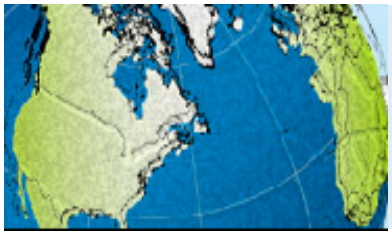


MIT GIS Services

http://libraries.mit.edu/gis/

Massachusetts Institute of Technology (MIT) GeoWeb Expands Access to GIS data through Open Source Tools

By Lisa Sweeney

Head, GIS Services, MIT Libraries

GeoWeb: *http://web.mit.edu/geoweb*

search, view, and download data, and view metadata from the MIT Geodata Repository through a web browser

IST Information Services and Technology

MIT Libraries

OEIT Office of Educational Innovation and Technology

Overview

- Setting the stage: MIT GIS Services
- Introduce MIT Geodata Repository
- MIT GeoWeb
  - Search
  - View & download data
  - Technical
  - Evolution
  - Impact
  - Future

MIT GIS Services

- Individual & classroom GIS support
- General workshops
- Loan GPS units
- Access to GIS data: Geodata Repository
  - MIT GeoWeb & ESRI ArcMap Interface

History

1999	• IS&T creates full time Spatial Data Specialist position • MIT gets ESRI site license
2001	• MIT Libraries create a full time GIS position • MIT GIS Lab opens in Rotch Library
2002	• MIT Libraries establish GIS collections budget • MIT Geodata Repository and search tool created to run on top of ESRI software
2004	• Civil and Environmental Engineering Librarian becomes involved with GIS services

History

2005	MIT GIS Lab remodeled to accommodate more computers, group workspace, demonstrations and small classes – expanded from 2 to 6 workstations
2007	• GIS responsibilities become part of Rotch Reference Coordinator position • Increased funding support for student/ casual workers
2008	MIT GeoWeb releases –Version 1: February –Version 2: April –Version 3: September

MIT Geodata Repository

- A diverse, international collection of GIS data covering maintained by GIS Services
- 24 / 7 online access
- Eliminates barriers to usage arising from challenges with finding data, and working with different formats and projections
- Data purchasing, licensing and loading handled by libraries
- Server supported by IS&T
- Oracle/ ESRI ArcSDE system
- 2 access points:
  - GeoWeb: search, view, and download data with a web browser
  - Tool (DLL) built for ESRI software: search and add data directly to ArcMap

MIT Geodata Repository
Why we built it in 2002

Collection of GIS data on CD/DVD in the GIS Lab, Rotch Library	**MIT Geodata Repository: collection of GIS data in an Oracle database**
Users must come to the library during regular operating hours	24/7 access from anywhere with a network connection
Collection level record for the CD/DVD	Metadata for each GIS data layer
Regularly swapping disks in drive or copying and moving large datasets around	Can work directly from the server and change machines without having to move data

MIT Geodata Repository
Why we built it in 2002

Collection of GIS data on CD/DVD in the GIS Lab, Rotch Library	**MIT Geodata Repository: collection of GIS data in an Oracle database**
Data comes in a variety of format types on CD/DVD	All data stored in oracle spatial format (formats invisible to the users)
Geographic projection of files not always defined – troubleshooting this is confusing	all files have their geographic projection defined
Each CD/DVD has a different arrangement & interface for data	2 access points & interfaces to access many data layers

A diverse, international collection of GIS data maintained by MIT GIS services.

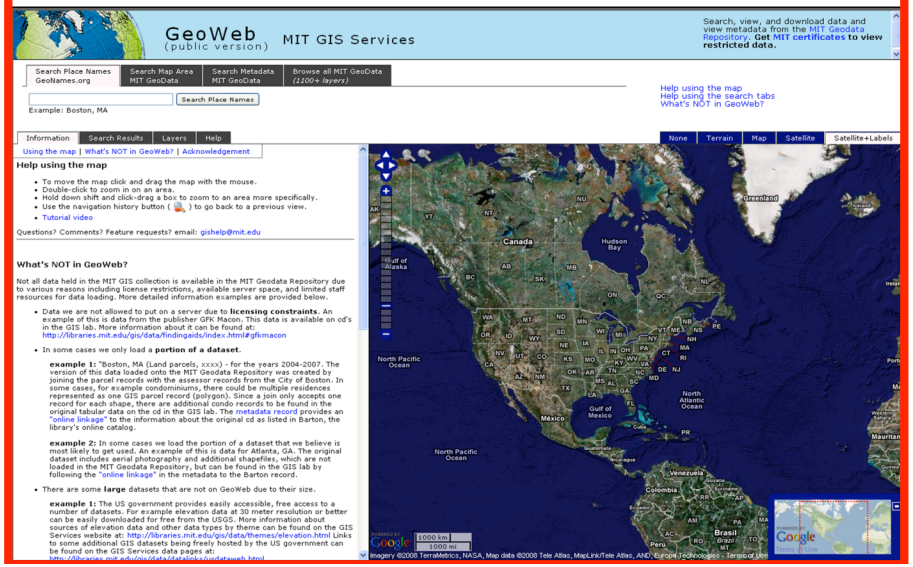
MIT Geodata Repository

Data is stored in an Oracle database.

2 access points:

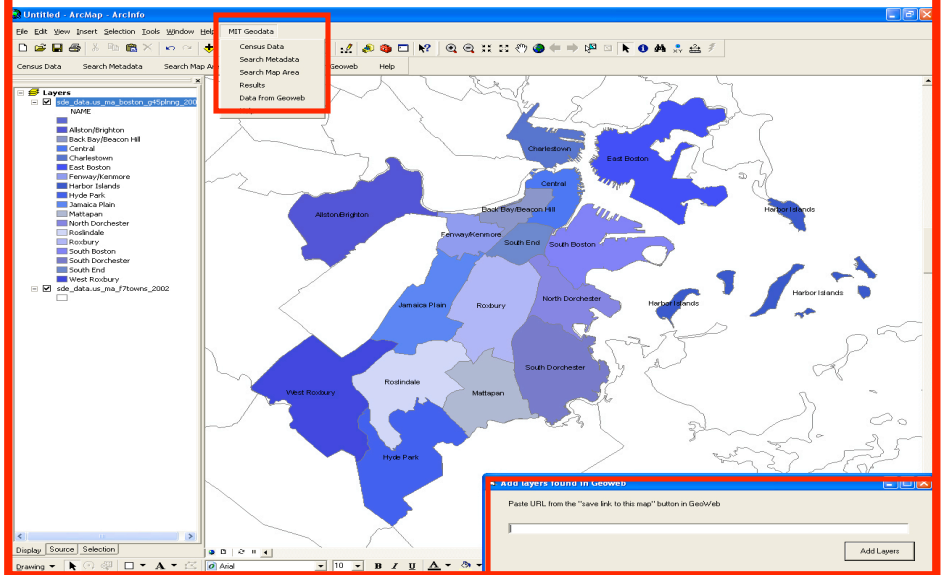
Released 2008

MIT GeoWeb:
Access through any web browser



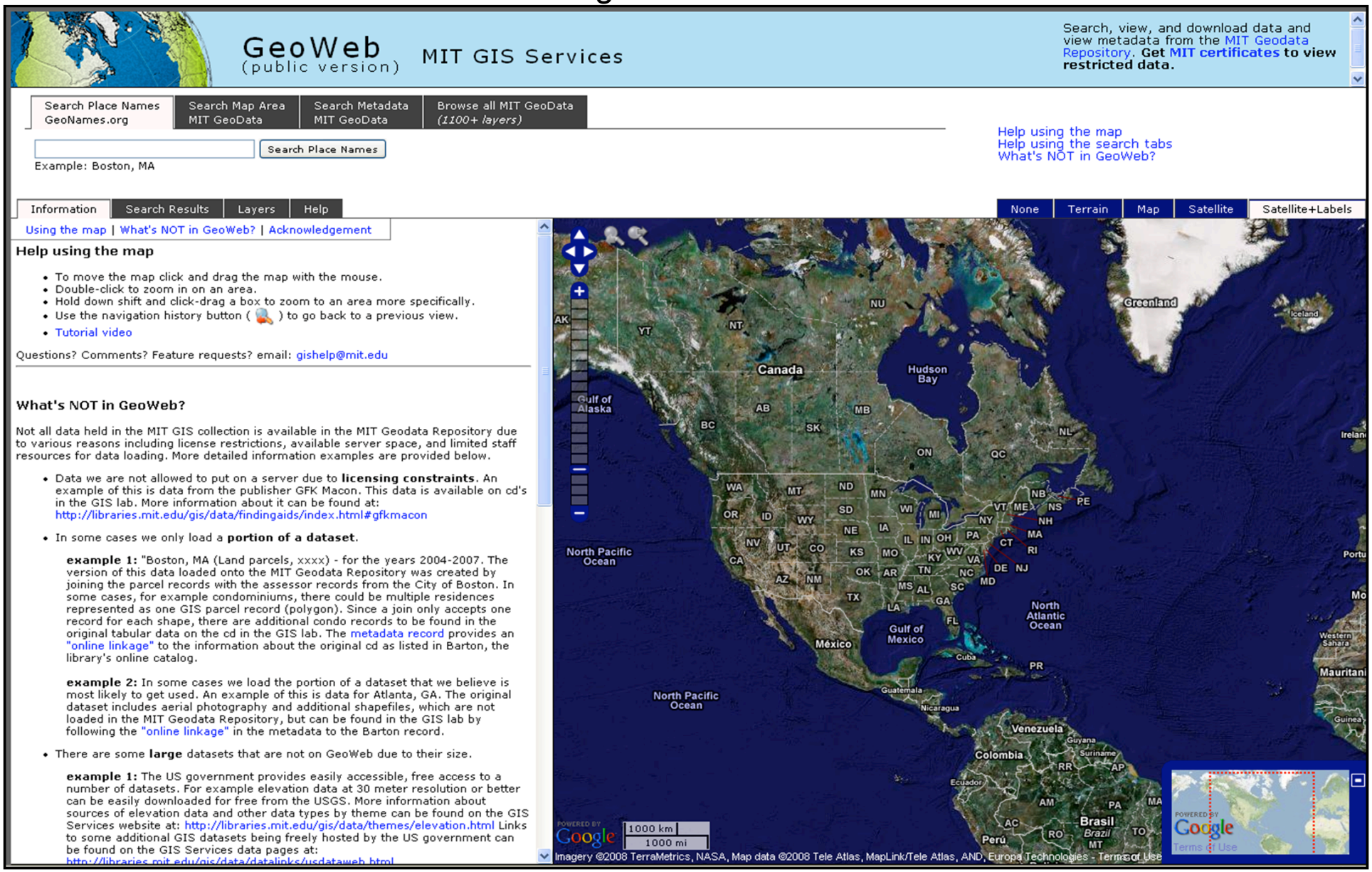
Released 2002

ESRI ArcMap with MIT built tool:
Must have ESRI software installed

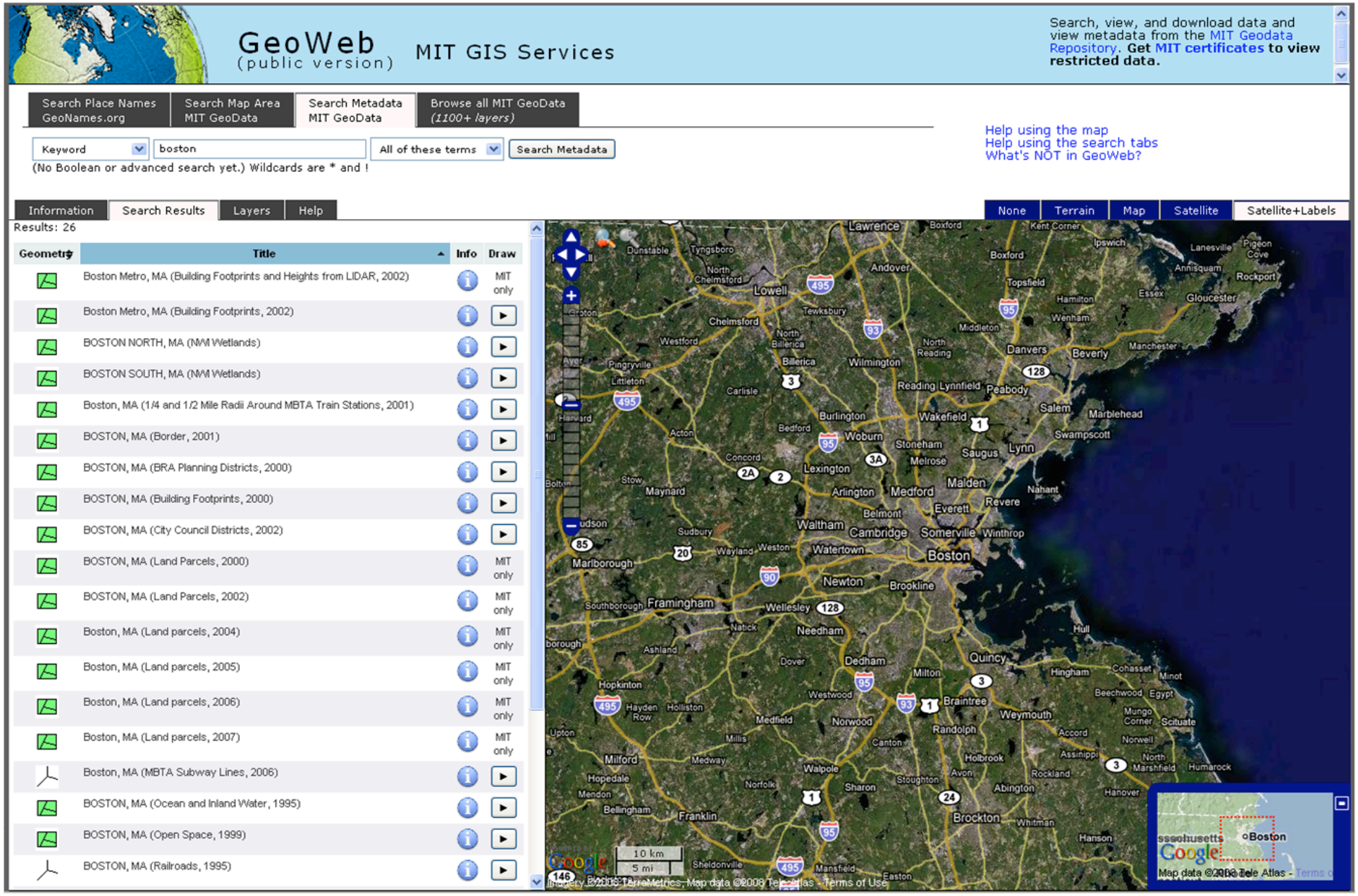


GeoWeb

search, view, and download data and view metadata from the MIT Geodata Repository through a web browser



Search


GeoWeb
(public version)
MIT GIS Services
Search, view, and download data and view metadata from the MIT Geodata Repository. Get MIT certificates to view restricted data.
Search Place Names GeoNames.org
Search Map Area MIT GeoData
Search Metadata MIT GeoData
Browse all MIT GeoData (1100+ layers)
Keyword
boston
All of these terms
Search Metadata
(No Boolean or advanced search yet.) Wildcards are * and !
Help using the map
Help using the search tabs
What's NOT in GeoWeb?
Information
Search Results
Layers
Help
None
Terrain
Map
Satellite
Satellite+Labels
Results: 26
Geometry
Title
Info
Draw
Boston Metro, MA (Building Footprints and Heights from LIDAR, 2002) MIT only
Boston Metro, MA (Building Footprints, 2002)
BOSTON NORTH, MA (NWI Wetlands)
BOSTON SOUTH, MA (NWI Wetlands)
Boston, MA (1/4 and 1/2 Mile Radii Around MBTA Train Stations, 2001)
BOSTON, MA (Border, 2001)
BOSTON, MA (BRA Planning Districts, 2000)
BOSTON, MA (Building Footprints, 2000)
BOSTON, MA (City Council Districts, 2002)
BOSTON, MA (Land Parcels, 2000) MIT only
BOSTON, MA (Land Parcels, 2002) MIT only
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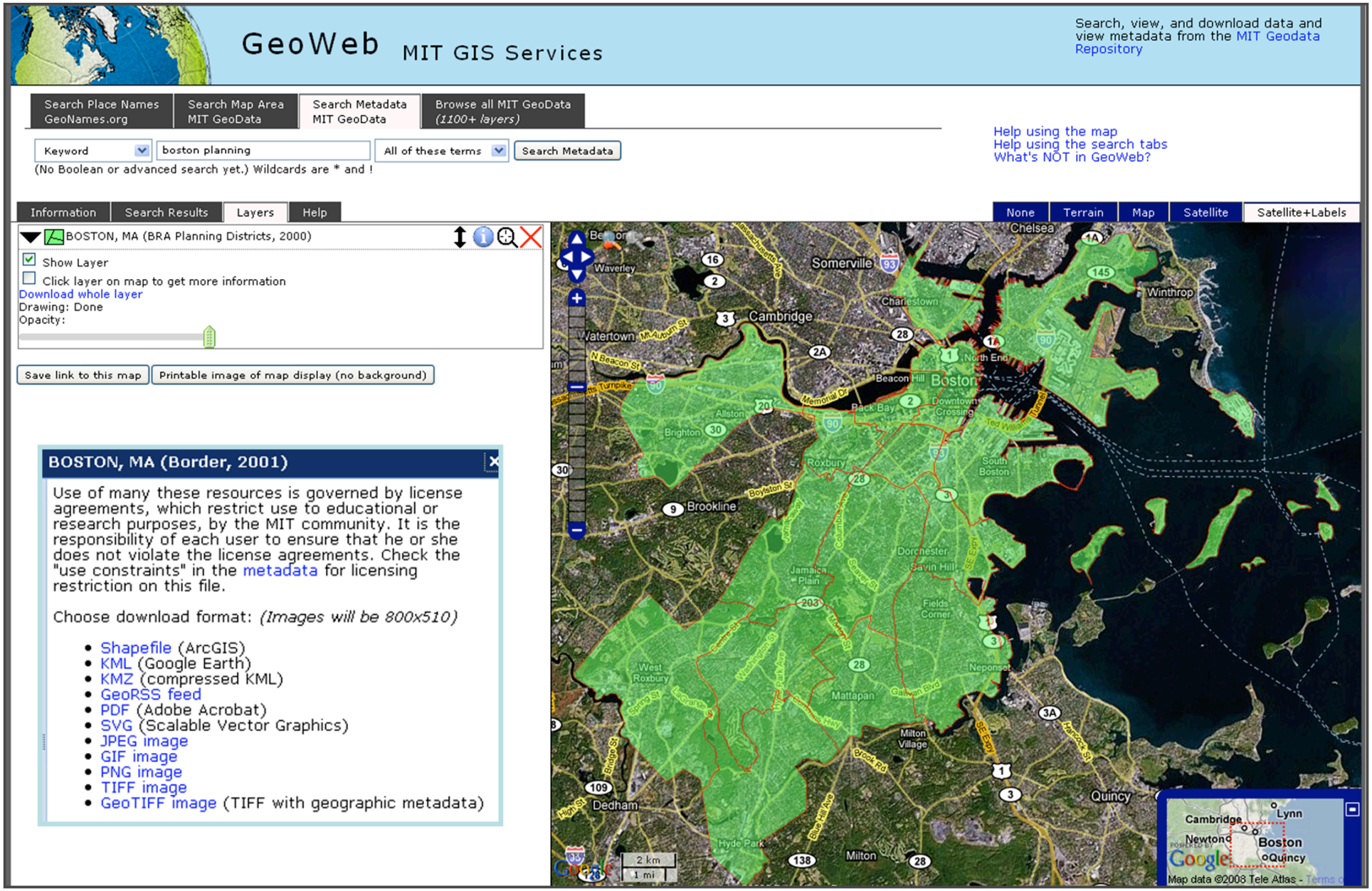
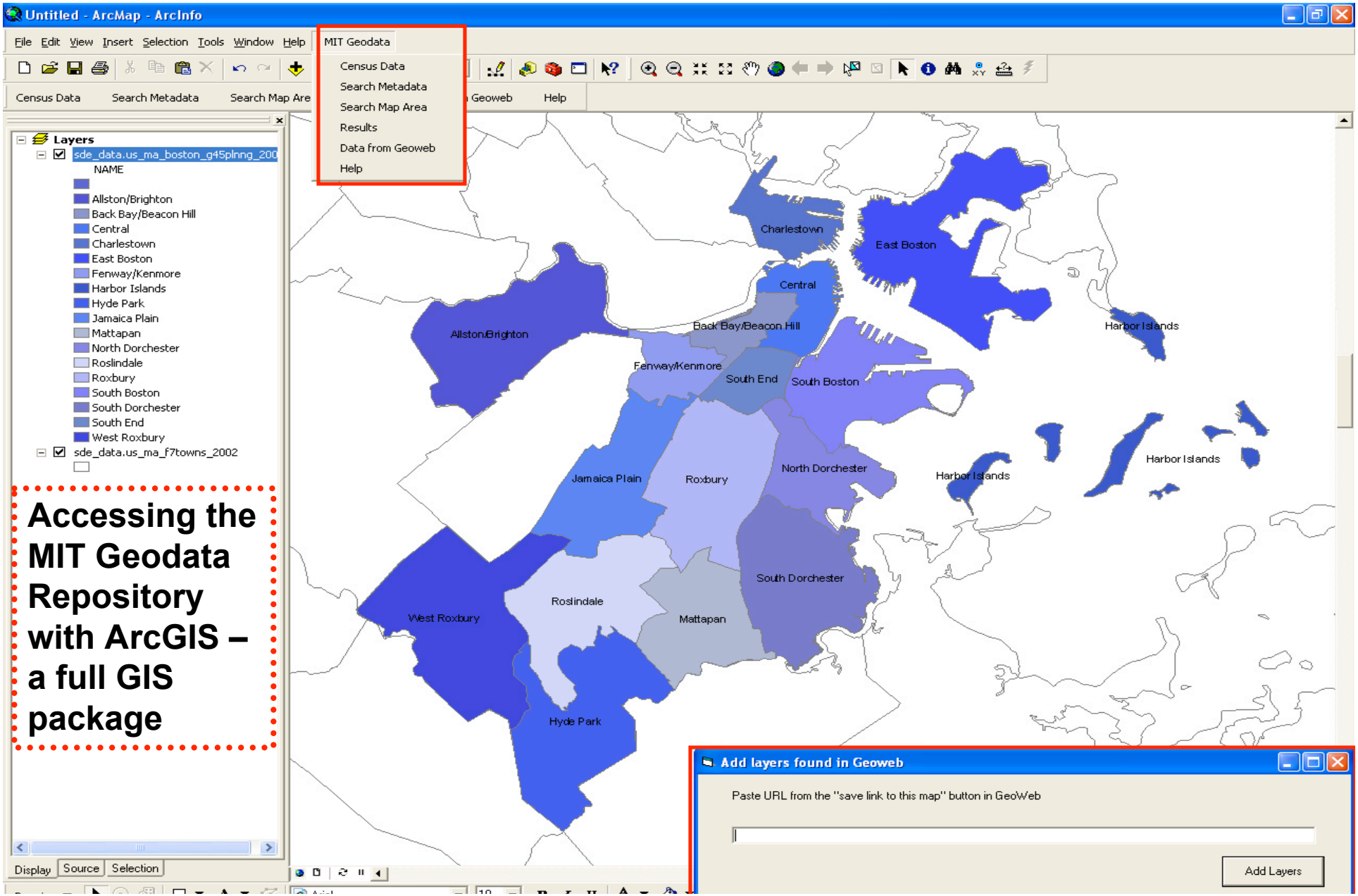
Boston, MA (Land parcels, 2007) MIT only
Boston, MA (MBTA Subway Lines, 2006)
BOSTON, MA (Ocean and Inland Water, 1995)
BOSTON, MA (Open Space, 1999)
BOSTON, MA (Railroads, 1995)
Lawrence
Andover
Lowell
Chelmsford
Westford
Billerica
Wilmington
Burlington
Woburn
Lexington
Arlington
Medford
Malden
Everett
Waltham
Cambridge
Somerville
Boston
Newton
Brookline
Framingham
Wellesley
Needham
Dedham
Quincy
Braintree
Weymouth
Milton
Randolph
Norwood
Medfield
Walpole
Brockton
Franklin
Wakefield
Reading
Lynnfield
Peabody
Salem
Lynn
Revere
Malden
Melrose
Stoneham
Saugus
Swampscott
Marblehead
Danvers
Beverly
Gloucester
Rockport
Hamilton
Wenham
Middleton
Topsfield
Ipswich
Boxford
Tewksbury
Littleton
Carlisle
Bedford
Concord
Acton
Maynard
Stow
Sudbury
Wayland
Weston
Watertown
Belmont
Marlborough
Southborough
Natick
Ashland
Hopkinton
Holliston
Hayden Row
Millis
Medway
Milford
Hopedale
Mendon
Bellingham
Norfolk
Sharon
Stoughton
Avon
Abington
Rockland
Holbrook
Whitman
Hanson
Hingham
Cohasset
Minot
Beechwood
Egypt
Mungo Corner
Scituate
Norwell
Marshfield
Humarock
Hanover
Assinippi
Accord
Canton
Upton
Hull
Dover
Sheldonville
Mansfield
Easton
Pingryville
Harvard
Nahant
Winthrop
10 km
5 mi
Google
Map data ©2008 Tele Atlas - Terms of Use

View & Download Data



Analysis


Untitled - ArcMap - ArcInfo
File Edit View Insert Selection Tools Window Help
MIT Geodata
Census Data
Search Metadata
Search Map Area
Results
Data from Geoweb
Help
Census Data
Search Metadata
Search Map Are
Geoweb
Help
Layers
sde_data.us_ma_boston_g45plnng_200
NAME
Allston/Brighton
Back Bay/Beacon Hill
Central
Charlestown
East Boston
Fenway/Kenmore
Harbor Islands
Hyde Park
Jamaica Plain
Mattapan
North Dorchester
Roslindale
Roxbury
South Boston
South Dorchester
South End
West Roxbury
sde_data.us_ma_f7towns_2002
Accessing the MIT Geodata Repository with ArcGIS – a full GIS package
Display
Source
Selection
Add layers found in Geoweb
Paste URL from the "save link to this map" button in GeoWeb
Add Layers

FGDC Metadata

http://web.mit.edu/sde/www/metadata/us_ma_cambridge_g46bldgs_1995.html - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites

Address http://web.mit.edu/sde/www/metadata/us_ma_cambridge_g46bldgs_1995.html

Google Search 78 blocked Check AutoLink AutoFill Options

Cambridge, MA (Building Footprint, 1995)

Metadata:

- Identification_Information
- Data_Quality_Information
- Spatial_Data_Organization_Information
- Spatial_Reference_Information
- Entity_and_Attribute_Information
- Distribution_Information
- Metadata_Reference_Information

Identification_Information:
Citation:
Citation_Information:
Originator: City of Cambridge GIS
Publication_Date: 19950329
Title:
Cambridge, MA (Building Footprint, 1995)
Geospatial_Data_Presentation_Form: vector digital data
Publication_Information:
Publication_Place: Cambridge
Publisher: City of Cambridge GIS
Online_Linkage: http://gis.ci.cambridge.ma.us/
Description:

Technical

	MIT system	Alternative option
Database (MIT Geodata Repository)	Oracle	postgresql
Spatial Data Engine (MIT Geodata Repository)	ESRI ArcSDE	PostGIS: PostGIS adds support for geographic objects to the PostgreSQL object-relational database. In effect, PostGIS "spatially enables" the PostgreSQL server, allowing it to be used as a backend spatial database for geographic information systems (GIS), much like ESRI's SDE or Oracle's Spatial extension.

Technical

	MIT system	Alternative option
Web Mapping Service (MIT GeoWeb)	**GeoServer** (geoserver.org): manages a web map service (WMS) with all data layers from the Oracle/SDE system, and makes images from the ArcSDE data. GeoServer is built on **Geotools**, an open source Java GIS toolkit. **TileCache** (tilecache.org): keeps the images for reuse and faster drawing, since the dimensions and locations of each map tile will always be the same. GeoServer is implementing TileCache into its next release. **OpenLayers** (openlayers.org) : a javascript library, integrated into GeoServer, used to control the map interface. OpenLayers makes it easy to put a dynamic map in any web page. It can display map tiles and markers loaded from any source. OpenLayers implements industry-standard methods for geographic data access, such as the OpenGIS Consortium's Web Mapping Service (WMS).	ESRI ArcIMS ESRI ArcGIS Server **MapServer**
Basemap (MIT GeoWeb)	**Google Maps API**: supplies the basemap (terrain, map, satellite, satellite & labels)	Yahoo Maps API

Technical

- searching is performed by **PHP** scripts called from the interface using **jQuery's** AJAX/JSON functions.

- Development tools included Firebug & text editors

Evolution of MIT GeoWeb

GIS Staff learned about GeoServer and OpenLayers at FOSS4G (Free and Open Source Software 4 Geospatial) conference in September 2007

Version 1: (November – February) move from concept to release

- –database connection setup and testing
- –Interface design
- –Usability testing

Functional requirements: search, view, and download data

Goal: launch version 1 for the beginning of Spring 2008 semester

Resources:

- –Alex Manley, casual employee with computer science and library degree, working ~20 hour/ week
- –IS&T server operations team
- –Libraries Web manager and Usability Specialist (Nicole Hennig)

Evolution of MIT GeoWeb

Version 2 – released April 2008
Implement suggestions from users :

Enable:

- Saving search results (through url) and making it easy to bring search results into ArcMap (with MIT tool)
- Reordering of layers in the layers list and on the map
- Obtaining record level attribute table information
- Transparency settings
- Printing of map (without Google background)

Evolution of MIT GeoWeb

Version 2 – released April 2008
Implement suggestions from users :

- Provide users with more control over number of search results listing per page
- Increase the number of export formats

Improve:

- alignment between data layers drawn by Geoserver and Google Maps background
- alignment and scrolling features on page
- messages indicating when searches and drawing of layers are in progress and complete

Evolution of MIT GeoWeb

Version 3 – released September 2008

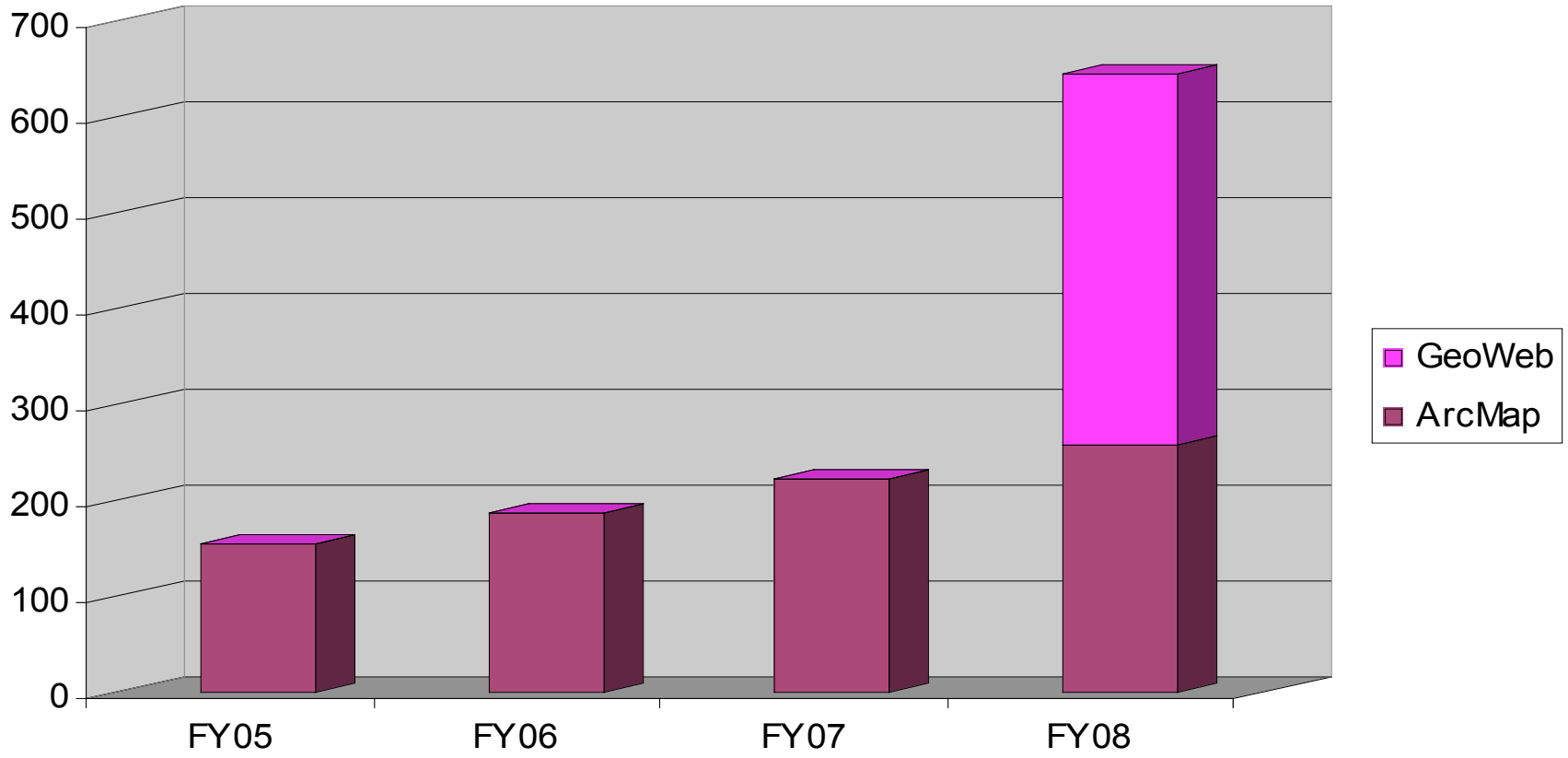
- MIT GeoWeb searchable by anyone

- Data which is restricted by license agreements require an MIT certificate to be able to view or download the data.

- People without an MIT certificate can view all metadata, which provides dataset descriptions, including source information.

MIT Geodata Repository
Number of Unique Users per fiscal year

(note: GeoWeb was released late Feb. 2008. FY08 stats do not include June, whereas June is included in the stats for all other fiscal years)



Future

Next steps:

- Use geographic coordinates already stored in the MARC record for paper maps to make paper and digital geographic information searchable through MIT GeoWeb – provides geographic interface for searching geographic info.
- Rasters
- Enable download of a selected portion of a dataset (important for large files)
- Coordinate MIT GeoWeb with MIT DOME – add coordinates to metadata for photography and make geographically searchable

Collaboration opportunities:

- Using open source tools, interoperability standards and sharing discoveries
- Data will continue to be created in a multitude of places / New data will continue to come online all the time / No one institution can house all information / Connection and cross searching of systems without recreating them – Universities, USGS, MASSGIS, etc