



# Visualizing Map Retrieval:

Searching CONTENTdm Collections With **ISIS**:  
an Interactive Spatial Image Search tool

Alex A. Dolski      [alex.dolski@unlv.edu](mailto:alex.dolski@unlv.edu)

Web & Digitization Application Developer

University of Nevada, Las Vegas Libraries

# Shortcomings of text-based search for maps

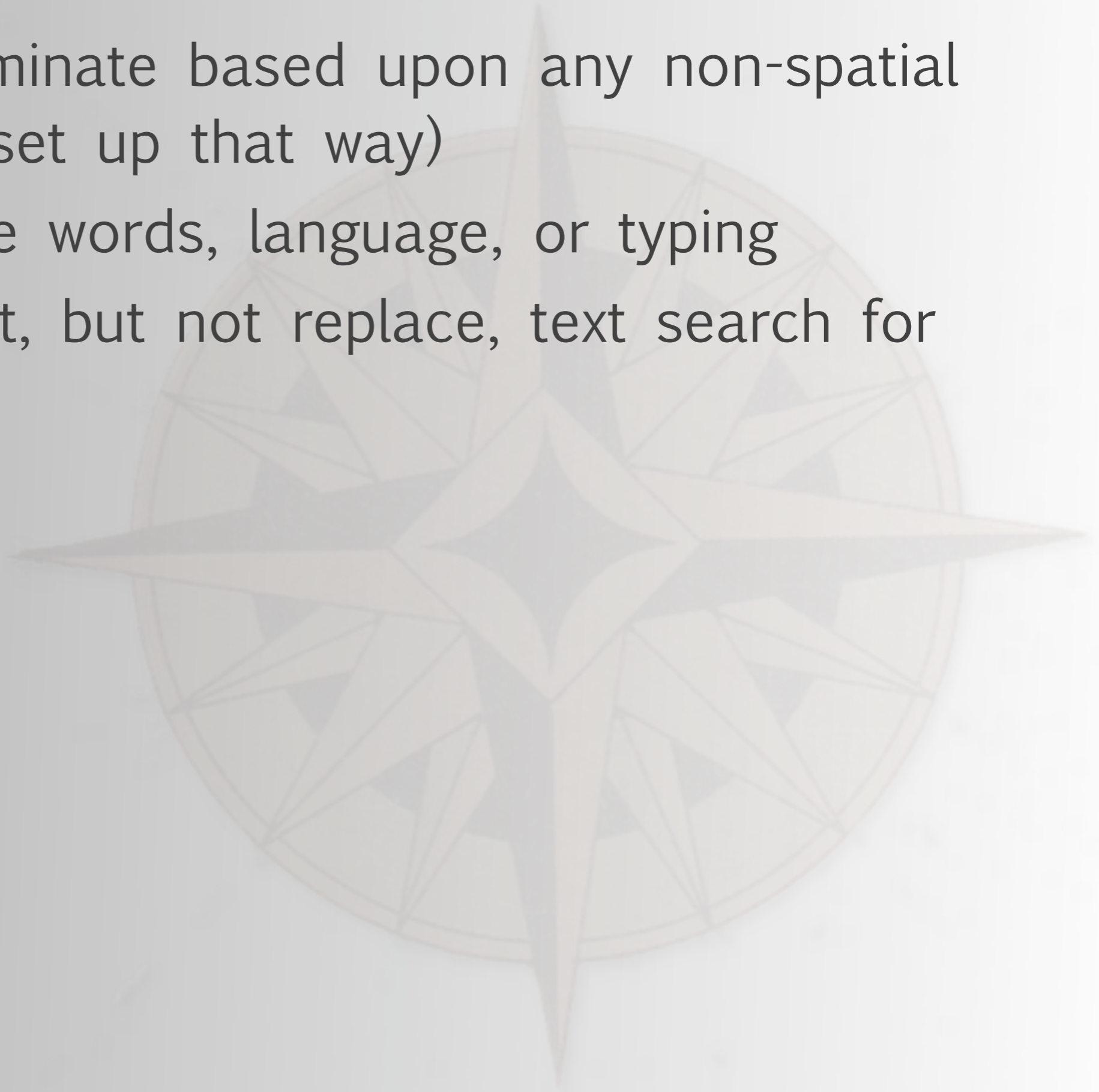
- ▶ Language breaks down when dealing with:
  - ▶ Different eras
  - ▶ Inconsistency in cataloging
  - ▶ Places with multiple names
  - ▶ Place names that change over time
  - ▶ Place names that overlap & change with scale
  - ▶ Place names that conflict politically
  - ▶ Different themes
    - ▶ climate, economy, environment, ethnography, exploration, geology, history, hydrography, immigration, industry, land use, migration, politics, population, religion, topography, vegetation...
  - ▶ Different languages
    - ▶ Different alphabets, imprecise translations

**Search the collection**

go

# Spatial search

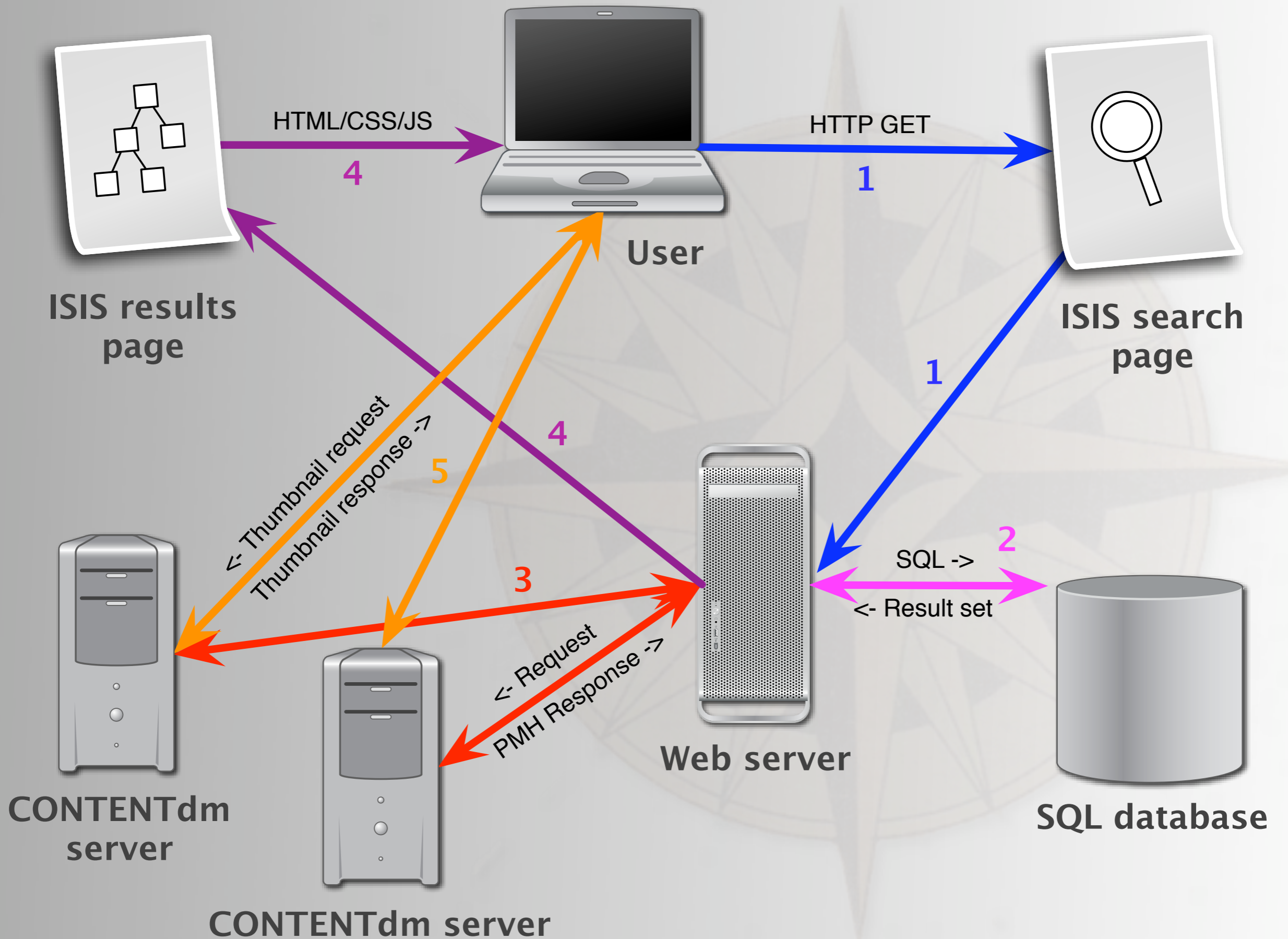
- ▶ Does not discriminate based upon any non-spatial factors (unless set up that way)
- ▶ Does not involve words, language, or typing
- ▶ Can complement, but not replace, text search for maps



▶ Link



# Sequence of events



- ▶ “Vector graphics for the web”
- ▶ XML-based, W3C-sponsored specification
  - ▶ <http://www.w3.org/Graphics/SVG/>
  - ▶ (The group behind HTML, CSS, and many other web standards)
- ▶ Part of the W3C Document Object Model
  - ▶ Fully scriptable with JavaScript
  - ▶ Supports CSS styling
- ▶ Interactivity & animation support with JavaScript & SMIL
- ▶ Easily manipulable with server-side scripting
- ▶ Embed inside (X)HTML with `<object>` or `<embed>` tag
- ▶ May someday work inline with XHTML

## Flash

- ▶ Binary (smaller file sizes, content is protected)
- ▶ Proprietary (Adobe)
- ▶ Well-optimized
- ▶ More mature, wide compatibility
- ▶ Complemented by a constellation of other proprietary technologies

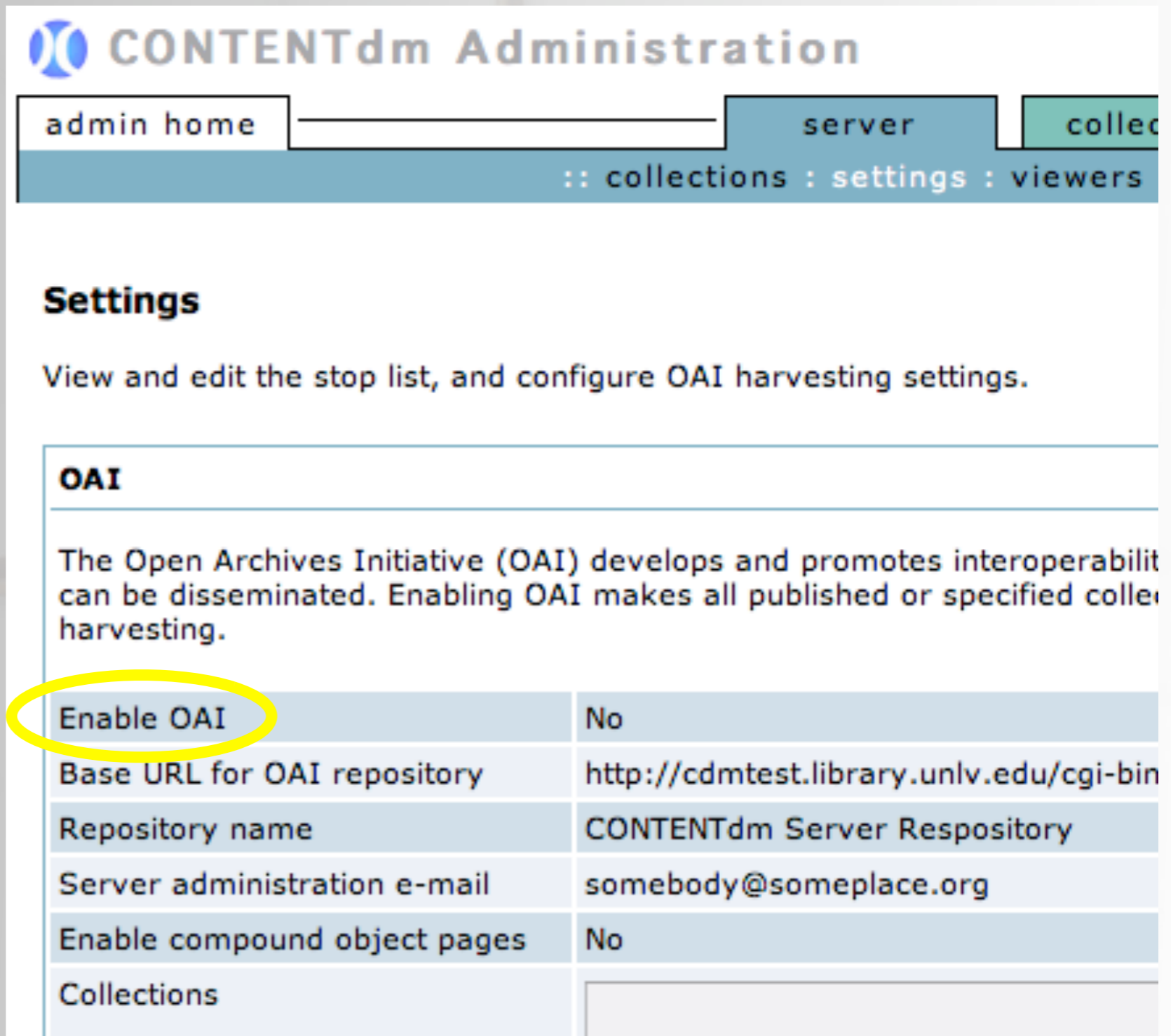
## SVG

- ▶ XML (editable with free tools, but “tag bloat”)
- ▶ Open (W3C)
- ▶ Browsers not well-optimized yet
- ▶ Less powerful backing, narrower compatibility
- ▶ Can be generated by any standard server-side language

- ▶ **Firefox (Gecko):**
    - ▶ 1.5: First version to include partial support
    - ▶ 2.0: Slightly improved
    - ▶ 3.0: Major improvement
  - ▶ **Safari (KHTML):**
    - ▶ 3.0: First version to include partial support (on par with Firefox 3)
  - ▶ **Opera:**
    - ▶ Partial support since version 8
  - ▶ **Internet Explorer**
    - ▶ Requires Adobe SVG Viewer plugin
- ISIS tested & supported browsers
- ✓ Firefox 1.5+
  - ✓ Safari 3.0+
  - ✓ IE 6+ with SVG Viewer 3.0+

# How ISIS taps CONTENTdm's metadata

- ▶ CONTENTdm's database: XML, not relational
- ▶ Can be queried through the PHP API, but query semantics are limited (no spatial support)
- ▶ Can be accessed via OAI-PMH if enabled



**CONTENTdm Administration**

admin home server collected

:: collections : settings : viewers

### Settings

View and edit the stop list, and configure OAI harvesting settings.

#### OAI

The Open Archives Initiative (OAI) develops and promotes interoperability standards that can be disseminated. Enabling OAI makes all published or specified collections available for harvesting.

Enable OAI	No
Base URL for OAI repository	http://cdmtest.library.unlv.edu/cgi-bin
Repository name	CONTENTdm Server Respository
Server administration e-mail	somebody@someplace.org
Enable compound object pages	No
Collections	

## 1) PHP API

- ▶ Retrieve results with `dmQuery()` (part of the PHP API) and write PHP pseudo-“search” code to narrow down the result set
- ▶ Pros:
  - ▶ No DBMS needed
- ▶ Cons:
  - ▶ Would require spatial metadata to be stored in item records
  - ▶ Would only work for local CONTENTdm sites

# Possible query approaches

~~1) PHP API~~

2) SQL (ISIS)

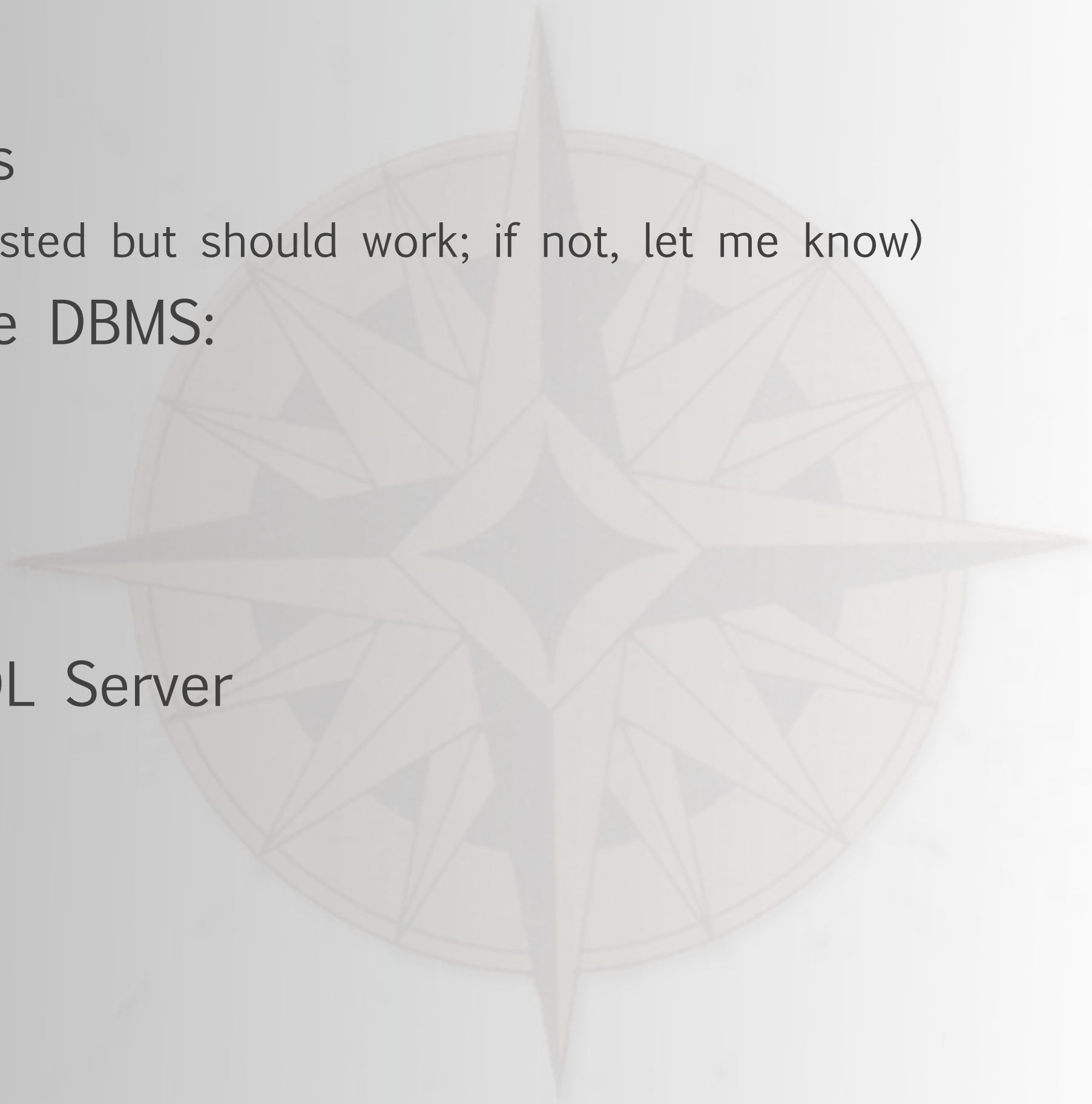
- ▶ Store spatial metadata in a DBMS and query with SQL
- ▶ Pros:
  - ▶ Works with any combination of local or remote CONTENTdm sites
  - ▶ Not necessary to modify item records in any way
- ▶ Cons:
  - ▶ Requires a DBMS

# Administrative interface

- ▶ Allows:
  - ▶ Addition
  - ▶ Modification
  - ▶ Deletion
  - ▶ Export (plain text & SQL)
- ▶ Of:
  - ▶ Maps
  - ▶ Collections



# Server software requirements

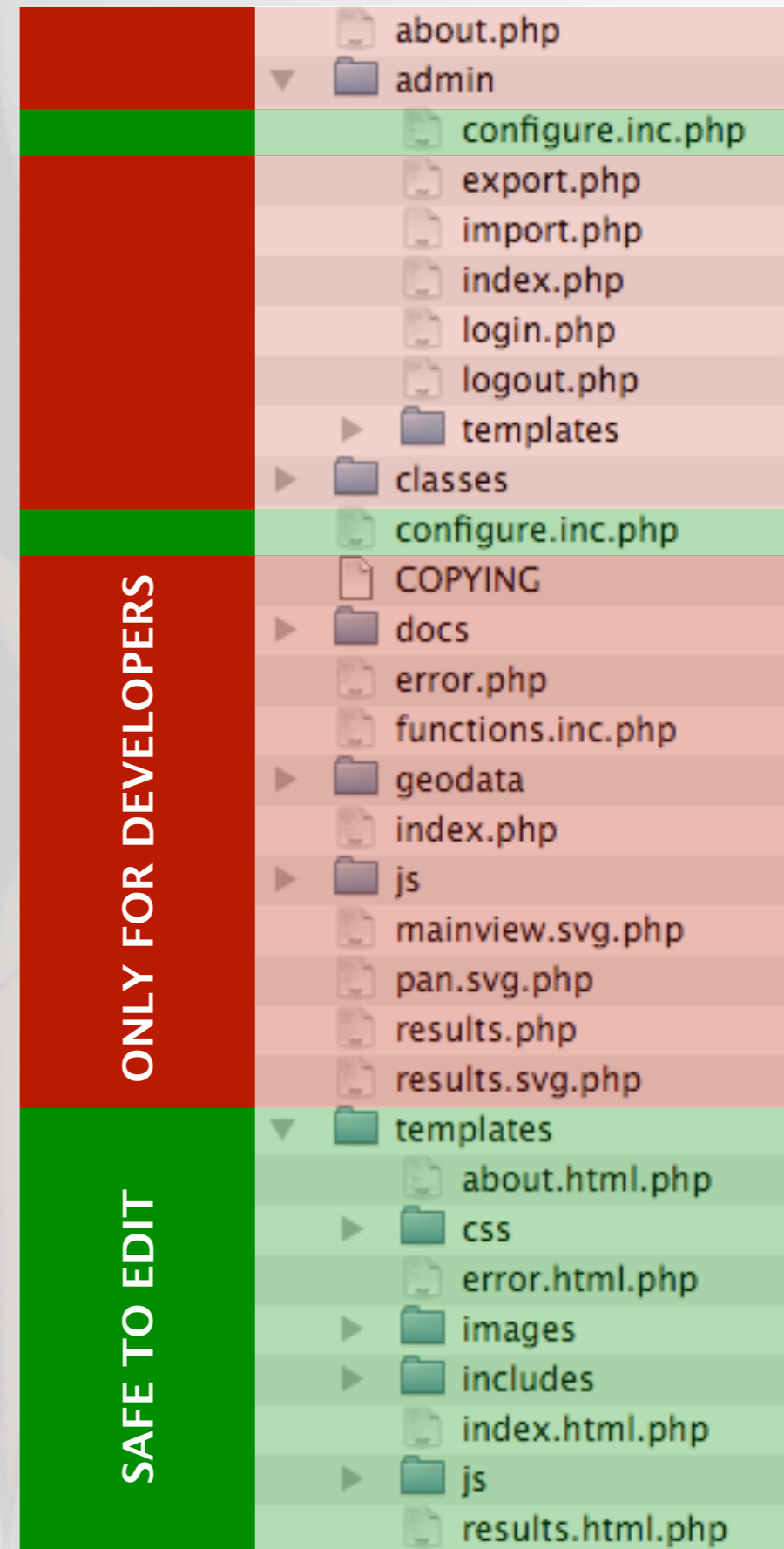
- ▶ PHP 5.1
  - ▶ Unix or Windows
    - ▶ (Windows not tested but should work; if not, let me know)
  - ▶ MDB2-compatible DBMS:
    - ▶ MySQL
    - ▶ PostgreSQL
    - ▶ Oracle
    - ▶ Microsoft SQL Server
    - ▶ SQLite
    - ▶ Firebird
    - ▶ Interbase
- 

## “Know-how” requirements

- ▶ Create the database and tables in your DBMS
- ▶ Customize the HTML templates for your site
- ▶ Acquire and add geodata to the map
  - ▶ Convert into SVG from other vector formats, or
  - ▶ Vector-trace another map in equirectangular projection, or
  - ▶ Use raster map image (e.g. JPEG) in equirectangular projection
  - ▶ GIS expert who owes you a favor helpful
- ▶ Installation guide included in the software distribution
  - ▶ Open-source means it's not my fault that it's brief and vague :)

# Appearance customization

- ▶ Standalone (does not integrate with CONTENTdm)
- ▶ Main template files:
  - ▶ index.html.php (main map view)
  - ▶ results.html.php (results view)
  - ▶ error.html.php (page that comes up if there is a fatal error)
  - ▶ unlv.css (UNLV Libraries CSS - replace)
  - ▶ main.css (CSS for all pages)
  - ▶ svg.css (CSS for the SVG maps)



- ▶ Map metadata does not often include the spatial extent info that ISIS needs
  - ▶ Necessitates additional data entry & research
- ▶ IE still doesn't have native SVG support
  - ▶ Some have the plugin installed without knowing it
- ▶ Poor browser SVG performance (improving)
- ▶ 1 projection only (equirectangular, a.k.a. plate carré, a.k.a. what Google Maps used to use)
  - ▶ “Vertical squishing” effect increases as scale and distance from poles decrease
- ▶ Non-rectangular, non-orthographic, off-axis, and polar maps cannot be stored accurately (only approximations are possible)

# Benefits

- ▶ Another option for the “visually oriented”
- ▶ Can reveal new/interesting relationships among your (and others’...) digital maps
- ▶ Can potentially succeed where textual search and/or browse fails
- ▶ Capable of searching across collections and across institutions, limited only by your map spatial extent indexing
- ▶ Can be installed by anyone, not just CONTENTdm users (can be set up to search external sites only)
- ▶ Built on W3C standards and open source

# Why not Google Maps?

## Google Maps

- ▶ Easy to set up
- ▶ Focus: Finding “stuff,” driving directions
- ▶ Compatible, high performance display
- ▶ Superior collaborative/data sharing features
- ▶ Well-documented API
- ▶ Extremely auto-centric cartography

## ISIS

- ▶ Harder to set up
- ▶ Focus: Finding maps
- ▶ Less compatible display
- ▶ Documentation limited by my laziness
- ▶ Great flexibility in cartography (whatever you want to make it)



# Availability

- ▶ Currently deployed on our digital collections home page:
  - ▶ <http://digital.library.unlv.edu/isis/>
- ▶ Download and browse source code at Google Code:
  - ▶ <http://code.google.com/p/isis-unlv/>
  - ▶ .zip distribution & Subversion repository
- ▶ GPL - contributions welcome
- ▶ Contact: [alex.dolski@unlv.edu](mailto:alex.dolski@unlv.edu)

Thank you!