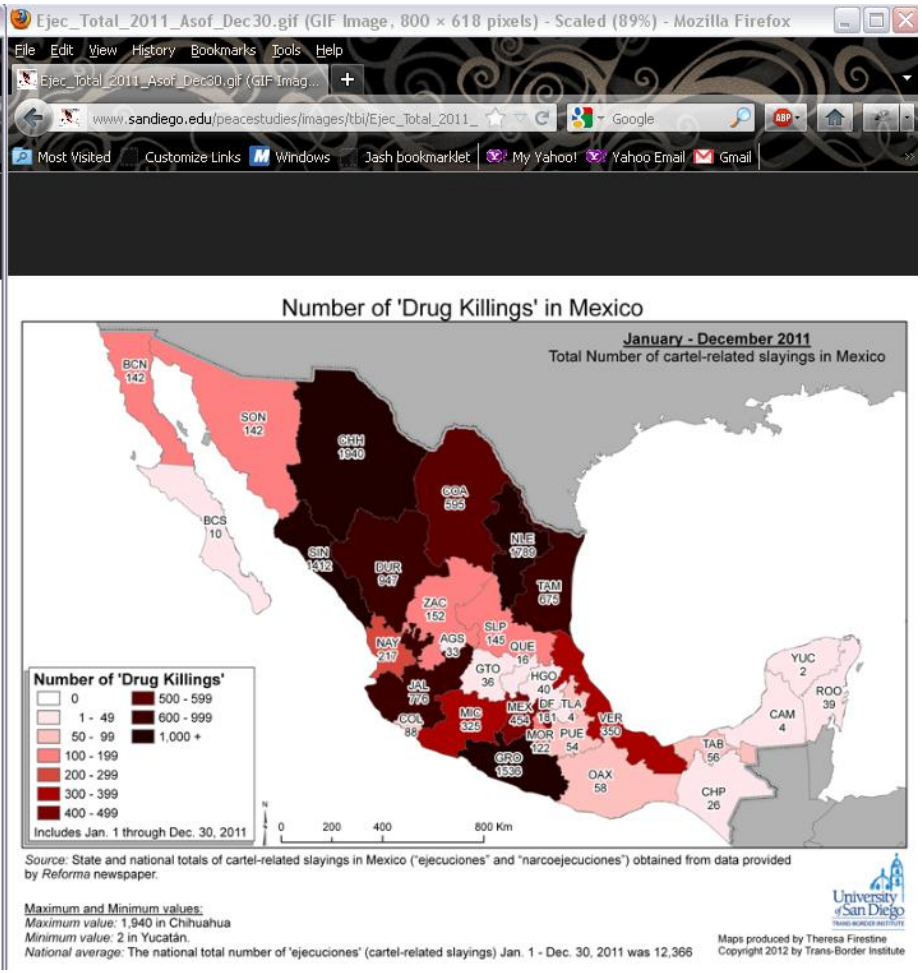
$205 million in drug money seized in Mexico city — the largest single drug cash seizure in history (2007)
Source: DEA, 2007 [1]

- Roughly 11 in 100,000 died in a drug-related homicide in 2011

Source: Data tallied by the University of San Diego Trans-Border Institute from La Reforma newspaper

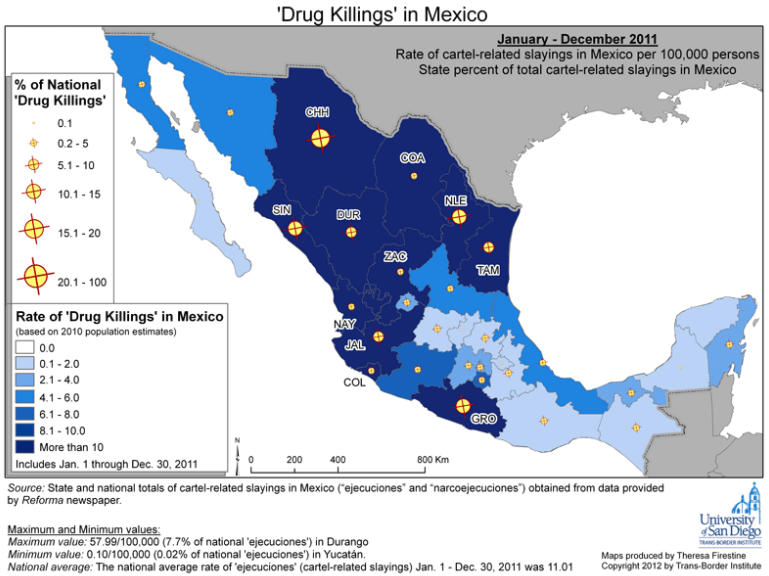
Motivation: Improving data access





Purpose

- Demonstrate the advantage of SVG for client side vector mapping
- Develop an interactive web map for showing drug-related killings
  - SVG used as the enabling technology



Outline

- SVG
  - What is it?
  - Why use SVG?
  - How can it be used for web mapping?
    - What about other technologies?
  - Is it time for SVG?
    - How is it currently used?
    - What are the disadvantages of using SVG?
- Mapping drug related slayings in Mexico
  - Why create a web map?
  - Why use SVG?
  - Prototype demonstration
- Future steps
- Concluding remarks

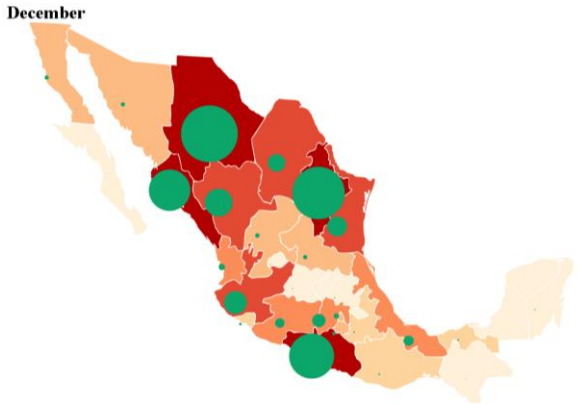
What is SVG?

- A vector graphics recommendation
- Markup contained in XML files

```
1  <?xml version="1.0" encoding="UTF-8" standalone="no"?>
2  <!-- Created with Inkscape (http://www.inkscape.org/) -->
3
4  <svg
5     xmlns:dc="http://purl.org/dc/elements/1.1/"
6     xmlns:cc="http://creativecommons.org/ns#"
7     xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
8     xmlns:svg="http://www.w3.org/2000/svg"
9     xmlns="http://www.w3.org/2000/svg"
10    xmlns:sodipodi="http://sodipodi.sourceforge.net/DTD/sodipodi-0.dtd"
11    xmlns:inkscape="http://www.inkscape.org/namespaces/inkscape"
12    id="svg3919"
13    sodipodi:version="0.32"
14    inkscape:version="0.48.2 r9819"
15    width="999.73236"
16    height="679.94141"
17    version="1.0"
18    sodipodi:docname="Mexico_Map_Wiki.svg"
19    inkscape:output_extension="org.inkscape.output.svg.inkscape">
20   <metadata
```

The Case for SVG

- SVG is the future web mapping technique for client side vector mapping
  - Open, interoperable, and extensible (Neumann and Winter 2001; Peng and Zhang 2004; Ramos et al 2007)
  - Suitable for animation and for static images (Clarke 2005)
  - Resolution independent



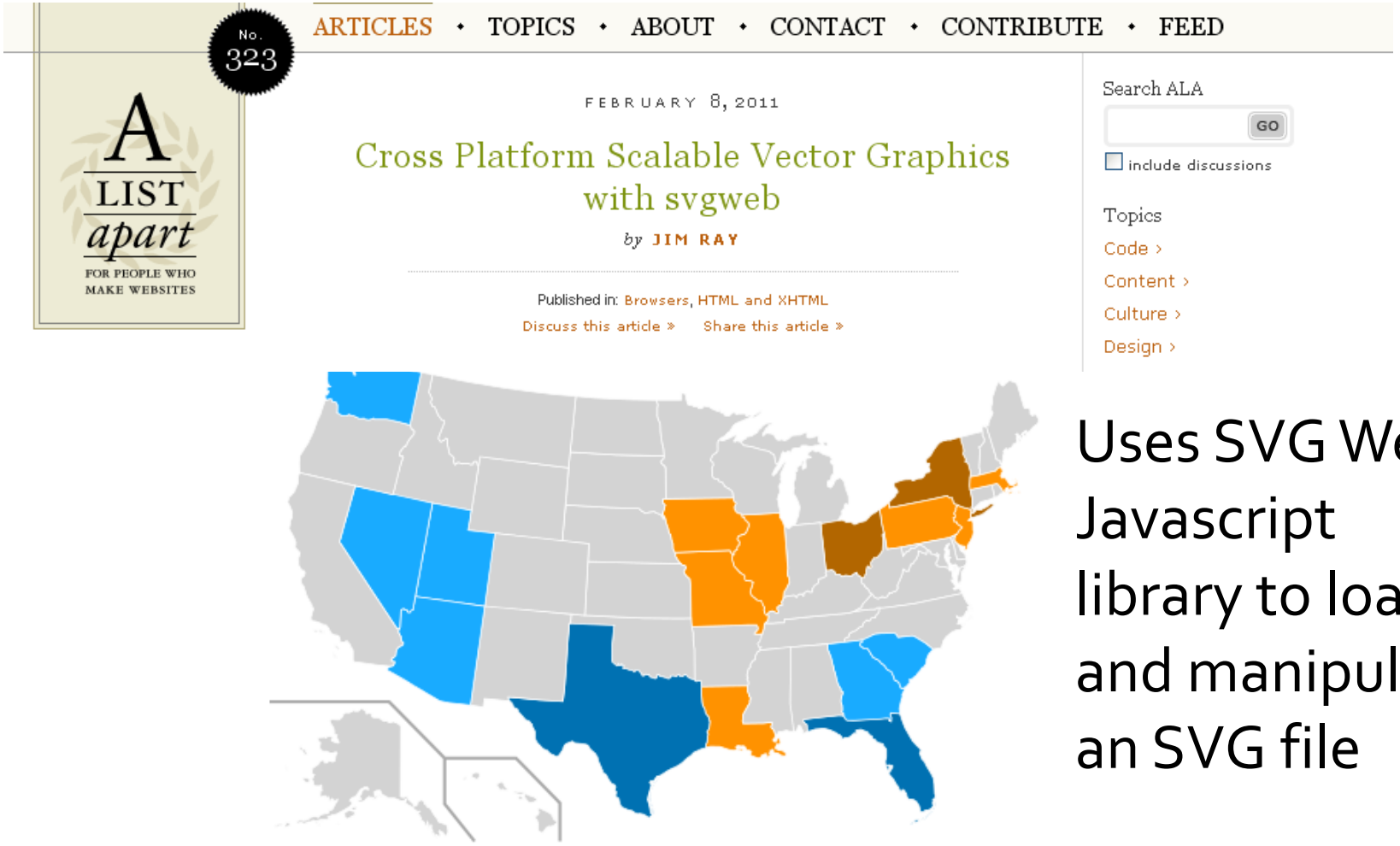

```
<animateTransform
    attributeType="XML"
     attributeName="transform"
     type="scale"
     keyTimes=str_times
     values=str_values
     dur="12s"
     fill="freeze"
     repeatCount="1"/>
```

http://www.personal.psu.edu/taf5118/blogs/geoecon/2011/test_svgEmbed.xhtml

How Can SVG be Used for Web Mapping?

- Two methods
  - Loading directly into the browser
  - Programmatic rendering

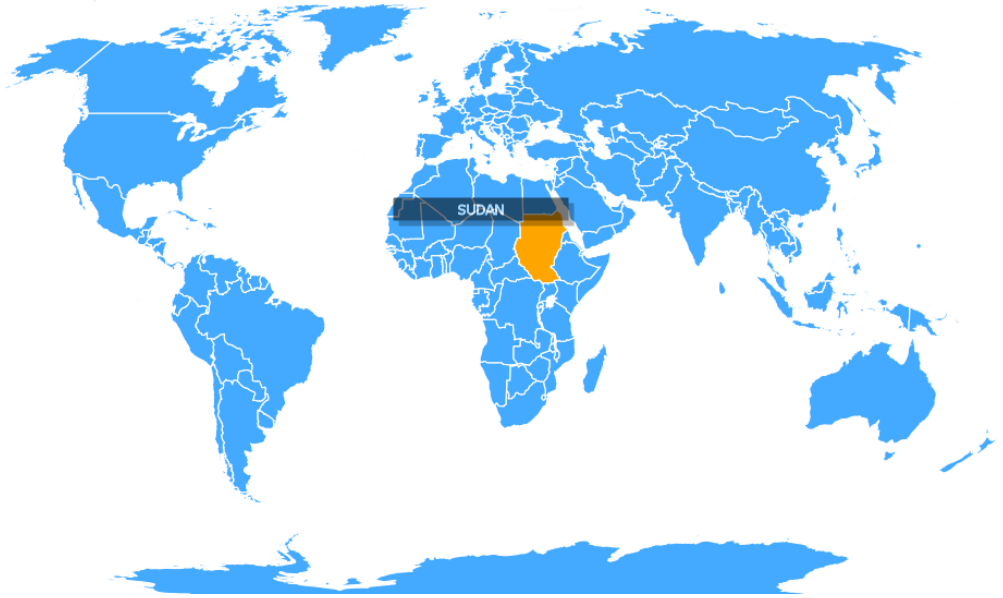
SVG Loaded into the Browser



Uses SVG Web Javascript library to load and manipulate an SVG file

http://www.alistapart.com/d/cross-platform-scalable-vector-graphics-with-svgweb/map-example/

Programmatic Rendering



Countries drawn through Javascript by their SVG coordinate paths

http://www.codeproject.com/Articles/262179/SVG-World-Map

What About Other Technologies?

- Custom drawings: Flash and Canvas
- Web-based GIS: tile-based services like Google Maps, Open Layers

The New York Times Technology | Personal Tech | Business Day

Bits

Adobe to Kill Mobile Flash, Focus on HTML5

By NICK BILTON | November 9, 2011, 1:15 PM | 29

screenshot via Apple.com

Adobe Flash does not work on any Apple mobile devices. In a video demonstration of the iPad, Apple left a large hole in place of the Flash Player.

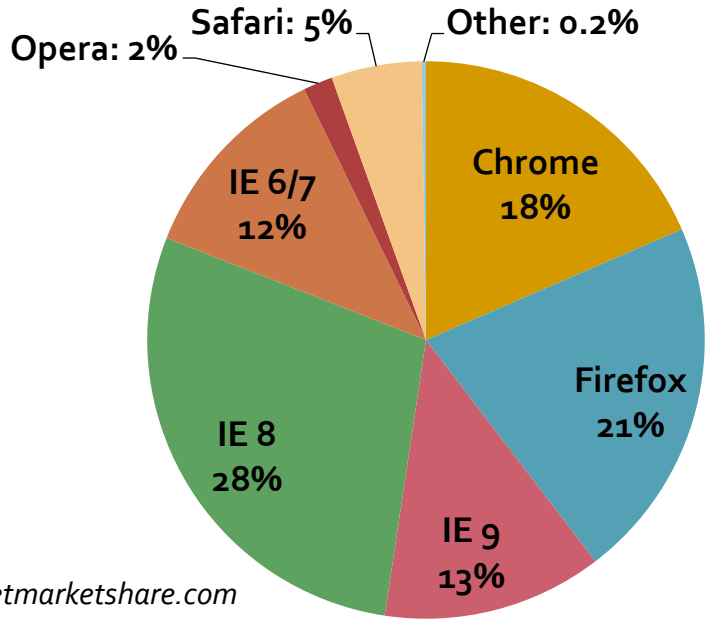
Adobe Systems, the software company, said Wednesday that it is killing its Flash for mobile browsers, and will instead focus its efforts on HTML5 for mobile developers.

Time for SVG?

- Recognized for role in producing high quality interactive maps in 2001 (Neumann and Winter)
- Supported gradually
  - Common format in Wikimedia
  - Native format in Inkscape (released 2003)
  - Open source GIS

NYTimes 10/23/11

Disadvantages



Source: netmarketshare.com
February 2012

Browser	Native SVG support
Internet Explorer 9	Yes
Other Internet Explorer versions	No
Firefox	Yes
Chrome	Yes
Safari	Yes
Opera	Yes

Source: http://www.codedread.com/svg-support.php

- Rendering can be slow when complexity increases

SVG Case Study: Background

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- US-Mexico Border Immersion Program
- U.S.-Mexico Security Cooperation Project
- USD-UABC Legal Education Program
- Summer Seminar in Border Studies
- Mapping Project

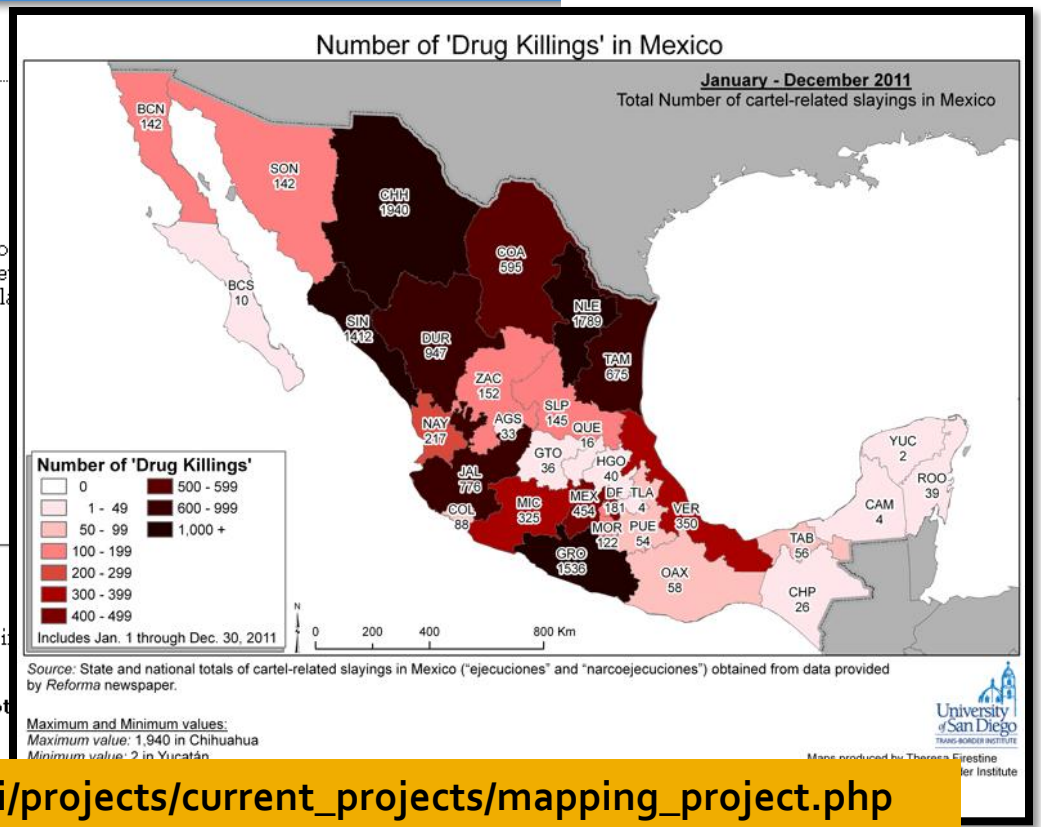
PROJECTS

Mapping Project

This project is made possible through the generous support o
of the TBI Justice in Mexico Project. These maps are being de
and map justice related trends (such as homicide rates) in rel
unemployment, inequality, party governance, etc.).

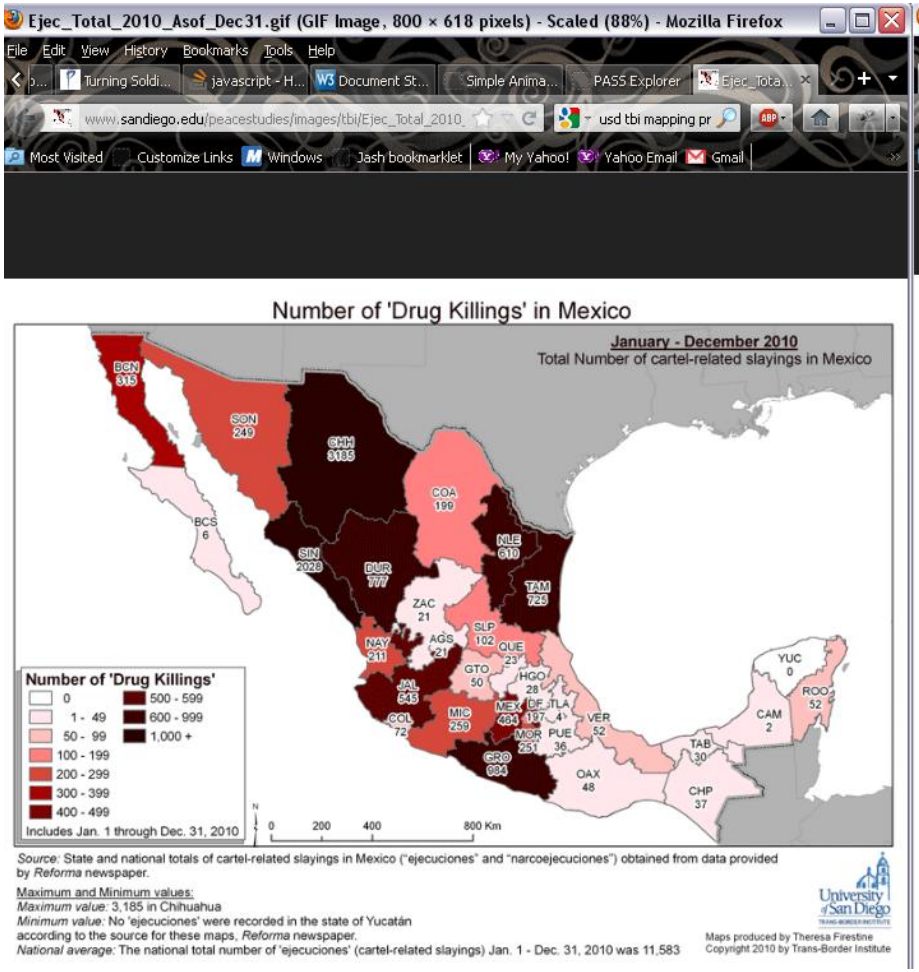
Crime and Law Enforcement
Drug Killings in Mexico (Annual/Midyear Totals)
Drug Killings in Mexico (Bi-monthly)
Demographics
Immigration
Socio-economics
Political

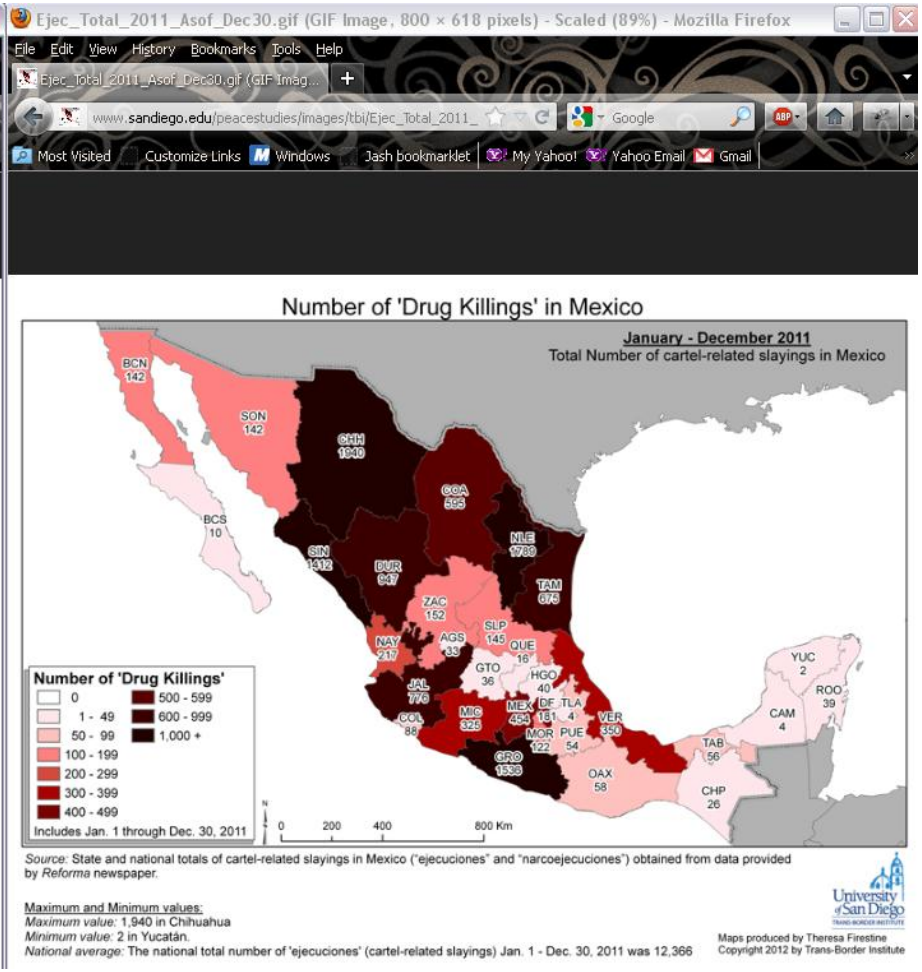
- **Crime and Law Enforcement**
  - Criminal Charges Filed for Homicide by State i
    [image | methodology]
- **Drug Killings in Mexico (Annual/Midyear Tot**
  - 2006 Drug Killings by State
    - Total Number of Drug Killings



http://www.sandiego.edu/peacestudies/tbi/projects/current_projects/mapping_project.php

Motivation: Improve data dissemination



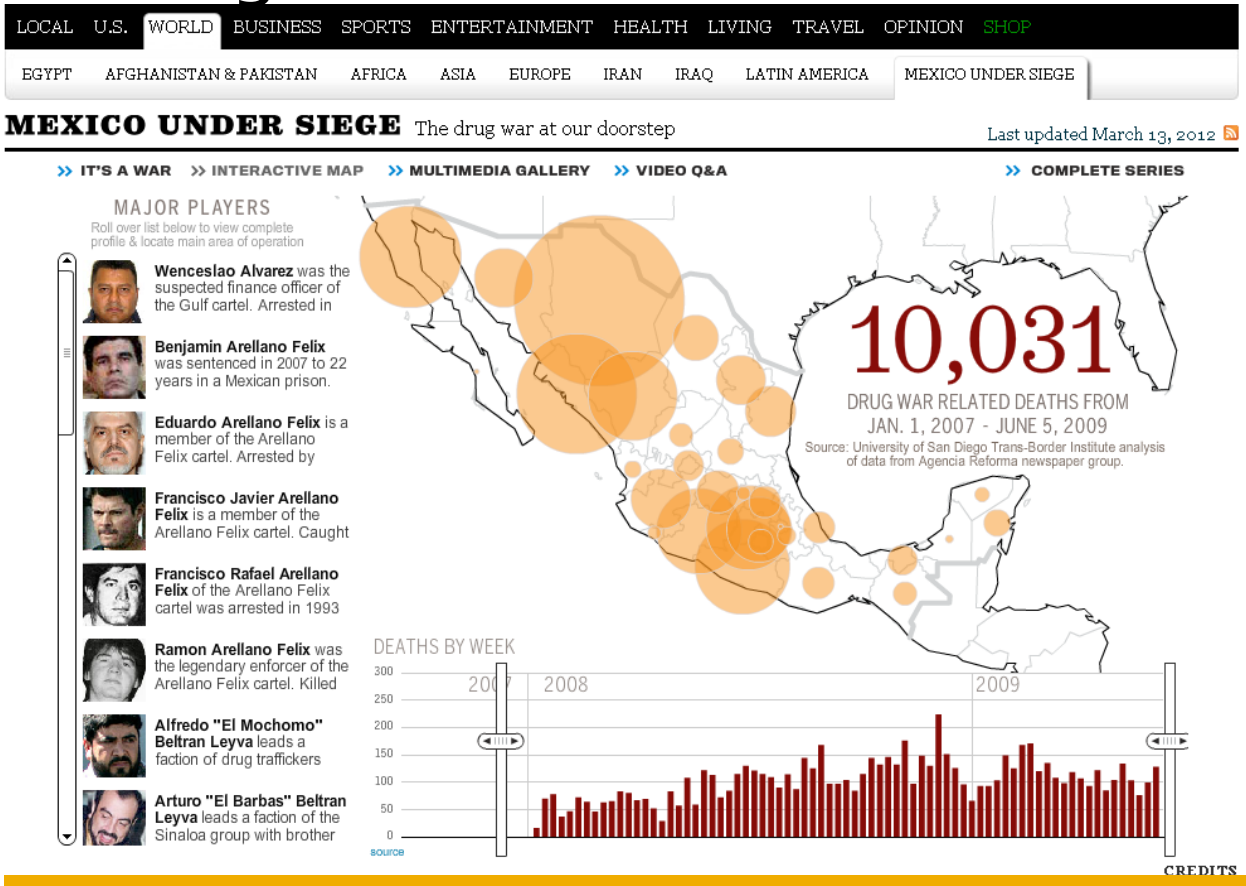


Identified Needs

- User control
- Ability to view data values
- Publically available

Existing Systems

- Los Angeles Times

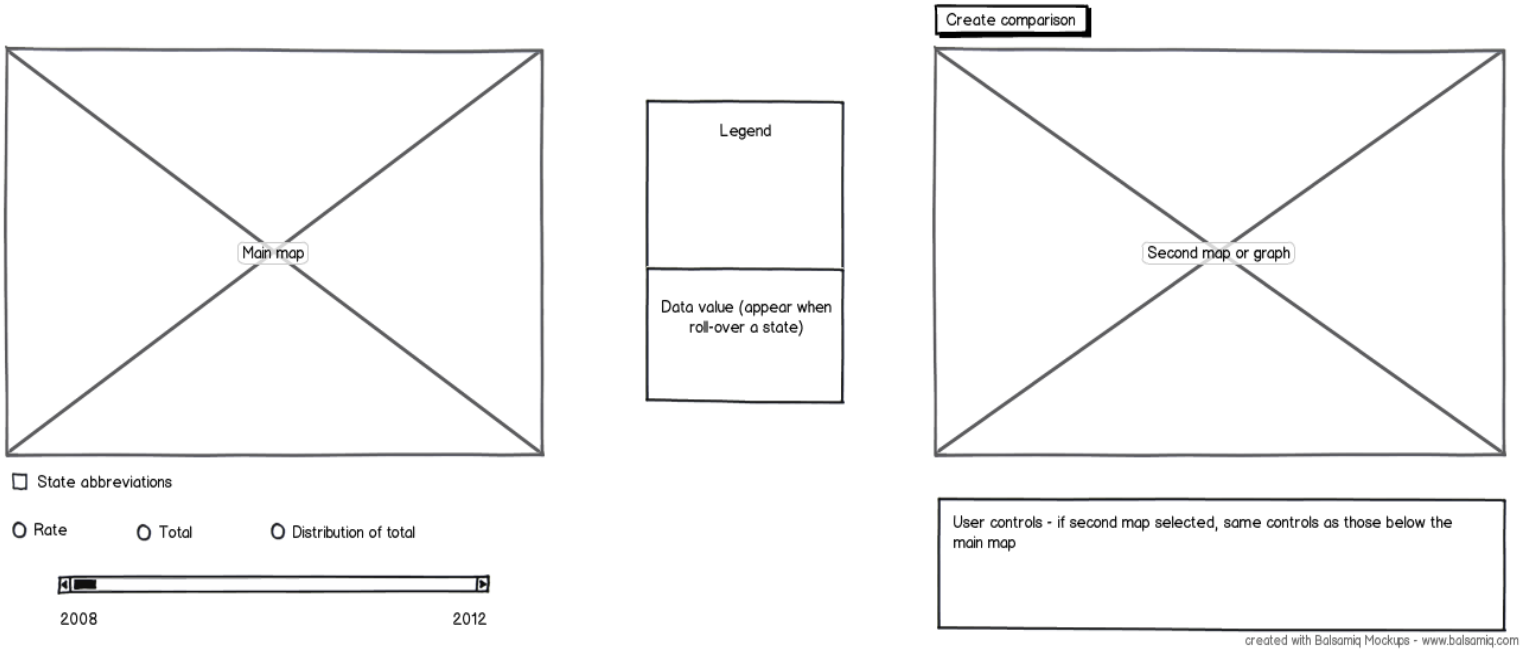


Uses Flash

http://projects.latimes.com/mexico-drug-war/#/interactive-map

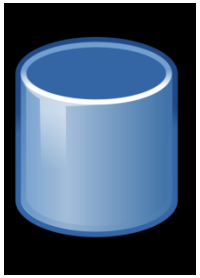
Proposed system

- Interactive web map made available through standard browser



Requirements

- Drawing library
- Database
- Database maintenance

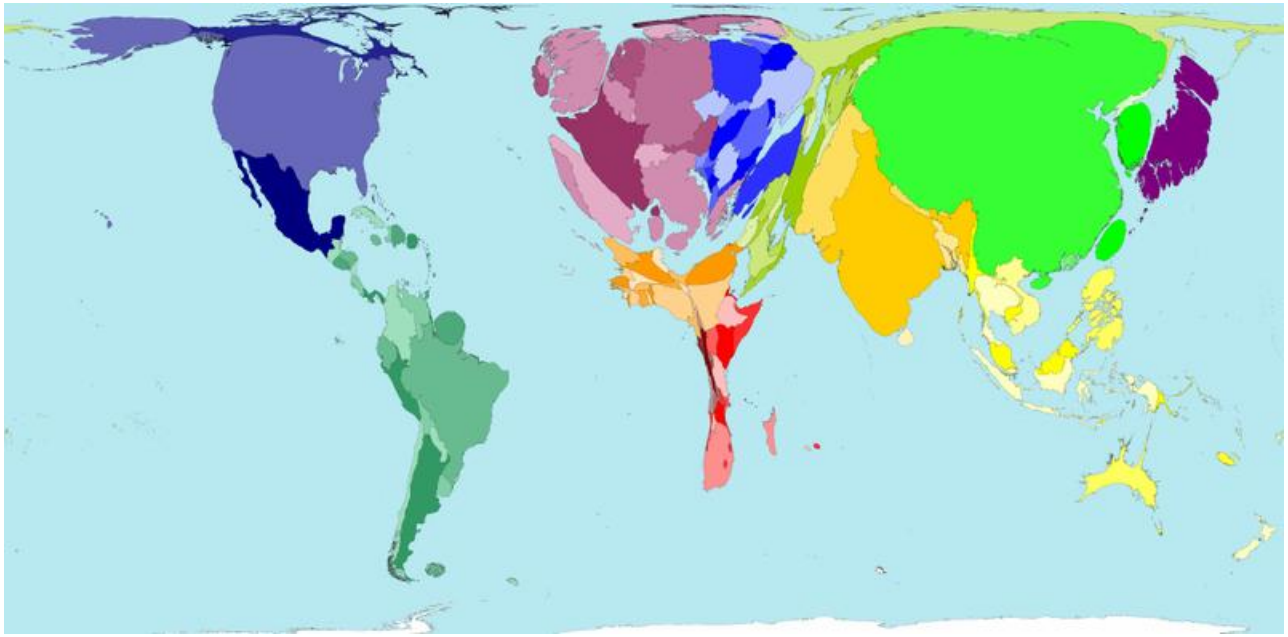


Prototype

http://www.personal.psu.edu/taf5118/blogs/geoecon/2011/MX_Map_raphael_15.html

Future Steps

- Review of application
- Re-evaluation of classification system used
- Exploration of alternative visualization



Concluding Remarks

- SVG is an advantageous web-mapping technology for web-based interactive mapping
- Interactive web maps enhance spatial data access and exploration

Contact Information

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References

- Neumann, A. and A. M. Winter (2001). "Time for SVG – Towards High Quality Interactive Web-Maps," paper presented at the 20th International Cartography Conference in Beijing China. Retrieved March 29,2012 from: http://icaci.org/files/documents/ICC_proceedings/ICC2001/icc2001/defult.htm
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- Ramos, C., W. Cartwright, and R. de Almeida (2007). "Scalable Vector Graphics and Web Map Publishing," Chapter in *Multimedia Cartography.* Eds. W. Cartwright, M. Peterson, and G. Gartner. Springer: New York, New York.

Image References

- Slide 2: Drug Enforcement Administration [Public domain or Public domain], via Wikimedia Commons. http://upload.wikimedia.org/wikipedia/commons/3/3f/Drug_Money_and_weapons_seized_by_the_Mexican_Police_and_the_DEA_2007.jpg
- Slide 3: Presenter's own work for the University of San Diego Trans-Border Institute: http://www.sandiego.edu/peacestudies/images/tbi/Ejec_Overlay_2011_Asof_Dec30.gif
- Slide 4: tkgd2007. [Public domain], via Wikimedia Commons. http://commons.wikimedia.org/wiki/File:Letters_SVG.svg
- Slide 5: Allstrak (File:States of Mexico.svg) [CC-BY-SA-3.0 (www.creativecommons.org/licenses/by-sa/3.0) or GFDL (www.gnu.org/copyleft/fdl.html)], via Wikimedia Commons. http://commons.wikimedia.org/wiki/File:Mexico_Map.svg
- Slide 7: Screenshot taken by presenter of *New York Times* article. Marsh, Bill. "It's All Connected: An Overview of the Euro Crisis," *The New York Times*, October 22, 2011. Retrieved March 29, 2012 from: http://www.nytimes.com/interactive/2011/10/23/sunday-review/an-overview-of-the-euro-crisis.html
- Slide 8: Screenshot taken by presenter of *New York Times* article. Bilton, Nick. "Adobe to Kill Mobile Flash, Focus on HTML5," *New York Times,* November 9, 2011. Retrieved March 18, 2012 from: http://bits.blogs.nytimes.com/2011/11/09/adobe-to-kill-mobile-flash-focus-on-html5/
- Slide 10: Screenshot taken by presenter of SVG mapping application http://www.alistapart.com/d/cross-platform-scalable-vector-graphics-with-svgweb/map-example/ on March 17, 2012
- Slide 11: Screenshot taken by presenter of SVG mapping application http://www.codeproject.com/Articles/262179/SVG-World-Map on March 17, 2012
- Slide 13: Screenshot taken by presenter of the University of San Diego's Trans-Border Institute's website. Map is presenter's own work for the University of San Diego Trans-Border Institute: http://www.sandiego.edu/peacestudies/images/tbi/Ejec_Total_2011_Asof_Dec30.gif
- Slide 15: Map prototype designed and developed by presenter using Balsamiq (http://www.balsamiq.com/products/mockups)
- Slide 16: RRZEicons (Own work) [CC-BY-SA-3.0 (www.creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons. http://commons.wikimedia.org/wiki/File:Database.svg
- Slide 17: Screenshot of application designed and developed by the presenter. Taken March 29, 2012.
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