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
The Challenge

- AfricaMap developed to address a perennial problem: the difficulty of finding and exploring current and historical spatial data on Africa.

The problem is not that there is little data for Africa, but that existing data is hard to find and hard to explore.
Beginnings of a Solution

- Recognize it’s early for historical GIS and for GIS tools focused on Africa and the developing world in general.

- Start with the basics like historical base mapping which simply doesn’t exist.

- Add a good gazetteer, basic collaboration tools.

- Listen to users. See what happens.
Beginning of a Solution

• AfricaMap first conceived as way to aid researchers at Harvard. Then realized making it public would make it much more valuable.

• The Harvard Map Collection contains a huge collection of paper map series for Africa – many scales, dates. Start to create historic base map.

• Work closely with Harvard Geospatial Library, the library’s spatial repository for archiving.

• Create permanent home for data developed by researchers. Projects layer. DataVerse Network
Funding and Support

- 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
Web-based - Web browsers, 3D clients, web services

Services oriented architecture (SOA) – AfricaMap will expose its data via open interfaces and will in turn consume various services.

Open Source code - All code used to build AfricaMap will be Open Source. This has special relevance for organizations in Africa where funding is limited, expertise is available, and empowerment is critical.
Service Oriented Architecture

Will act as a server to remote clients
Will act as a client to remote servers
System Characteristics (2/4)

- *Long term data access, storage* - Once maps are scanned, digitized, georeferenced it should not be necessary for anyone in the world to repeat that work.
- *Public access to data* - Core holdings will be put in the public domain or licensed using a Creative Commons type license wherever possible.
- *Encourage replication* - One reason data is hard to find for Africa is that the data which exists is not replicated.
• **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 start with gazetteer data from the geonames.org project. This database includes about 1 million place names for Africa.

• **Historic base mapping** – AfricaMap will assemble base mapping at key scales and time periods.

• **Decentralized Architecture** - Support unlimited growth.

• **Current Satellite Mapping from Google and Others** – In addition to historic mapping, scientific layers and commercial layers inserted.
• **Research at Multiple scales** - The system will support research at a variety of scales from sites or cities to country or continent-wide projects.

• **Concurrent Layer Viewing** – Transparency, side by side, roving window for comparison of historic layers.

• **Ability to View Data in 3 Dimensions** – Data in web map client exported to Google Earth via superoverlays.

• **Multiple media types** – Support access to many types of media in addition to spatial data, including photos, maps, text, video, audio.
Initial Data Layers

• For the initial release of AfricaMap, mapping has been developed at the following scales for all or most of the continent:
  – 1:2,000,000
  – 1:500,000
  – 1:250,000
• Mapping at 1:50,000 for selected countries
• Mapping at 1:10,000 and 1:2000 scale for selected cities
Building the Base

- The U.S., France, Germany, Italy, Russia, and many African countries have created map series for multiple scales and time periods.
- Harvard Map Library has a complete or near complete set for many series.
Google for most of Africa

HMC base mapping
same location
Level of Detail
Scanning and Georeferencing
Base Mapping - 1890
More Detailed Mapping – 1:250k
250k Level of Detail
The gazetteer will support search for materials and navigation.

- Geographic Names System (GNS)
- Getty Thesaurus of Geographic Names
- Alexandria Digital Library
- Others
Gazetteer

An Africa Gazetteer has many uses:
• User navigation, map labeling
• User georeferencing of materials
• Used in automated georeferencing of collections
• Can be provided as a web service for other organizations to use
Gazetteer source: Geographic Names System (GNS)

Estimate for Africa based on Benin: over 1 million

6357 place names for Benin
Cultures
Cultures in the Ethnographic Atlas

Fields in Ethnographic database

We have compiled ethnographic data on over 500 African cultures primarily from George P. Murdock's Ethnographic Atlas of the World. Since we have over 100 fields of data for each culture, the database will allow us to examine areas of creativity from a wide range of perspectives.

1. Agriculture
2. Animal Husbandry
3. Boat Building
4. Cast Stratification
5. Class Stratification
6. Civil History
7. Cogitative Raw Groups
8. Community Organization
9. Consanguinity
10. Congenital history
11. Cousin Marriage
12. Cultural Typology
13. Distribution of Inheritance
14. Distribution of Immovable Property
15. Extended Family Organization
16. Family Organizations
17. Fishing
18. Floor Level
19. Floor Level Copy
20. Gatherers
21. Gestural Variation
22. Ground Plan of Dwelling Copy
23. Gross plan of Dwelling
24. Height Variation
25. High-Grade
26. House Construction
27. Hunting
28. Inheritance of Immovable Property
29. Inheritance of Real Property

Done
Historic Base Maps

1829 Herrison
Harvard Museum of Comparative Zoology (Amphibians and Reptiles)
Projects Layer

View project descriptions and contact information for any project in Africa
Peabody Collections as Map Layers
Access Project Information
City of Abomey Project (Benin)
City of Abomey Project
## Abomey Data

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Google Earth View
AfricaMap Data - Vector and Superoverlay
Beta Application

- http://AfricaMap.harvard.edu
Case Driven Demo of AfricaMap

- Phase I work completed
  - # layers
  - # map sheets georeferenced
  - # place names in gaz
  - # thematic layers
  - Creation of Murdock, other ethno, language layers
  - HMC index, projects from DVN, slave routes
- Designed to aid researchers in following ways
  - Find remote places by name
  - Access to contextual information for the most remote regions
  - Compare layers visually
  - Link to content outside AfricaMap
  - Share views with colleagues, capture maps for publication
Research Cases

1. Finding Remote Sites Quickly (Umm Gernanchok)
2. Road Networks and Population Distribution (Northern Nigeria)
3. Exploring a Place Through a Series of Historic Maps (Timbuctu)
4. Examining the Growth of Cities (Freetown)
5. Looking for Patterns and Relationships (ethnographic and linguistic layers)
6. Discovering and Sharing Scholarly Work (Projects linking to researcher contact, data in AfricaMap, DVN, Harvard Google Books, Peabody Museum, YouTube, Flickr)
Case 1 – Find Remote Places Quickly

• Using gazetteer find **Umm Gernanchok** a town of perhaps a couple hundred
Case 1 – Find Remote Places Quickly

- Turn on Satellite and see what is there
Case 1 – Find Remote Places Quickly

• Turn on Soviet mapping
Case 1 – Find Remote Places Quickly

• Compare Soviet and Satellite
Case 1 – Find Remote Places Quickly

- Turn on place names
Case 1 – Find Remote Places Quickly

- Approach works across continent
Case 1 – Roads and Population

- Kano area
Case 1 – Roads and Population

• Extent of road network in Google
Case 1 – Roads and Population

- Soviet 500k Mapping
Case 1 – Roads and Population

• Soviet 500k Mapping, zoomed-in
Case 1 – Roads and Population

- Soviet 500k Mapping, transparent over satellite
Case 2 – Roads and Population

• Soviet 500k Mapping, w/ towns
Case 2 – Roads and Population

- Population Distribution
Case 2 – Roads and Population

- Population Distribution and Road Network
Case 2 – Roads and Population

- Population and Roads
Case 2 – Roads and Population

• Soils
Case 2 – Roads and Population

• Soils and Population
Case 3 – Historic Representations

- Timbuktu
Case 3 – Historic Representations

- Timbuktu – Alternate Names
Case 3 – Historic Representations

• Search in Arabic, Chinese, and other languages
Case 3 – Historic Representations

- Timbuktu and 1612 map
Case 3 – Historic Representations

• Timbuktu and 1722 map
Case 3 – Historic Representations

- Timbuktu and 1770 map
Case 3 – Historic Representations

- Overlaying historic maps
Case 3 – Historic Representations

• Period map of Songhai Empire
Case 3 – Historic Representations

• Sample of French slave voyages
Case 3 – Historic Representations

• Slave voyages and 1612 map
Case 3 – Historic Representations

- Slave voyages and 1612 map
Case 3 – Historic Representations

- Use Link to send view to someone else
- Use Jing to capture a map, markup, and insert into document
Case 4 – Growth of Cities

• Freetown, Sierra Leone
Case 4 – Growth of Cities

- Freetown, satellite view
Case 4 – Growth of Cities

- Only road in Google
Case 4 – Growth of Cities

• Soviet mapping
Case 4 – Growth of Cities

- 1970 British mapping
Case 4 – Growth of Cities

• Comparing development 1970 and 2008
Case 4 – Growth of Cities

• More detailed comparison 1960 and 2008
Case 4 – Growth of Cities

• Harvard Map Collection Index
Case 4 – Growth of Cities

- Harvard Map Collection Index
Case 4 – Growth of Cities

- Harvard Map Collection Index
Case 5 – Ethnography and Languages

- View Murdock
Case 6 – Project Layer for Finding Projects

- Project Layer (work in progress)
Thank you

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