Using Savanna to Model and Analyze Complex Human Ecosystems
(or any Complex Systems)

Phelps 5824
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Overview

• Modeling dynamic, complex and interconnected systems
• The role of context, lineage, annotation, confidence and connection

Abstract. Modeling and communicating complex interconnected cultural and behavioral systems is difficult as the participants and observers bring their own bias, influence and motivations. While difficult in familiar regions, understanding unfamiliar regions of the world where power, trade, communication, finance, cultural and social practices have changing players, pressures and nuances seems insurmountable. Nonetheless, government, non-government, commercial organizations and academics continue to try to collect, connect, contextualize and communicate this information for security, stability, and sustainability purposes worldwide. This session addresses the approaches and tools used by US Government Commands, NGOs and ways that they may apply in an academic and research setting.
Modeling
Bench Science Approach

Santa Barbara County is changing

Observed Data

Derived Data

Predicted Reality

Observed Reality
Santa Barbara County has 399,347 residents (56% White, 34% Latino)
and growth in the City of Santa Barbara is 8% (2000)
  - loss of 17,683 Whites
  - gain of 38,469 Latinos

* source: http://www.geog.ucsb.edu/~sara/html/mapping/newspress/population0408.html

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429,086 people in Santa Barbara County in 2010

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The 2009 population estimate for Santa Barbara County, California is 407,057.
Forecasts adjusted as observed reality changes
Complex Systems

- Not fully knowable, often involve many dimensions
- Use data from many sources
- Often use multiple analytic/analysis techniques
- Involve many participants
  - Motivations and incentives not always clear
  - Different goals, perspectives and levels of influence
- Affected by ‘outside system’ action
- Single, static representation of systems does not allow participants with different beliefs to connect, project, hypothesize, affect and optimize
  - Need a multi-model approach for interacting with complex systems
    - Knowledge/Ontology, Workflow, Analytical, Structural, System
Full Understanding

• Data is not enough
• Existing metadata is often insufficient (and difficult to collect)
• Need
  • Context, lineage, annotations, confidence and connections
    • Purpose, goals, biases, intent, situations, practices,..
    • History and derivation paths
    • Perspectives of others
    • Confidence and certainty
    • Connection types

• Present/publish/report using perspective, level of detail, and abstraction while retaining the drill down metadata/sources/derivation for validation
System

Dynamically Loading Components based on:
- Authentication
- Application Privileges
- User Roles
- Preferences

Model Driven Services
- Abstraction
- Annotation
- Lineage
- Perspective
• Web based analysis application
• Dynamically loaded and customizable set of components

- Crumbnets
- Maps
- Linkgraphs
- Virtual Reports
- Collections
- Images
- Concept Search
- Concept Modeling and Simulation, Quantitative and Clustering Tools
- Tradecraft/ACH
- As collection process is occurring, clusters are forming
- Abstracted cluster views

• Designed to work with unstructured, semi-structured, formatted structured, signal, GIS, XML,.... data and a any analysis technique
  • ingested
  • discovered and accessed
Framing the challenge
(U) Unguja, the largest island of Zanzibar and the search of the political capital, with the exception of Stone Town, overwhelmingly supports the ruling Chama Cha Mapinduzi (CCM). In contrast, the majority of those on Pemba support the opposition Civic United Front (CUF). However, there are pockets of support for both parties on all of Zanzibar’s islands.

(U) Stone Town is the political capital, home to a large majority of Zanzibar’s population, and is a major CUF area of support.
Map Component

- OpenScales Flex component with custom drawing canvas (crosses several components but requires manual projection and synching with the underlying map component)
- OpenScales with native layer support - features that stay in synch with the map and move in a much more fluid manner
- Support for TMS, WMS and KML Services
- Support for geoprocessing Services provided by ArcGIS Server
- Integration with other system components
• **Filters**
  - Keyword, proximity
  - Boolean
  - Faceted - source, concept, producer, distributor, security classification,
  - Spatial
  - Temporal

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**Search**

- **Filters**
  - Keyword, proximity
  - Boolean
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  - Spatial
  - Temporal
Zanzibar Political Dynamics

2005 Election Violence

January 2001 Massacre

Civic United Front (CUF)

Self Shariff Hamad

Chama Cha Mapinduzi (CCM)

President Amani Karume

In October 2009 Zanzibar President Amani Karume met with CUF Secretary Self Shariff Hamad at the State House to discuss how to save Zanzibar from future political turmoil and to end the badmash between them[7], a move which was welcomed by many people including the USA.
In October 2009 Zanzibar President Amani Karume met with CUF Secretary Seif Shariff Hamad at the State House to discuss how to save Zanzibar from future political turmoil and to end the standoff between them[7], a move which was welcomed by many people including the USA.
The CPA "calls upon the international community to assist in the areas of training, establishment and capacity building of police and other law enforcement agencies", Permanent Cessation and Security Arrangements Implementation Measures and Appendices, Appendix L, Section 22.5. 


For current donor support to the UNPOL, see Appendix D below.

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Angelo'sPoliticalConflict: Countering Insecurity in South Sudan
Crisis Group Africa Program Report N° 174, 21 December 2009

D. POST-REFERENDUM IMPLICATIONS

In Anglo's State as elsewhere in South Sudan, disaffected people and opposition leaders frequently voiced a similar sentiment to Crisis Group. Despite their disaffection with GoSS performance and leadership -- and in some cases SPLM estrangement -- they do not wish to "rock the boat" at this time. They prefer to express grievances until after the Referendum has a chance to vote on self-determination. Like this suggests intra-Sudan violence may well intensify after the referendum.

Given the worry of former political and military adversaries it contains, the GoSS is in many regards a marriage of convenience and a government with multiple centers of power. Many political officials, like their constituents, reach across tribal and regional lines national.
arms race between the north and the south, including heavy weapons such as T-72 tanks, he says the peace agreement did not prevent the SPLM from buying weapons if it had the resources to do so. He denies there is any arms race, adding that war industries in Khartoum are manufacturing T-72 and other types of tanks.

Al-Fadil has been instrumental in creating the National Democratic Alliance (NDA) which is an umbrella of northern opposition parties and Sudan People Liberation Movement (SPLM) working to topple the Sudanese regime at the time. He was appointed as the NDAs secretary general.
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Demonstration
Collaboration Opportunities

- **US Federal**
  - DoD Africom, Eucom
  - USDI (all COCOMs)
  - NGA CRADA
  - NSF?
  - Broader Academic Research

- **NGO**
  - Mercy Corps

- **Commercial**
  - Energy
  - Sustainability and Optimization

- **Employment and Internships**
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Backup Slides

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