

The conceptualization and system design of AfricaMap - a spatial framework for Africa studies

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The Problem

- The idea for AfricaMap was developed to address a perennial problem at Harvard:
 - the difficulty for faculty, students, and researchers of finding spatial data for Africa.
- The problem is not that there is little data for Africa, but that existing data is hard to find.
- Data for Africa is scattered across organizations, not widely shared or replicated on the web, or not yet in digital form.
- Often researchers develop detailed Africa datasets in the course of their work but have no place to store the data where it can be used by others.
- Researchers often don't mind sharing their data, but without a home, it will be lost to the rest of the world.

A Solution

- The Harvard Map Collection contains a large collection maps—valuable spatial information for Africa at many scales in paper form.
- Researchers will benefit if this collection is made discoverable on the web.
- AfricaMap was conceived of at first as a platform that would combine networking, collaboration, data organization, and data discovery tools for researchers at Harvard.
- It soon became clear that by making the system broadly available, especially to those in Africa, it could serve a greater purpose.

Fundamental Objectives

- Map Africa with a high level of resolution online
- Allow users to see the whole of Africa yet also zoom in to particular places
- Accumulate both contemporary and historical data supplied by researchers and make them permanently accessible online
- Work collaboratively with other spatial information sources for Africa in an online environment

System Characteristics (1/6)

- Web-based - The system will take advantage of the latest techniques for making large amounts of data and mapping discoverable and usable through a standard web browser.
- Services oriented architecture (SOA) - The system will support access by other web and desktop systems and will be able to access and display the maps on Africa Map directly via web services. This means that other systems will not have to download the data to access it within their applications.
- Open Source code - All code used to build AfricaMap will be Open Source. This means that any organization that wants to create a standalone system (or one that shares data with AfricaMap) can download the code for free and set up their own high performance geospatial server. This has special relevance for organizations in Africa.

System Characteristics (2/6)

- Long term data access - Once maps are scanned, digitized, georeferenced it should not be necessary for anyone in the world to repeat that work. Techniques will be used to ensure long term access to public domain digital materials wherever possible, taking into consideration the changing technologies.
- Encourages replication - One reason data is hard to find for Africa is that the data which exists is not replicated. By contrast the base map for the United States (the Digital Raster Graphics files) exists on hundreds of servers.
- Public access to holdings - Core holdings will be put in the public domain or licensed using a Creative Commons type license wherever possible. This means that researchers anywhere in the world will be able to download and use these original digital materials without major restriction.

System Characteristics (3/6)

- Text-based search of contents - Google-type text search against the contents of the entire system will be possible with results displayed on the map.
- Place Name Gazetteer - AfricaMap will use gazetteer data from the geonames.org project. This database includes about 1 million place names for Africa. Users will be able to search for and zoom to any place in the gazetteer.
- Historic base mapping - AfricaMap will assemble base mapping at all scales and time periods which have been developed for Africa or parts of Africa. To start, AfricaMap will digitize paper maps from the Harvard Map Collection and create a framework for distributing this material which can be built upon over time.
- Current Satellite Mapping from Google and Others - In addition to historic mapping at various scales, Google and other commercial layers will be available.

System Characteristics (4/6)

- Multiple scales - The system will support research at a variety of scales from sites or cities to country or continent-wide projects.
- Transparency Control – Users will be able to overlay historic mapping on top of current imagery or mapping and control transparency of overlaid layers.
- Ability to View Data in 3 Dimensions – Data which is seen in the web map client can be exported to Google Earth for immediate viewing in 3D.
- Multiple media types – In Release I, the system will support access to many types of media in addition to spatial data, including photos, maps, text, video, audio, and KML for Google Earth display.

System Characteristics (5/6)

- Collaborative approach - Tools to support collaboration between researchers will be provided. For example researchers will be able to add information about current projects to the map, add point features to the map as comments on another layer, to reference an external resource, or to add to the gazetteer.
- Interdisciplinary approach - The system will bring together mapped data (and facilitate the mapping of data) from a wide range of disciplines including archaeology, public health, history, linguistics, literature, zoology, and the natural sciences to name a few.
- Global approach - The goal is to create a technical framework to support research on Africa which could also be applied to other parts of the world.

System Characteristics (6/6)

- Usability - Ease of use is of primary importance. It must be easy and quick for non-technical people to find the information they need. Researchers are the end users of this system and will be consulted frequently to guide the design of the user interface.
- Improves over time - While the Harvard Map Collection has large Africa holdings, it does not always have all maps for a given series, and there may be important series which it does not have. The goal is to fill in holes in the collection over time by sharing with other libraries and collections.

Initial Data Layers

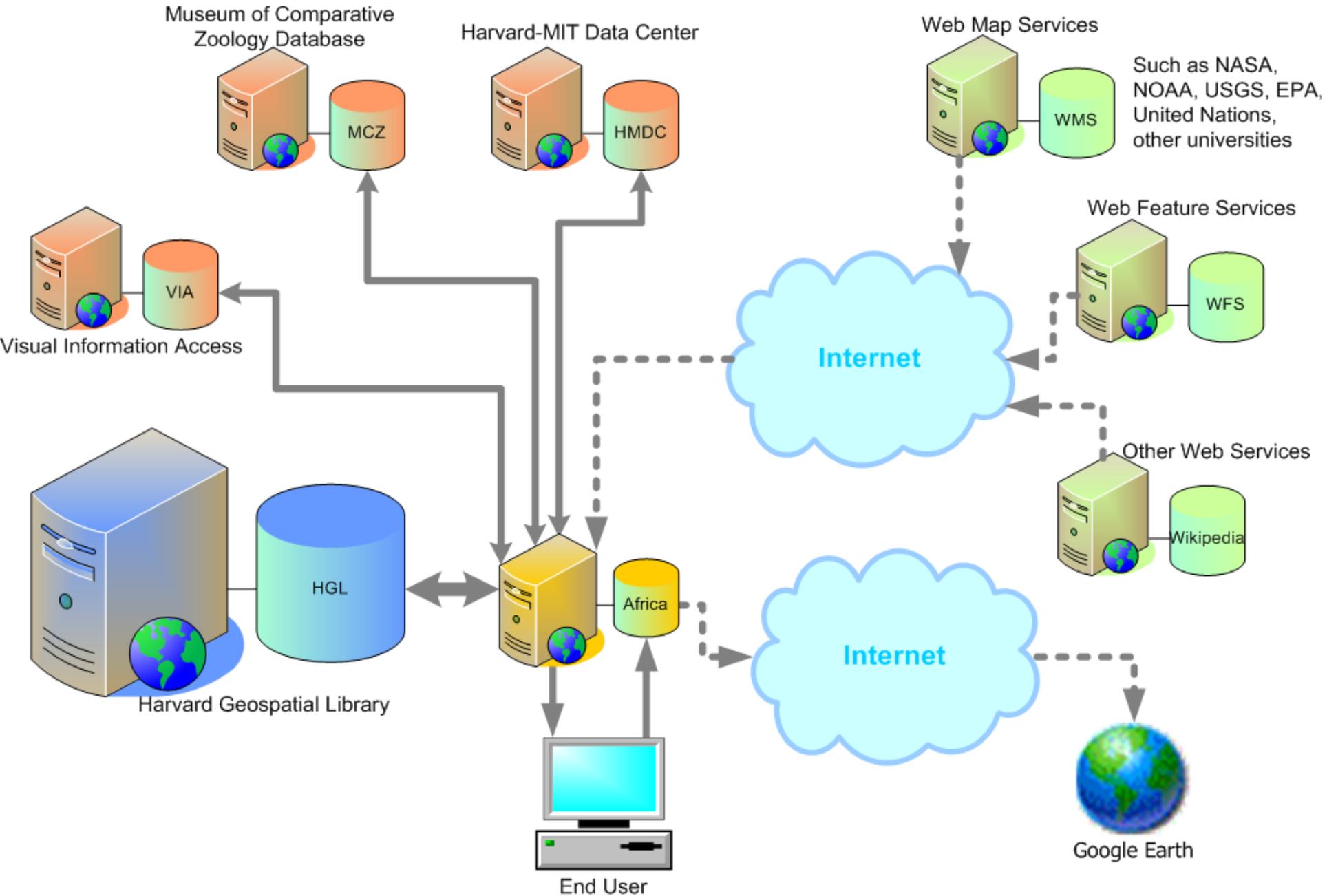
- For the initial release of AfricaMap, mapping will be developed for various years at the following scales for all or most of the continent:
 - 1:2,000,000
 - 1:500,000 and
 - 1:250,000
- Mapping at 1:50,000 for selected countries will be developed and
- Mapping at 1:5000 scale for selected cities will be developed.

Other Data Under Consideration

- High resolution maps of the continent from several twentieth century sources and historical African maps (15th-19th century)
- Scholarly maps showing Africa through time (Africa 1000 BCE, Africa 500 BCE, Africa in the year 0, Africa 500 CE, Africa 1000 CE, Africa 1200 CE, Africa 1400 CE, Africa 1600 CE etc.)
- Maps that address the continent topically (language divisions, ethnic identities, cultural variables/divisions, climate (including historical), minerals, trade routes, hydrology, topography, ports, etc.
- Socio-cultural-political-economic data, including: Human Area Relation Files data (comparative socio-cultural practices), historic slave ports, trade routes, migration routes, dynastic changes, population density variables, changing climate data, botanical and zoological data
- Links to georeferenced images of African material culture (the Peabody Museum at Harvard for example)
- Links to bibliographic references specific to various communities and areas (Harvard's Tozzer Library Anthropological collections)

Summary of the System

- An on-line, dynamic African Atlas which will include:
 - electronic basemap and gazetteer to support African research;
 - public and Harvard accessible, continent-wide, and regional datasets;
 - ability for users to zoom, pan, overlay, search by place name or key words;
- A gateway to on-line data libraries, primarily HGL, as well as VIA, HMDC, and systems outside Harvard:
 - to allow users to search, display, download, submit data, georeference links;
 - that will use the library user interfaces wherever possible;
- A long term repository and sharing tool for Harvard research activity that will include:
 - a base map which will improve over time as better mapping becomes available;
 - a gazetteer will improve over time as new place names are added;
 - project specific data visualization;
 - a view of Africa projects across disciplines;
 - tools for commenting on mapped data.



Mapping Africa: a spatial portal for African Research – System Diagram

Layer List Div provides layer control for all non-base map layers.

Places view will go against Geonames service to be developed by Harvard.

About will bring up div which will provide overview of project and will include url to <http://www.africamap.harvard.edu>
About will also provide access to Help documentation.

AfricaMap (beta) banner

Location Lookup Tool
(coming soon)

[Maps](#)

[Places](#)

[Link to this page](#)

[About](#)

This panel is optional place to present lists such as the list of project names returned by a click on the project map and the list of place names returned by geonames

Zoom bar

<MAP>

Default view is zoomed to extent of Africa, Google Hybrid with US Govt maps on top, opaque.

Map expands to fill extent of display device

View is in Mercator Spheriod

Base Layers:
* U.S. 1980
* Russian 1970
* French 1900
* OpenLayers
* Google Hybrid

Dynamic scale bar



Collaboration

- AfricaMap's focus is to support collaboration among Africa researchers.
- Vehicles for collaboration includes:
 - University-wide Steering Committee
 - International Advisory Board
 - Institutional Partners
 - Infrastructural Connections
 - Researcher Network
 - Built-In Collaboration Functions

University-wide Steering Committee

- A steering committee composed of faculty from across the university has been formed.
- Representatives are from a broad array of interests, including:
 - African and African American Studies Department,
 - the School of Public Health,
 - the School of Medicine,
 - the Graduate School of Design,
 - the JFK School of Government,
 - the Law School,
 - the Museums, and
 - the Libraries.
- The Steering Committee members are from a wide range of disciplines including:
 - the natural sciences,
 - the social sciences,
 - the humanities, and
 - the applied sciences.

External Collaboration

- International Advisory Board
 - AfricaMap is beginning to identify experts in various fields with an interest in Africa to serve on the International Advisory Board.
 - The Board will provide AfricaMap with expertise in many areas.
 - It will be a forum through which external organizations play a roll in the development of AfricaMap.
- Institutional Partners
 - AfricaMap is very interested in collaborating with organizations worldwide which share our mission of organizing and sharing geospatial information for the study of Africa.
 - Such organizations need not have a seat on the Advisory Board in order to work with us.
 - Partnership may be in sharing data, or sharing network access to the system

Infrastructural Collaboration

- **Infrastructural Collaboration**
 - AfricaMap's open architecture will allow its data to be available to other applications as web services and in turn,
 - AfricaMap will be capable of consuming map services from other organizations.
 - In this way AfricaMap will be a node on the emerging geoweb.
 - Where relevant, AfricaMap plans to consume map services provided by government providers such as the FAO GeoNetwork, EIS-Africa, NASA, as well as commercial providers such as Google, Yahoo, and Metacarta.
- **Researcher Network**
 - AfricaMap supports a global network of Africa researchers by providing a secure place to store, retrieve, visualize and share spatially referenced data.
 - AfricaMap will provide tools for researchers to find one another and collaborate directly.

Built-In Collaboration Functions

- Upload map data and make it searchable and viewable
- Perform a keyword search against all materials
- Perform a drill-down query on the map and return information and attributes about all datasets covering that location
- Mark up maps with comments
- Link multimedia materials to locations
- Control permission levels for materials added
- Save and share views of map data via permalink
- Download data or access data via a service
- Add a past, current, or planned projects to a map so that others can discover them.

Funding and Supports

- Funded by:
 - Harvard Provost Fund
 - The Milton Fund
 - W.E.B Du Bois Institute
 - The Committee on African Studies
 - The Department of African and African American Studies
- Supported by:
 - Center for Geographic Analysis
 - Harvard Map Collection
 - Harvard Geospatial Library
 - Harvard-MIT Data Center
 - The Institute for Quantitative Social Science

Key Players

- Principle Investigators
 - **Suzanne Blier**, Allen Whitehill Clowes Professor of Fine Arts and Professor of African and African American Studies
 - **Peter Bol**, Director of the Center for Geographic Analysis; Charles H. Carswell Professor of East Asian Languages and Civilizations
- Project Manager
 - **Ben Lewis**, Senior Staff, Center for Geographic Analysis

Related Session

4363 Africa: Regionalization, Urbanization
and Segregation in Africa

Friday, 4/18/08, from 12:20 PM - 2:00 PM

1:20 PM Author(s):

- ***Suzanne P Blier**, Professor - Harvard University
- William Haveman - Harvard University

Abstract Title: ***Exploring Historical Urban Space in Africa - a GIS based analysis***

Additional Information

- The AfricaMap project planning website:
AfricaMap.harvard.edu
- Presentation by Ben Lewis at the Workshop on Volunteered Geographic Information (VGI), UC Santa Barbara, December 13-14:
http://www.ncgia.ucsb.edu/projects/vgi/docs/present/Lewis_AfricaMap_2.pdf