



**RVAC**  
Regional Visualization  
and Analytics Centers

North-East Visualization  
and Analytics Center

[www.geovista.psu.edu/NEVAC](http://www.geovista.psu.edu/NEVAC)



# NEVAC R&D – GeoVisual Analytics

June, 2008

Alan M. MacEachren – PI  
GeoVISTA Center/Geography, Penn State  
[maceachren@psu.edu](mailto:maceachren@psu.edu)

PENNSTATE



GeoVISTA

MINDSgroup



iSchool





**RVAC**  
Regional Visualization  
and Analytics Centers

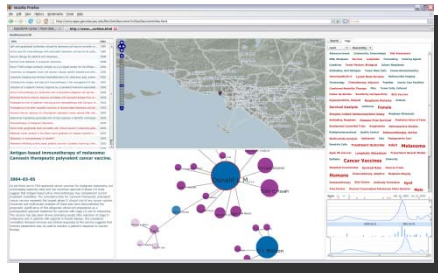
North-East Visualization  
and Analytics Center

www.geovista.psu.edu/NEVAC

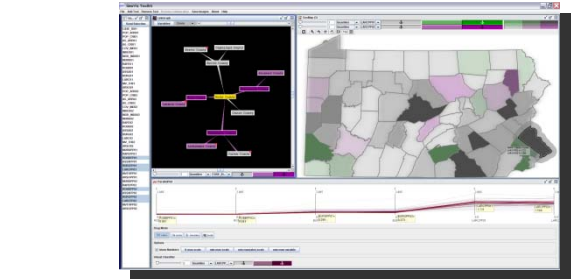


# GeoVisual Analytics Tools for:

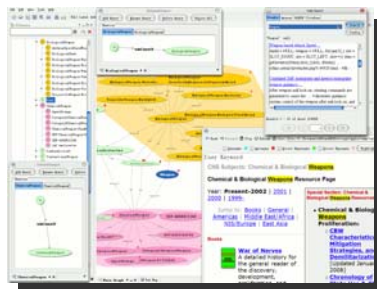
- Public Health
- Facility Security
- Study of Terrorism
- Intelligence Analysis
- Emergency Management



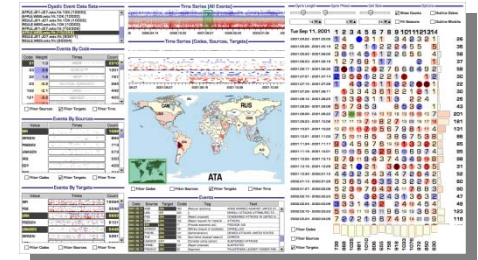
**GeoDiscoverer** — Searching social networks + geo info in web and text



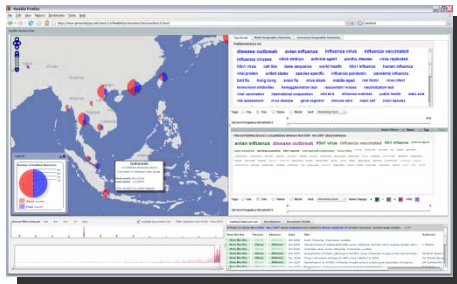
**GeoViz Toolkit** — Rapid construction of custom analysis tools (crime rates in PA)



**ConceptVista** — Visualizing, manipulating, and managing knowledge (perspectives about chemical and biological weapons)

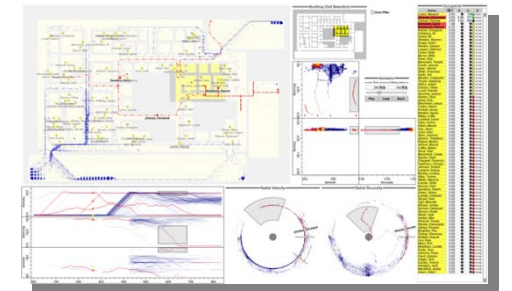


**Improvise** — Querying multidimensional data (world events in newswire reports)



**Health GeoJunction** — Web portal analysis of place-time-concept info extracted from documents

Alan M. MacEachren – PI  
GeoVISTA Center  
Geography, Penn State  
maceachren@psu.edu



**Improvise** — Identifying and analyzing movement behavior (synthetic health facility evacuation)

PENN STATE



GeoVISTA MINDSgroup

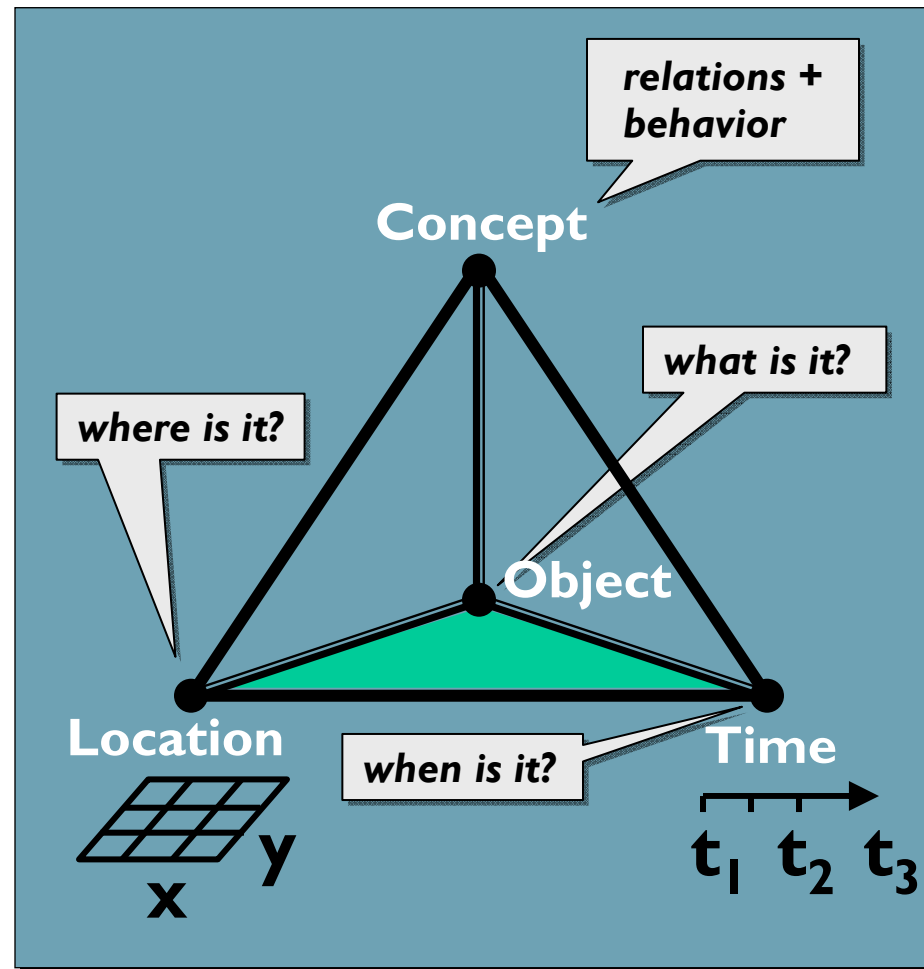
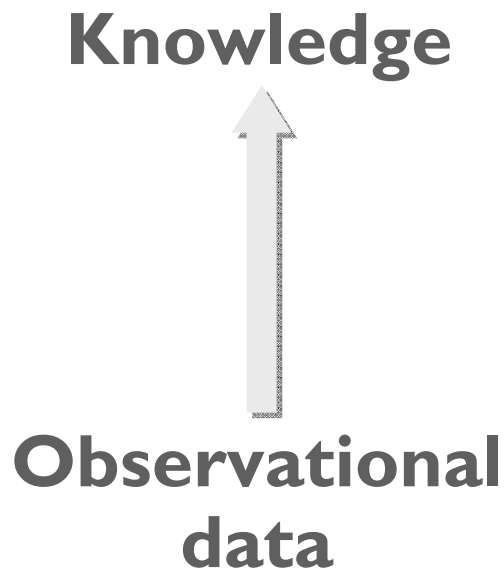


# NEVAC Goal: geo-visual analytics for public health, intel analysis, study of terrorism, & emergency mgt

- Place & Time are Fundamental ... to all components of Homeland Security
- NEVAC foci: R&D to assemble time-relevant info about places at risk and to use the information effectively to decrease threats and increase resilience ... three topics highlighted:
  - ***finding info quickly***: browse, query, & filter
  - ***foraging & contextualizing info***: retrieve info & build place-time context → achieve situation awareness
  - ***analyzing place-time info***: get answers about what, where, when, who, how, and why



# A multi-representation info-model



Mennis, J. L., D. J. Peuquet, & L. J. Qian. 2000. 'A conceptual framework for incorporating cognitive principles into geographical database representation', International Journal of Geographical Information Science, 14(6), pp. 501-520.



# Foraging and contextualizing info → Situation Awareness

- knowledge enabled information foraging and geo-historical contextualization
- FEMARepViz:



# FEMARepViz

- example info review session

The image displays a Google Earth interface with several overlapping windows. The main window shows a 3D map of the Caribbean region with yellow and orange markers indicating earthquake activity. A timeline at the top of the map shows dates from 3 FEB 2007 7:00pm to 6 FEB 2007 6:59pm. A search bar on the left contains the text "Ag, 1700 Pennsylvania Ave, 20000". A "Places" panel on the left lists several earthquake events, with "earthquake - Cuba" selected. A detailed information popup for this event is open, providing the following text:

**earthquake - Cuba**  
Date: 2007-02-05  
Earthquake Activity  
At 3:57 PM EST there was a strong (magnitude 6.1) earthquake in the Cuba Region, about 125 miles south of Bayamo, Cuba and 116 miles north of Lucea, Jamaica. The quake caused mild tremors along Cuba's southwestern coast. No tsunami bulletins issued. The Caribbean Area Office reports no damage and no request for assistance in Puerto Rico or the US Virgin Islands.  
[Classify this article](#)  
Directions: [To here](#) - [From here](#)

Presenjit Mitra & ChiChun Pan

PENNSTATE



© Alan M. MacEachren, 2008



# Problem: Help analysts retrieve relevant info and contextualize complex events

Approach: Concept Discovery Application (CDA) – knowledge enabled information foraging and geographical contextualization

The screenshot illustrates the CDA process across four numbered steps:

- 1**: A ConceptVISTA window displays an ontology of classes (California, Caribbean\_Sea, Carlisle, Central\_Valley, FEMA\_HQ, Fillmore, Frankfort, Franklin\_County, Gulf\_of\_Mexico, Hardin\_County) and a ConceptGraph showing relationships between entities like 'mentioned\_in', 'related\_to', and 'has'.
- 2**: A Google News search interface shows a search for 'floods' with a geographic scope set to Missouri. A map of Missouri is displayed.
- 3a**: A search result snippet for 'Floods force them from their homes - but doesn't break their spirits' is shown.
- 3b**: A Google Earth Plus window shows a map of the United States with several locations marked as 'Concept (Missouri)', 'Concept (Kentucky)', 'Concept (Madrid)', 'Concept (Missouri)', 'Concept (reported)', 'Concept (Missouri)', 'Nevada', 'Lebanon', 'Caledonia', 'Cuba', 'Republic', 'New Madrid', 'Cape Girardeau', 'Sikeston', and 'Campbell'. A red line is drawn across the map.

## CDA process

1. apply *entity-relation extractor (ERE)* to FEMA National Situation Report → generate: people, places, organizations
2. use ERE results to ID places of interest
3. supplement Google News query on floods, in located places, with ERE derived Owl (web ontology language) file
4. map results & relations

see poster

Brian Tomaszewski, Alan MacEachren



# Concept Discovery Application (CDA) – knowledge enabled information foraging and geo-historical contextualization

## United Nations ReliefWeb headline search

Brian Tomaszewski

**Context Discovery Application (CDA) Output Results**

**Rwanda: Congo Agrees to FDLR Disarmament Plan - AllAfrica.com**  
[Story Link](#)

**Publish Date:** Mon, 12 Nov 2007 04:14:53 GMT

**Content:** Rwanda: Congo Agrees to FDLR Disarmament Plan This Page on this article (Kigali) 12 November 2007 James Manyamba Nairobi Rwanda and the Democratic Republic of Congo (DRC) have reached an agreement that will see the latter disarm and expel genocidal forces, grouped in what is known as the Democratic Forces for the Liberation of Rwanda (FDLR). The deal was reached on Friday between Foreign Affairs ministers from the two neighbours in Nairobi, Kenya, at a ceremony that was facilitated by the UN and witnessed by the US and the European Union. The Government of the Democratic Republic of Congo commits to launch military operations, as a matter of urgency, to dismantle the ex-FAR Interahamwe as a genocidal military organisation in the DRC, a joint communique signed by among others, Rwanda's Foreign Affairs minister Dr Charles Ndayishimiye and Congolese State Minister of Foreign Affairs, Antipas Mbusya Nyamwisi, reads in part. DRC agreed to prepare a detailed plan to disarm the militia, while the UN Mission in Congo (MONUC) agreed to provide support to the planning and implementation of the operation. The operation will be coordinated with the mandate and capabilities of the UN Mission in Congo (MONUC) and the UN Mission in Rwanda (UNAMIR).

**ReliefWeb: Headlines**

ReliefWeb is the global hub for time-critical humanitarian information on Complex Emergencies and Natural Disasters. [Copyright \(c\) 2007 ReliefWeb](#). All rights reserved. No part of the structure of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, recording or otherwise without prior written permission of the publisher, the United Nations Office for the Coordination of Humanitarian Affairs (OCHA).

**México: Respuesta humanitaria conjunta a las graves inundaciones**  
Date: 12 Nov 2007  
Source: UN Children's Fund

**Iraq: Refugees forced home as funds dry up**  
Date: 12 Nov 2007  
Source: Integrated Regional Information Networks

**Somalia: Thousands flee as fighting in capital claims 59 lives**  
Date: 12 Nov 2007  
Source: Agence France-Presse

**Too many states not on course to meet clearance deadlines - Landmine Monitor 2007**  
Date: 12 Nov 2007  
Source: Landmine Monitor

**DR Congo agrees with Rwanda to disarm Hutu rebels in an effort to reduce tensions**  
Date: 12 Nov 2007  
Source: Reuters

ReliefWeb headline follow-up query in Google News using nouns from RW headline as search terms





# computational methods with visual interface support applied to semi/unstructured text

FEMARepViz

GeoJunction

Jerusalem, Israel

Parents: Israel,



Tags related to Jerusalem, Israel

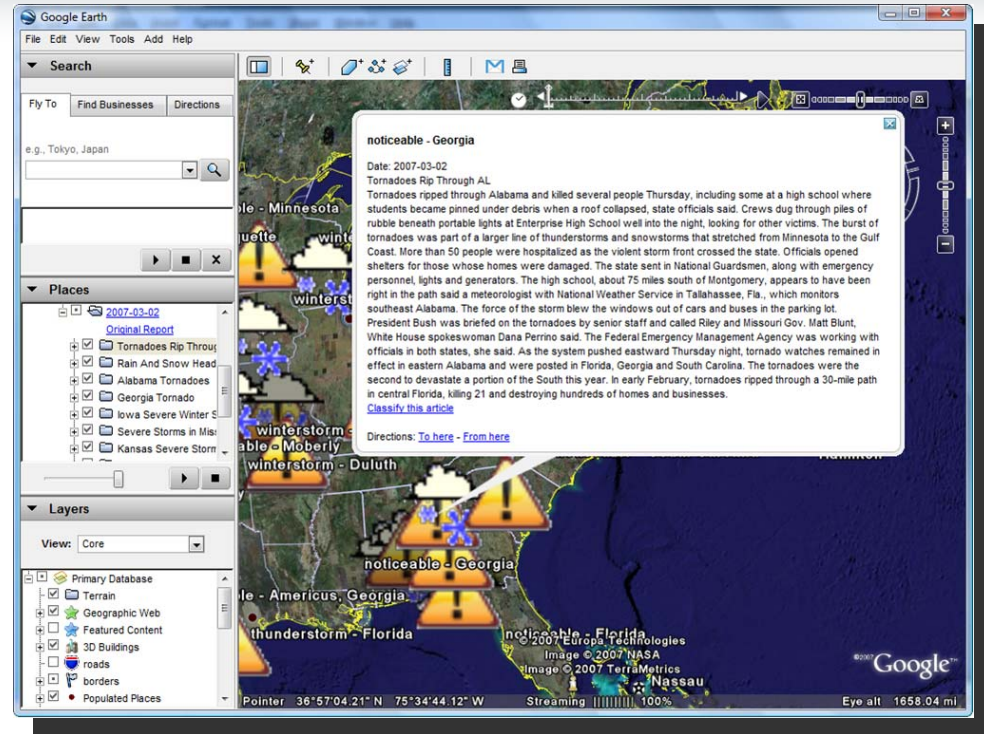
Tags: [measles](#), [household](#), [vaccine coverage](#), [index case](#), [contact](#), [households](#), [mumps](#), [mmr vaccine](#), [rubella](#), [national immunization](#), [populations](#), [5 months](#), [immunization coverage](#), [outbreak](#), [offspring](#), [controlling](#), [subsequently](#), [varicella](#), [genotypes](#), [d4](#), [communicable disease](#), [d8](#), [five months](#), [pregnancy](#), [kindergarten](#), [infectious hepatitis](#), [orthodox communities](#), [jerusalem](#), [trisomy 18](#), [jerusalem israel](#), [west jerusalem](#), [menstrual periods](#), [born babies](#), [autosomal](#),

Papers about Jerusalem, Israel

[Stein-Zamir,C; Zentner,G; Abramowitz,M; Shulman,M](#) [Measles outbreaks affecting children](#) [5 months](#), [controlling](#), [d4](#), [d8](#), [genotypes](#), [households](#), [immunization coverage](#), [index](#)

Shulr

FactXtractor used in collaboration with PNNL on SRS & in new NGA GeoCAM project ...



FactXtractor

Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://localhost:8700/flex/CDA\_Flex/CDA\_Flex.html

Getting Started Latest Headlines PSU Webmail Welcome to Google C...

Google News Search  
 RSS Feed  
 Flat Files  
 Ontology Search  
 File -> Ontology -> Geography (FOG) Search

Geographic Scope  
 World Cities  
 World Country Names

Output Visualization Parameters  
 Load Search Support Ontology  
 Linked Tools and Functions  
 ReliefWeb Sudan Update

Data Views  
 Search Results Time Map Synchronizat... GeoCollaboration Document Visuali... Stored Documents

Search Results

- Document: Sudan: Attacked UNAMID convoy completes trip back to base
- Document: Nutrition information in crisis situations - Report number 15
- Document: Sudan: Newsletter Nov 2007 vol. 20
- Document: Security Council strongly condemns Sudanese Armed Forces attack on supply convoy of African Union-United Nations hybrid operation in Darfur
- Document: CWS emergency appeal: 2008 Darfur (Sudan) humanitarian response
- Document: EU commanders give green light to Chad mission
- Document: Sudan: A new day in Melut town
- Document: Conférence de presse de la Secrétaire générale adjointe au Bureau des services de contrôle interne (BSCI) et du Président de l'Équipe spéciale du BSCI chargée des enquêtes relatives aux achats
- Document: Press conference by Under-Secretary-General for Internal Oversight Services
- Document: Sudan: The Office of the Army Spokesman says attacks on UNAMID forces in Tine area was due to joint error
  - Title
  - Story Source
  - Story Publish Date
  - Extracted Text

Document Contents

Source: Date: 10 Jan 2008 - The Office of the Spokesman for the Armed Forces, commenting on the accusation of attacking a UNAMID force unit last Monday in the area of Tine in West Darfur State, said the attack had actually taken place due to joint error that led an Armed Forces Unit in the area to attack the UNAMID unit. The Office pointed out that the error was a joint one as this UNAMID unit had failed to notify the Armed Forces and take permission about their movement according to the agreed norm, pointing out that the convoy was moving by night and the correct action was that the UNAMID unit should make its movements at daytime. The office added that the Western Sudan Military Command has provided an apology to the representative of UNAMID in the region and that the apology was accepted, in recognition of the dual mistake committed. MA/MA

Document Link Click to View

Content

Select web view option:

Welcome Screen/Information Map Search Results FEMA Situation Report Extractor (FEM...)

Subscribe to this feed using Live Bookmarks

Always use Live Bookmarks to subscribe to feeds

Subscribe Now

ReliefWeb: Updates by Country

Time-critical humanitarian information on Complex Emergencies and Natural Disasters. Updated 24-hours per day. Copyright 2007 ReliefWeb. All rights reserved. No part of the structure of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, recording or otherwise without prior written permission of the publisher, the United Nations Office for the Coordination of Humanitarian Affairs (OCHA).

www.reliefweb.int

[Sudan: Attacked UNAMID convoy completes trip back to base](#)

[Nutrition information in crisis situations - Report number 15](#)

[Sudan: Newsletter Nov 2007 vol. 20](#)

[Security Council strongly condemns Sudanese Armed Forces attack on supply convoy of African Union-United Nations hybrid operation in Darfur](#)

[CWS emergency appeal: 2008 Darfur \(Sudan\) humanitarian response](#)

[EU commanders give green light to Chad mission](#)

[Sudan: A new day in Melut town](#)

[Conférence de presse de la Secrétaire générale adjointe au Bureau des services de contrôle interne \(BSCI\) et du Président de l'Équipe spéciale du BSCI chargée des enquêtes relatives aux achats](#)

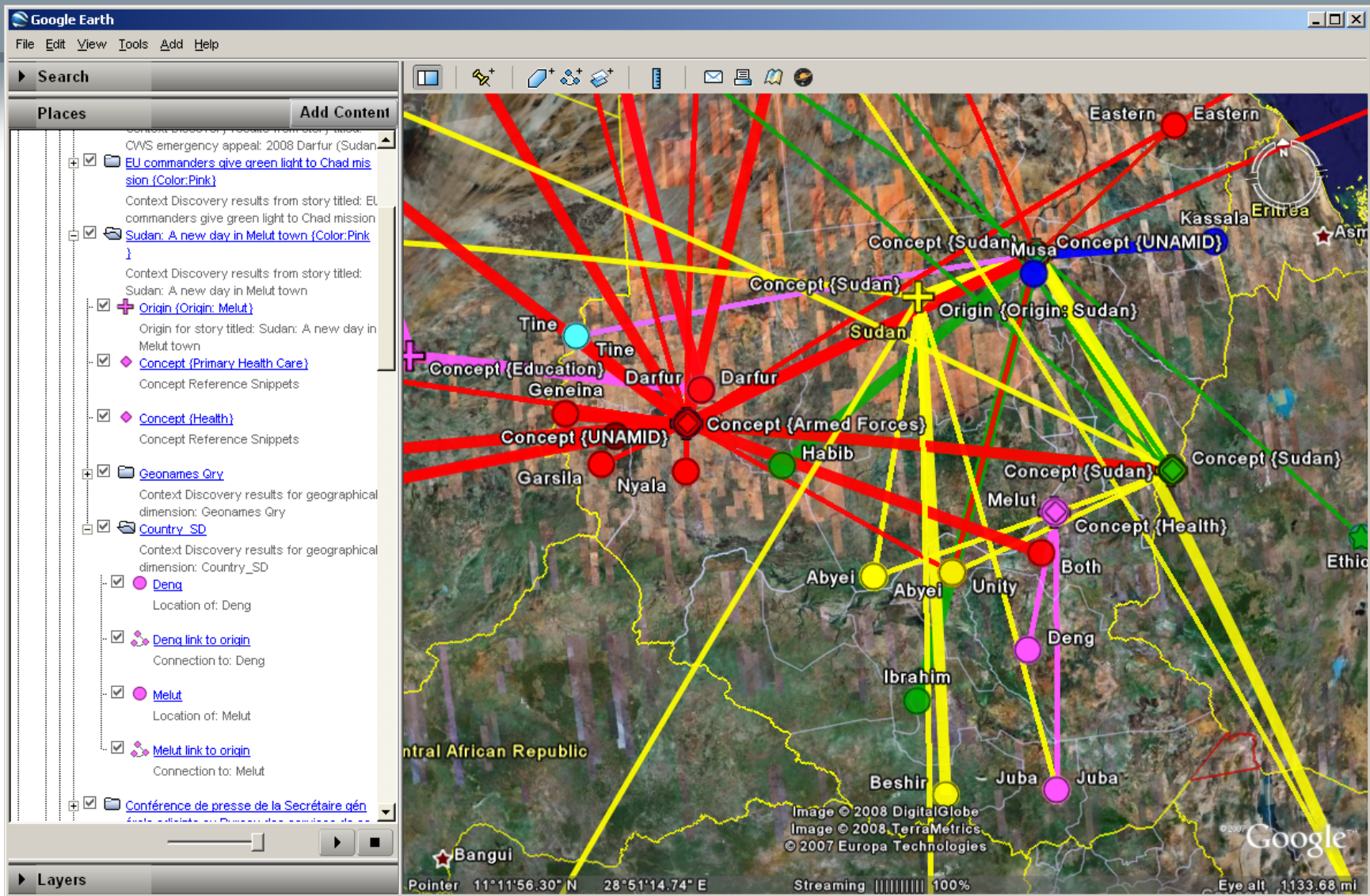
[Press conference by Under-Secretary-General for Internal Oversight Services](#)

[Sudan: The Office of the Army Spokesman says attacks on UNAMID forces in Tine area was due to joint error](#)

Done 2 Errors







Google Earth

File Edit View Tools Add Help

Search

Places Add Content

- Concept (UNAMID)**  
Concept Reference Snippets
- Concept (Armed Forces)**  
Concept Reference Snippets
- Concept (Sudan)**  
Concept Reference Snippets
- Geonames Qry**  
Context Discovery results for geographical dimension: Geonames Qry
- Countries**  
Context Discovery results for geographical dimension: Countries
- Country\_SD**  
Context Discovery results for geographical dimension: Country\_SD
- Unity**  
Location of: Unity
- Unity link to origin**  
Connection to: Unity
- For**  
Location of: For
- For link to origin**  
Connection to: For
- Eastern**  
Location of: Eastern
- Eastern link to origin**  
Connection to: Eastern
- EI**

Layers

Pointer 13°04'23.09" N 25°00'09.59" E elev 2615 ft Streaming 100% Eye alt 4514 ft

URL: http://www.google.com/search?hl=en&q=UNAMID

Web Images Maps News Shopping Gmail more Sign in

Google UNAMID Search [Advanced Search](#) [Preferences](#)

Web Results 1 - 10 of about 148,000 for UNAMID. (0.11 seconds)

**UNAMID: African Union/United Nations Hybrid operation in Darfur**  
The Council, acting under Chapter VII of the United Nations Charter, authorized UNAMID to take necessary action to support the implementation of the Darfur ...  
[www.un.org/Depts/dpko/missions/unamid/](http://www.un.org/Depts/dpko/missions/unamid/) - 15k - [Cached](#) - [Similar pages](#)

**UNAMID: African Union/United Nations Hybrid operation in Darfur**  
On 31 July 2007, the Security Council unanimously adopted resolution 1769 which

UNAMID - Google Search

**Concept (UNAMID)**  
Concept Reference Snippets

eply disturbing" turn just two nights ago, when a **UNAMID** convoy of more than 20 clearly marked white  
rised mostly of large trucks carrying rations for **UNAMID** personnel in West Darfur, had come under s  
ffered seven gunshot wounds during the incident. **UNAMID** troops had elected not to return fire and  
fensive position. After the attack, he added, the **UNAMID** Deputy Force Commander had been  
telephoned

commitment to ensuring the safety and security of **UNAMID** personnel, and also, more broadly, to the  
nical issues. With all that in mind, he said that **UNAMID** would not have the personnel or assets in  
of **UNAMID**. Discussions on the composition of the UNAMID military component had been going on for m  
up of personnel who had served with AMIS. The new **UNAMID** units must deploy to Darfur as swiftly



# finding info quickly → browse, query, & filter

- space-time questions: given  $X \rightarrow$  **determine Y**
  - when + where → **what**: Describe the objects or set of objects that are present at a given location or set of locations at a given time or set of times.
  - when + what → **where**: Describe the location or set of locations occupied by a given object or set of objects at a given time or set of times.
  - where + what → **when**: Describe the times or set of times that a given object or set of objects occupied a given location or set of locations





# Health GeoJunction: place, time, concept filtering of health science in PubMed

http://www.personal.psu.edu/mzs114/HealthGeoJunction/GeoJunction9b.html - Windows Internet Explorer

http://www.personal.psu.edu/mzs114/HealthGeoJunction/GeoJunction9b.html

Health GeoJunction

Apply Filters:  Place  Tag  Time

Legend

Number of reports or abstracts

30  
25  
10  
1

Pub Med Abstracts OIE Animal Flu Reports

Choose filter interval: 3m 6m 9m 1Y Max

Update Document List

Filter Selection Feb/2007 - Nov/2007

Tag Clouds MeSH Geographic Hierarchy Geonames Geographic Hierarchy

PubMed abstract set

disease outbreak avian influenza influenza virus influenza vaccinated  
 influenza viruses chick embryo antiviral agent poultry disease virus replicated h5n1 virus cell line  
 base sequence world health h5n1 influenza human influenza viral protein united states  
 species specific influenza pandemic pandemic influenza bird flu hong kong avian flu virus strain  
 middle aged risk factor virus infect monoclonal antibodies hemagglutination test reassortant viruses  
 neutralization test viral vaccination international cooperation wild bird influenza outbreak public health  
 sialic acid risk assessment virus disease gene segment immune sera mdck cell avian species swine influenza

Tags:  One  Two  Yahoo  MeSH Sort: Descending Count

Set term frequency threshold: 0

Filtered PubMed abstract set published between Feb/2007 - Nov/2007

virus replication avian influenza influenza vaccinated h5n1 virus h5n1 influenza  
 influenza virus influenza viruses antiviral agent pandemic influenza cell line united states wild bird  
 human influenza middle aged world health risk factor virus replicated virus h5n1 influenza pandemic  
 viral protein virus isolate species specific base sequence infected control virus infect avian flu clinical signs  
 h5n1 infected influenza outbreak poultry disease real time risk assessment virus strain control measure great britain rt\_pcr  
 chick embryo h9n2 influenza migratory bird antiviral drug international cooperation neuraminidase inhibitor neutralization test  
 virus disease virus shed ai virus h5n1 vaccine host range influenza infected phylogenetic analysis protected immunized  
 reassortant viruses respiratory system animal husbandry bird flu domestic bird health plan human transmissibility inactivated vaccine

Tags:  One  Two  Yahoo  MeSH Sort: Descending Count Rank Change: + -

WHO RSS Feed OIE Event List PubMed Abstract List Annotations

Articles for dates Feb/2007 - Nov/2007

More like this  Places  Abstract  Date  Title

More like this	Place(s)	Abstract	Date	Title	Author(s)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Dec 2006	Reverse transcriptase-polymerase chain reaction-enzyme linked immunosorbent assa...	B ChaharainI A
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Dec 2006	H9N2 influenza viruses isolated from poultry in Korean live bird markets continuously ...	JA KimHS KimSH
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Dec 2006	Development and evaluation of a real-time Taqman RT-PCR assay for the detection o...	SA CallisonTO B
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Dec 2006	Genetic characterization of influenza A viruses (H5N1) isolated from 3rd wave of Thaila...	R Jam-OnA Cha
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Dec 2006	Avian influenza virus exhibits rapid evolutionary dynamics.	EC HolmesR Che
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Dec 2006	Comparison of avian and human influenza A viruses reveals a mutational bias on the ...	R RabadanH Ro
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Dec 2006	Inhibition of influenza virus infection by a novel antiviral peptide that targets viral lta...	S Schultz-Cher

# Health GeoJunction: place, time, concept filtering of health science in PubMed

Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.personal.psu.edu/mzs114/HealthGeoJunction/GeoJunction9b.html

Health GeoJunction

Apply Filters:  Place  Tag  Time

Legend

Number of reports or abstracts

25  
13  
5  
1

Pub Med Abstracts OIE Animal Flu Reports

Tag Clouds MeSH Geographic Hierarchy Geonames Geographic Hierarchy

PubMed abstract set

disease outbreak avian influenza influenza virus influenza vaccinated  
 influenza viruses chick embryo antiviral agent poultry disease virus replicated h5n1 virus cell line  
 base sequence world health h5n1 influenza human influenza viral protein united states  
 species specific influenza pandemic pandemic influenza bird flu hong kong avian flu virus strain  
 middle aged risk factor virus infect monoclonal antibodies hemagglutination test reassortant viruses  
 neutralization test viral vaccination international cooperation wild bird influenza outbreak public health  
 sialic acid risk assessment virus disease gene segment immune sera mdck cell avian species swine influenza

Tags:  One  Two  Yahoo  MeSH Sort: Descending Count

Set term frequency threshold: 0 974

Filtered PubMed abstract set published between Feb/2007 - Nov/2007 about Thailand

disease outbreak h5n1 virus virus h5n1 antiviral agent avian influenza clinical signs domestic cats  
 influenza vaccinated mammalian species

Tags:  One  Two  Yahoo  MeSH Sort: Descending Count Rank Change: + -

Set term frequency threshold: 0 5

Choose filter interval: 3m 6m 9m 1Y Max  Update Document List Filter Selection Feb/2007 - Nov/2007

WHO RSS Feed OIE Event List PubMed Abstract List Annotations Document Details

Articles about Thailand for dates Feb/2007 - Nov/2007 16 articles returned. Current page results: 1-16

More like this	Place(s)	Abstract	Date	Title	Author(s)
<a href="#">More like this</a>	<a href="#">Places</a>	<a href="#">Abstract</a>	Mar 2007	Field performance and new uses of rapid influenza testing in Thailand.	D ErdmanP Sava
<a href="#">More like this</a>	<a href="#">Places</a>	<a href="#">Abstract</a>	Feb 2007	On the lower susceptibility of oseltamivir to influenza neuraminidase subtype N1 than ...	M MalaisreeS Ha
<a href="#">More like this</a>	<a href="#">Places</a>	<a href="#">Abstract</a>	May 2007	Highly pathogenic avian influenza H5N1 virus in cats and other carnivores.	H Pouleth Eaber
<a href="#">More like this</a>	<a href="#">Places</a>	<a href="#">Abstract</a>	Feb 2007	The indirect immunofluorescence assay using cardiac tissue from chickens, quails and...	R SirimujalinSD S
<a href="#">More like this</a>	<a href="#">Places</a>	<a href="#">Abstract</a>	May 2007	Difficulty in the rapid diagnosis of avian influenza A infection: Thailand experience.	LM Mundva Apis
<a href="#">More like this</a>	<a href="#">Places</a>	<a href="#">Abstract</a>	Apr 2007	Review of human infections with avian influenza H5N1 and proposed local clinical man...	BS AnqDC LveYS
<a href="#">More like this</a>	<a href="#">Places</a>	<a href="#">Abstract</a>	Mar 2007	Summary of swine influenza activity in Europe, Asia, Africa and Australasia, 2002-2006	D1 Alexander

Transferring data from www.experimental.geovista.psu.edu...

Open Notebook

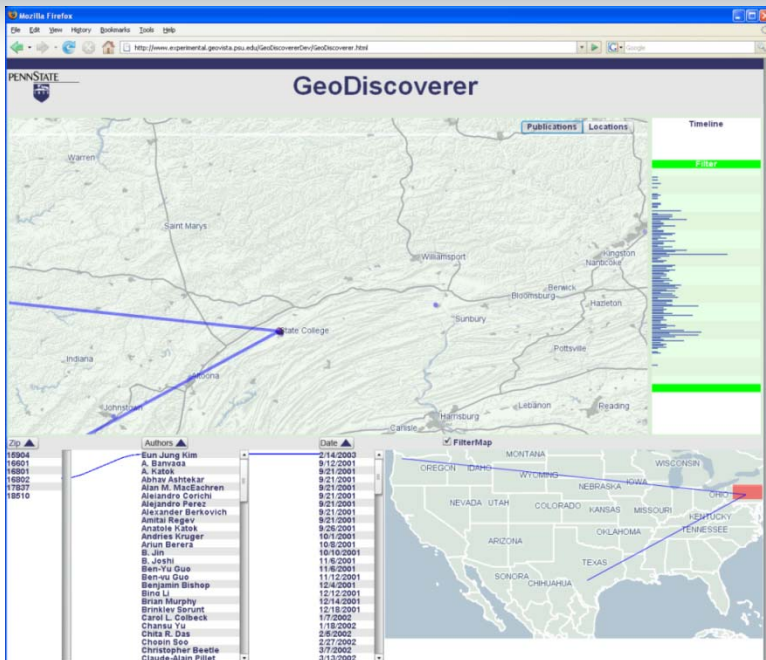
PENNSTATE



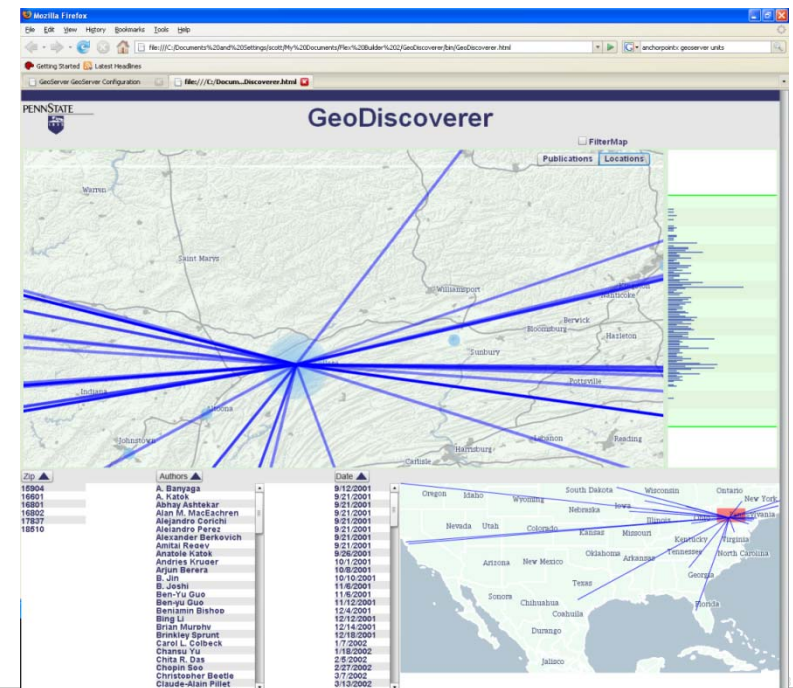
# GeoDiscoverer: search engine to integrate social networks with geospatial information

in collaboration with Lee Giles

An analyst is interested in determining when a particular individual has ‘published’ one or more documents, thus when the content had the potential to make an impact. To pose this question, he simply scrolls to the author name, clicks on it, and views a display of publication dates associated with this author. Clicking on a particular publication shows (on the map) where the co-authors are in relation to the main author.



A second analyst notices a series of publications of interest generated from one institution/ location. She is curious about who the authors are collaborating with. To investigate, he uses the geographic view into the data and selects a place by clicking its location on the map. The map shows the number of publications (represented by circle size) and the locations of all collaborators from other locations (shown with radiating lines).





# GeoDiscoverer: search engine to integrate social networks with geospatial information

in collaboration with Lee Giles

Mozilla Firefox  
 File Edit View History Bookmarks Tools Help  
 http://www.apps.geovista.psu.edu/flex/GeoDiscoverer20/GeoDiscovererNew.html

GeoDiscoverer20

title	date
Current issues in cancer vaccine development.	1999
Interleukin-10 enhances the therapeutic effectiveness of a recombinant poxvir...	1999
A phase I trial of intralesional RV-B7.1 vaccine in the treatment of malignant ...	2000
Phase I clinical trial of a recombinant canarypoxvirus (ALVAC) vaccine expressi...	2000
The next generation of vaccines for the treatment of cancer.	2001
Innovative treatments for pancreatic cancer.	2001
Insertion of interleukin-2 (IL-2) and interleukin-12 (IL-12) genes into vaccinia ...	2002
Prostate-specific antigen vaccines for prostate cancer.	2002
Immunotherapy for pancreatic cancer: current concepts.	2002
Poxviruses as vectors for cancer immunotherapy.	2003
Clinical protocol. Intra-Lesional rF-B7.1 versus rF-TRICOM vaccine in the treat...	2003
The role of poxviruses in tumor immunotherapy.	2003
Local delivery of poxvirus vaccines for melanoma.	2004
Poxvirus vaccines for cancer and HIV therapy.	2004
Phase II randomized study of vaccinia treatment of advanced prostate cancer (...)	2004
Local delivery of recombinant vaccinia virus expressing secondary lymphoid ch...	2004
Immunotherapy for melanoma.	2004
Adjuvant therapy for malignant melanoma.	2004
Paniculitis after vaccination against CEA and MUC1 in a patient with pancreati...	2005
TG-4010 Transgene.	2005

**Local delivery of recombinant vaccinia virus expressing secondary lymphoid chemokine (SLC) results in a CD4 T-cell dependent antitumor response.**

**2004-07-12**

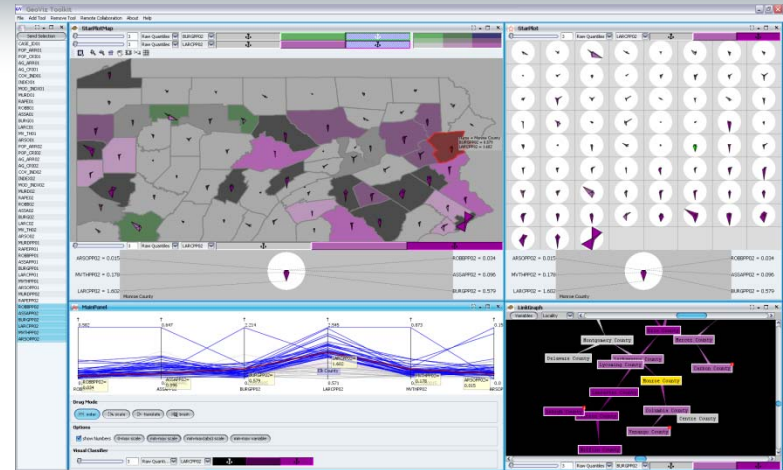
Secondary lymphoid chemokine (SLC) attracts mature dendritic cells (DCs) and nave T cells. Co-localization of these cells within local tumor environments may enhance the induction of tumor-specific T cells. However, the presence of danger signals or other DC maturation signals are required to optimize T-cell priming. We hypothesized that expression of SLC in vaccinia virus would provide local chemokine delivery and adjuvant factors. A recombinant vaccinia virus expressing murine SLC (rVmSLC) was constructed and characterized. SLC expression was confirmed by Western blot analysis and functional activity was determined by in vitro chemotaxis assay. Supernatants from rVmSLC-infected cells attracted CD4 T cells, and also induced the migration of CD8 T cells and DCs. Although poxviruses are known to express several chemokine-binding proteins, systemic injection of rVmSLC was well tolerated in mice up to a dose of  $1 \times 10^7$  pfu and did not significantly alter vaccinia-specific T-cell immunity. Local injection of rVmSLC into established tumors derived from the murine colon cancer line, CT26, resulted in enhanced infiltration of CD4 T cells, which correlated with inhibition of tumor growth. The central role of CD4 T cells was further demonstrated by loss of anti-tumor activity in CD4 T-cell depleted mice. Intratumoral delivery of SLC using a poxviral vaccine extends the use of SLC in anti-tumor therapies and may present an effective alternative for improving the immunotherapy of cancer alone or in combination with other anti-tumor agents

Search Tags  
 count Descending  
 Adenocarcinoma Disease Models, Animal T-Lymphocytes  
 Tumor Escape Cytotoxicity, Immunologic Poxviridae Interleukin-2  
 Chemokines, CC Genetic Vectors Cohort Studies Forecasting  
 Cytokines Kinetics Blotting, Western Peptide Fragments  
 Colonic Neoplasms Prostate-Specific Antigen Interleukin-10  
 Interleukin-12 Drugs, Investigational Immunohistochemistry  
 Liver Neoplasms CD4-Positive T-Lymphocytes T-Lymphocytes, Regulatory  
 Granulocyte-Macrophage Colony-Stimulating Factor Peptides Lac Operon  
 Chemotherapy, Adjuvant Lymphocyte Activation Mice  
 Tumor Cells, Cultured Blotting, Southern Phenotype Gene Expression  
 HIV Recombination, Genetic Chemotaxis, Leukocyte  
 Antineoplastic Agents Neoplasms, Experimental United States  
 Rectal Neoplasms Female Patient Selection Disease-Free Survival  
 Vaccines, Synthetic beta-Galactosidase Fatal Outcome  
 Antibodies, Monoclonal Adult Stomach Neoplasms Epitopes  
 T-Lymphocyte Subsets Proportional Hazards Models  
**Cancer Vaccines** Microinjections Quality of Life  
 Clinical Trials Neoplasms Humans Antigens, CD80  
 Gene Therapy Immunotherapy, Adoptive Vaccines, Subunit  
**Immunotherapy** Avipoxvirus Aged Time Factors  
 Reverse Transcriptase Polymerase Chain Reaction Clinical Trials, Phase II  
 Male Prostatic Neoplasms Drug Compounding HIV Infections  
 Prostate Autoimmunity Neovascularization, Pathologic Vaccination



# Analyzing Place-Time

homeland security goal: address the need for an orders of magnitude increase in ability to extract situation-relevant info from diverse data sources



- integrated visual + computational methods applied to multivariate data
- finding the where, when, what, and who of events and relations in unstructured text

**The attacks**

Main article: [September 11, 2001 timeline for the day of the attacks](#)

Four commercial **airliners** were hijacked en route to California from Logan International, Dulles International, and Newark airports. Each of the **airliners** had a jet fuel capacity of nearly 24,000 U.S. gallons (91,000 liters) or 144,000 pounds (65,455 kilograms).<sup>[9]</sup> Two of the **airliners** were flown into the World Trade Center, one each into the **North** and South towers, one was flown into the Pentagon, and the fourth crashed near Shanksville, Pennsylvania.

- **American Airlines Flight 11**, a Boeing 767-200<sup>[7]</sup> wide-body **aircraft**, crashed into the **northern** side of the **North** Tower of the World Trade Center (WTC) at 8:46-30 a.m. local time (Eastern Daylight Time, 12:46:30 UTC).
- **United Airlines Flight 175**, a Boeing 767-200<sup>[8]</sup> crashed into the South Tower at 9:02:59 a.m. local time (13:02:59 UTC), an event covered live by television broadcasters and amateur filmers from around the world who had their cameras trained on the buildings after the earlier crash.
- **American Airlines Flight 77**, a Boeing 757-200<sup>[9]</sup> crashed into the Pentagon at 9:37:46 a.m. local time (13:37:46 UTC).
- **United Airlines Flight 93**, a Boeing 757-200<sup>[10]</sup> crashed in a field in southwest Pennsylvania just outside of Shanksville, about 150 miles (240 km) northwest of Washington, D.C., at 10:03:11 a.m. local time (14:03:11 UTC). The crash in Pennsylvania resulted from the passengers of the **airline** attempting to regain **control** from the hijackers.

Three buildings in the World Trade Center Complex collapsed due to structural failure on the day of the attack. The south tower (2 WTC) fell at approximately 9:59 a.m., after **burning** for 56 minutes in a fire caused by the impact of United Airlines Flight 175 at 9:03 a.m. The **north** tower (1 WTC) fell at 10:28 a.m., after **burning** for approximately 102 minutes in a fire caused by the impact of **American Airlines Flight 11** at 8:46 a.m. A third building, 7 World Trade Center (7 WTC) collapsed at 5:20 p.m., after being heavily **damaged** by debris from the Twin Towers when they fell.<sup>[11][12]</sup> Numerous adjacent buildings to the complex also had substantial **damage** and fires and had to be demolished. The Deutsche Bank Building is the only remaining large structure that suffered **damage** and fires at **ground** zero that has yet to be fully demolished, though this is expected to be completed by mid 2007.<sup>[13]</sup>

During the hijacking some passengers and crew members were able to make phone calls using the cabin GTE airplane service.<sup>[14][15]</sup> They reported that several hijackers were aboard each plane.

The **terrorists** reportedly took **control** of the **aircraft** by using knives and box-cutter knives to kill flight attendants and at least one **pilot** or passenger, including the **captain** of Flight 11, John Ogonowski.<sup>[16]</sup>

Some form of noxious chemical spray, such as tear gas or pepper spray, was reported to have been used on **American 11** and United 175 to keep passengers out of the first-class cabin.<sup>[17]</sup> Bomb threats were made on three of the **aircraft**, but not on **American 77**. According to the 9/11 Commission Report, the bombs were probably fake. The 9/11 Commission established that two of the hijackers had recently purchased Leatherman multi-function hand tools.

On United Airlines Flight 93, black box recordings revealed that crew and passengers attempted to seize **control** of the plane from the hijackers after learning through phone calls that similarly hijacked planes had been crashed into buildings that morning. According to the transcript of Flight 93's recorder, one of the hijackers gave the order to roll the plane once it became evident that they would lose **control** of the plane to the passengers. Soon afterward, the **aircraft** crashed into a field near Shanksville in Stonycreek Township, Somerset County, Pennsylvania, at 10:03:11 a.m. local time (14:03:11 UTC). Al-Qaeda leader Khalid Shaikh Mohammed mentioned in a 2002 interview with an Al Jazeera journalist that Flight 93's target was the United States Capitol,<sup>[18]</sup> which was given the code name "The Faculty of Law."<sup>[19]</sup>

The attacks created widespread confusion across the United States. All international civilian air traffic was banned from **landing** on US soil for three days; **aircraft** already in flight were either turned back or **rerouted** to airports in eastern Canada. Unconfirmed and often contradictory reports were aired and published throughout the day. One of the most prevalent of these reported that a car bomb had been detonated at the U.S. State Department's **head**quarters, the Truman Building in Foggy Bottom, Washington, D.C. This erroneous report, picked up by the wire services, was reported on CNN and in a number of newspapers published that day. Soon after reporting for the first time on the Pentagon crash, CNN and

World Trade Center  
The Pentagon  
Shanksville, Pennsylvania  
Effects and aftermath  
World political effects  
World economic effects  
Defections  
Airport security  
Cloisings and cancellations  
Audiovisual entertainment  
Local health  
**Response**  
Global Guardian  
Government response  
Rescue and recovery effort  
Financial assistance  
Operation Yellow Ribbon  
Memorials and services  
**Perpetrators**  
Responsibility  
Organizers  
Conspiracy theories  
**Miscellaneous**  
Communication  
Tower collapse  
Slogans and terms  
**Opportunities**  
**Inquiries**  
U.S. Congressional Inquiry  
9/11 Commission Report  
This box: view - talk - edit

A sequential look at United Flight 175 crashing into the south tower of the World Trade Center

Above, a taxicab was hit by a lightpole as **American Airlines Flight 77** passed over Washington Boulevard and crashed into the Pentagon.

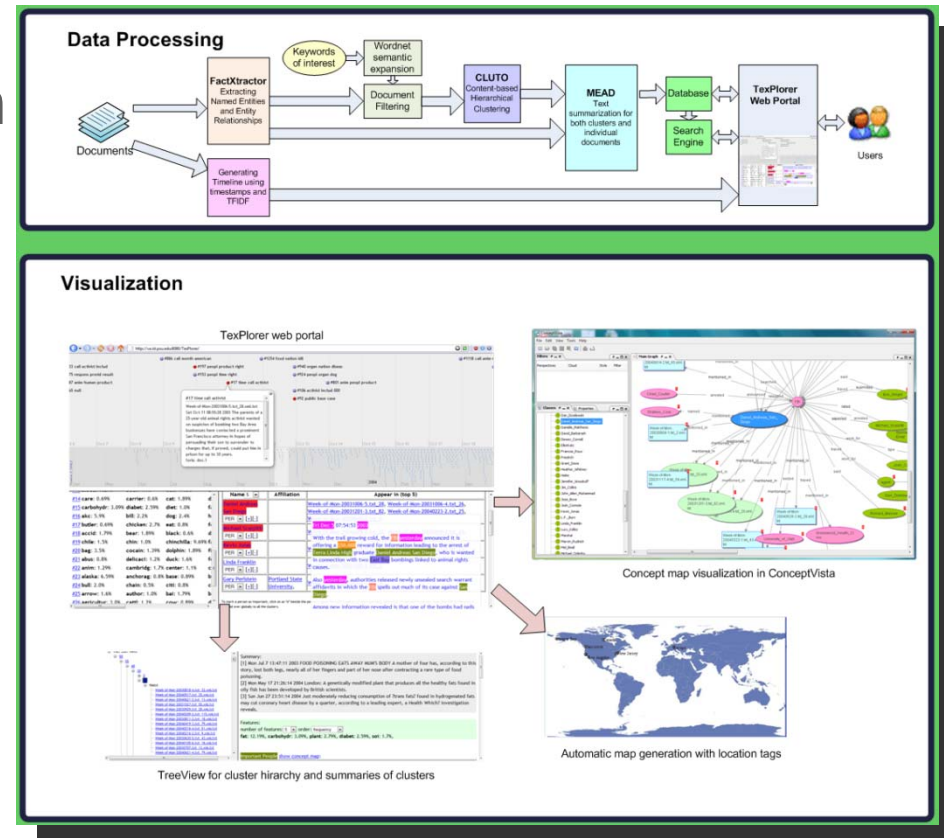
en 2008

# TexPlover

- An integrated system for exploring and analyzing large amounts of text documents.

TexPlover includes:

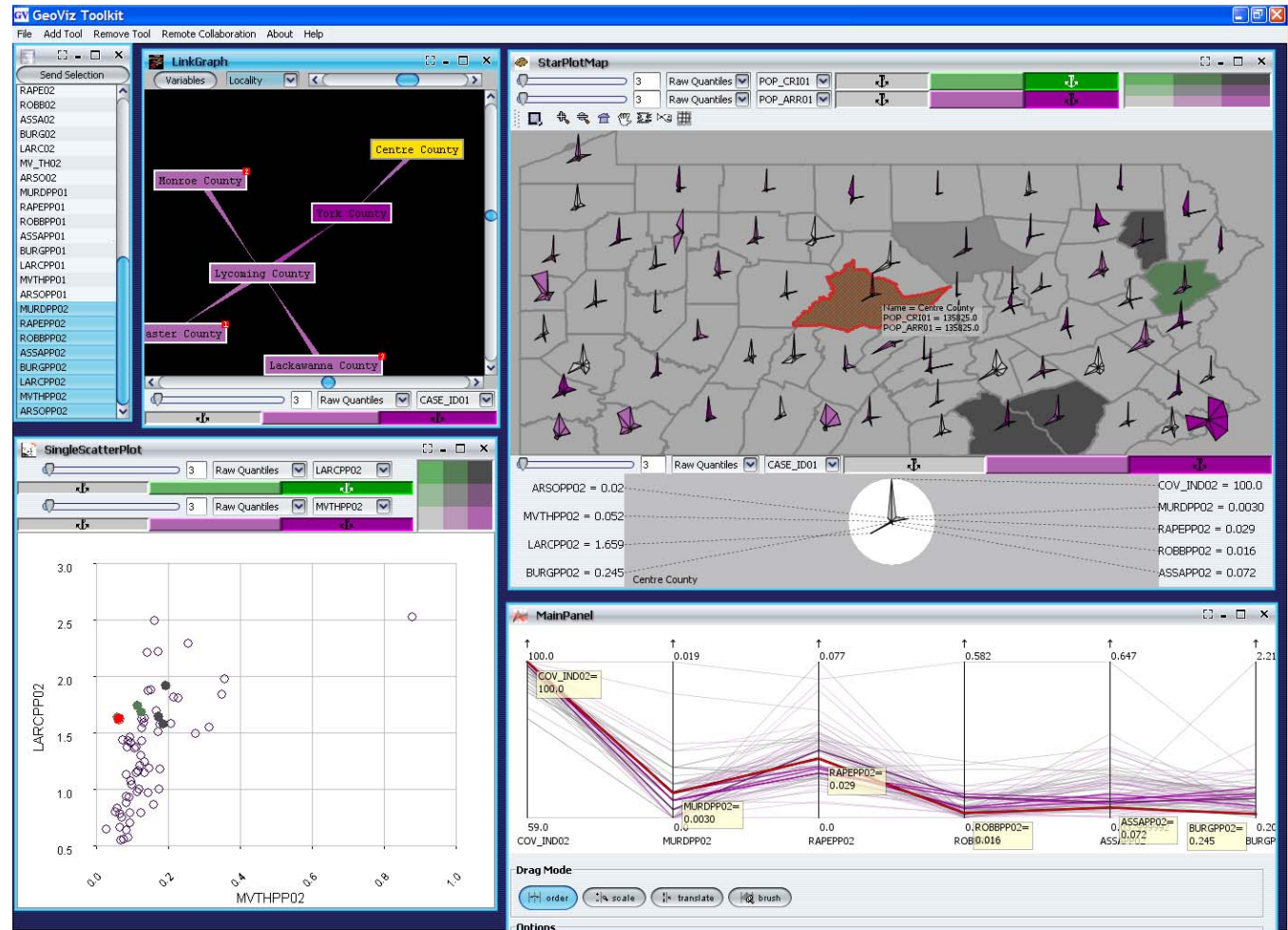
- Named Entity Recognition
- Entity Relation Extraction
- Text Clustering
- Text Summarization
- Visualization





# GeoViz Toolkit: finding patterns and relations in multivariate, georeferenced data

- Enables analysts to easily understand multivariate patterns
- Applied here to crime pattern analysis
- Funding by CDC for application to cancer & co-variate analysis



Frank Hardisty

© Alan M. MacEachern, 2008

# Research: Visual Relationship Analysis

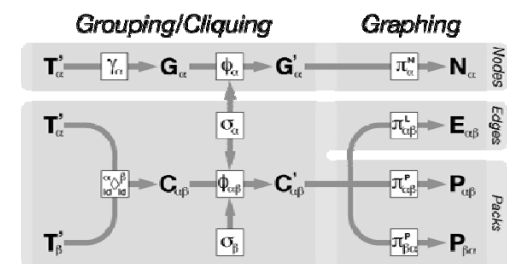
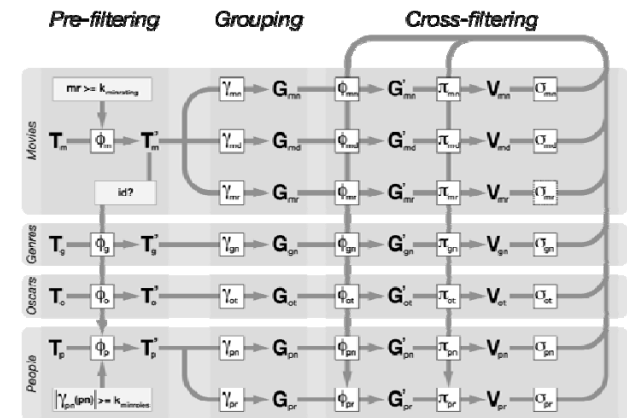
- Goals
  - Support a wide variety of general and specific visual analysis tasks.
  - Allow users to follow complex lines of inquiry using sequences of simple interactions.

- Relevance

- Provide visual means to find and compare the ‘needles’ that connect attribute values in ‘haystacks’ of high-dimensional data.

- Accomplishments

- **Cross-Filtered Views:** Pose complex drill-down set queries.
  - **Attribute Relationship Graph:** Filter a multigraph of attribute value co-occurrences across data columns.
- Generalizable to different information sources
- Extendable to multiple interrelated data sets
- Combinable into functionally-rich visual tools



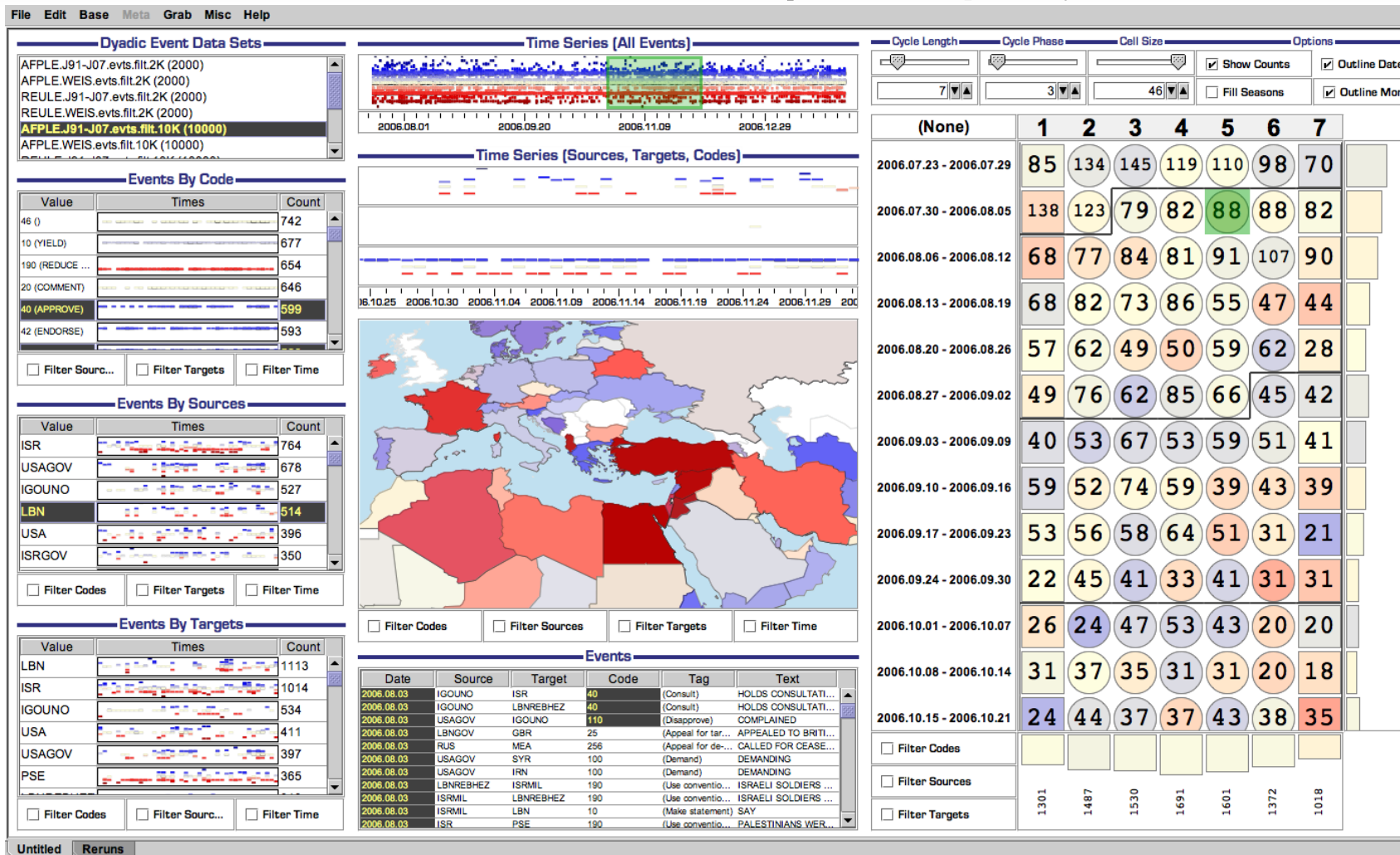
Chris Weaver

© Alan M. MacEachern, 2008



# News wire-extracted international events between state-level actors

Problem: What geographic and temporal patterns of political activity can be discovered in international events reported by major news services?

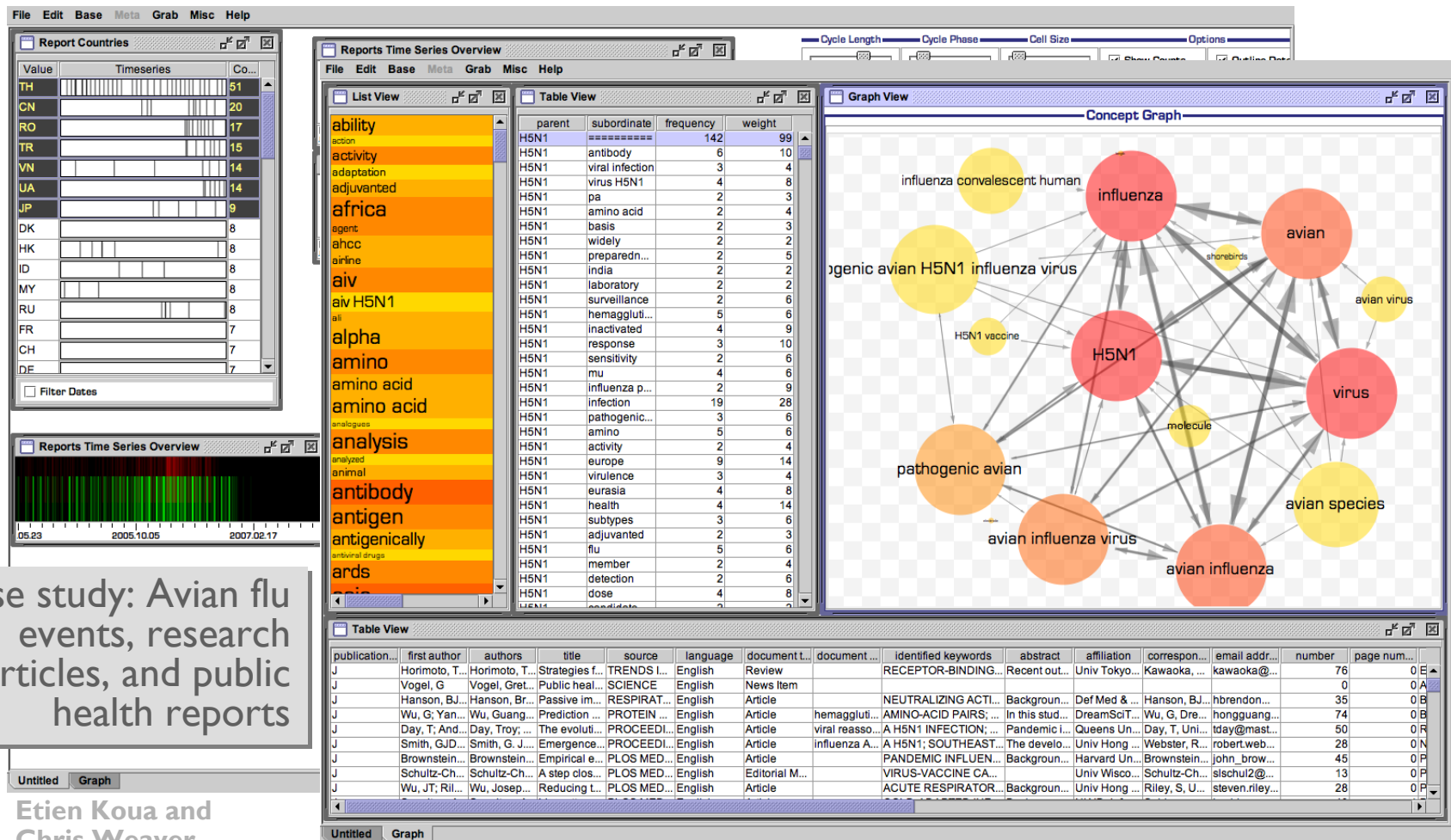


Using the Kansas Event Data System (KEDS) Chris Weaver & Phil Schrodt (U of Kansas)



# Linking events with science: Geo-temporal relationships among multiple data channels

Problem: How can we contextualize events and risks, geo-temporally, in evolving scientific knowledge?

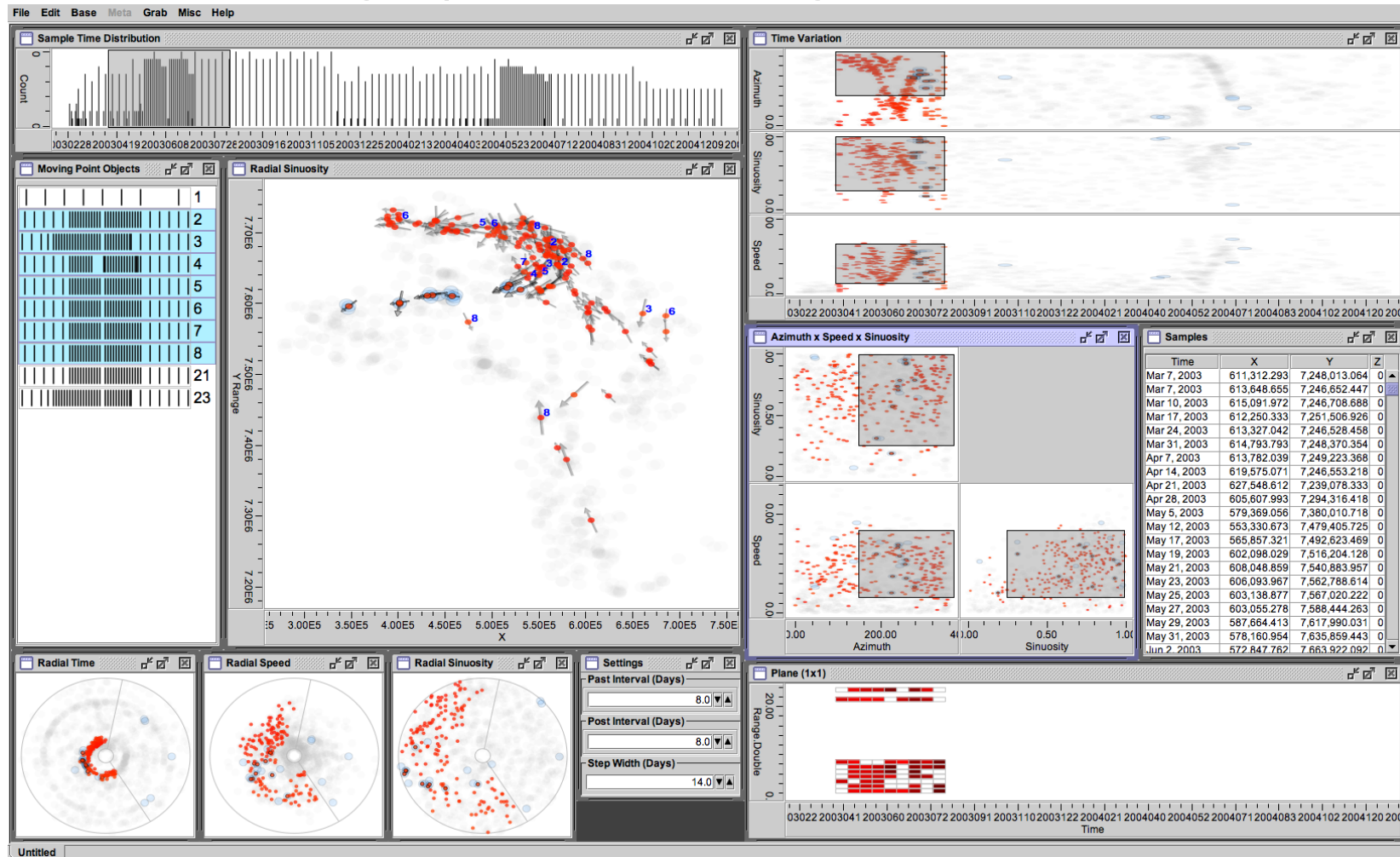


Case study: Avian flu events, research articles, and public health reports

Etien Koua and Chris Weaver

# Space-Time Analytics: Analysis of group behavior

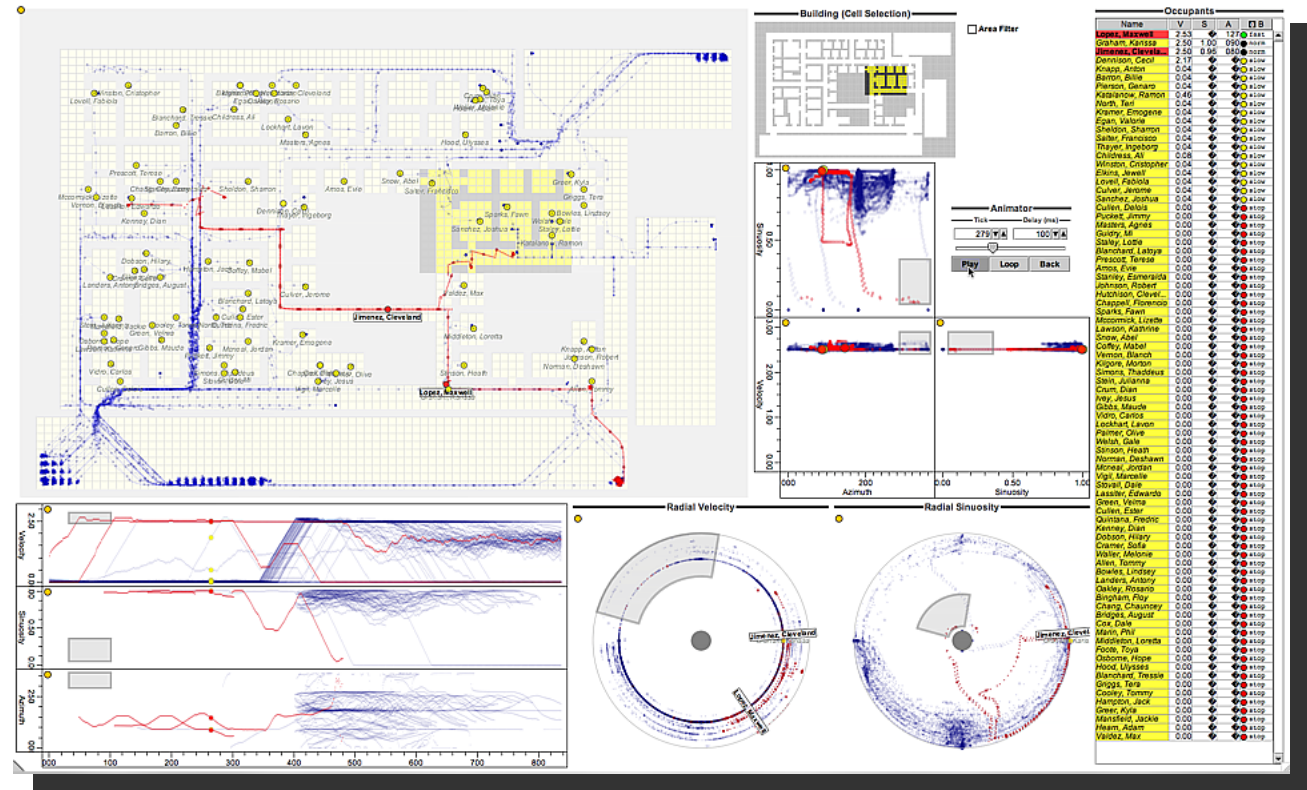
Problem: Given the dramatic increases of data depicting moving point objects, how can “relevant” group behaviors be recognized?



Chris Weaver & Patrick Laube M. MacEachren, 2008

# Space-Time Analytics: building evacuation

- evacuation analysis: looking for unusual behaviors, bottlenecks, impediments



# Conclusions

- Place & Time are Fundamental ... to all components of Homeland Security
- NEVAC foci: R&D to assemble time-relevant info about places at risk and to use the information effectively to decrease threats and increase resilience

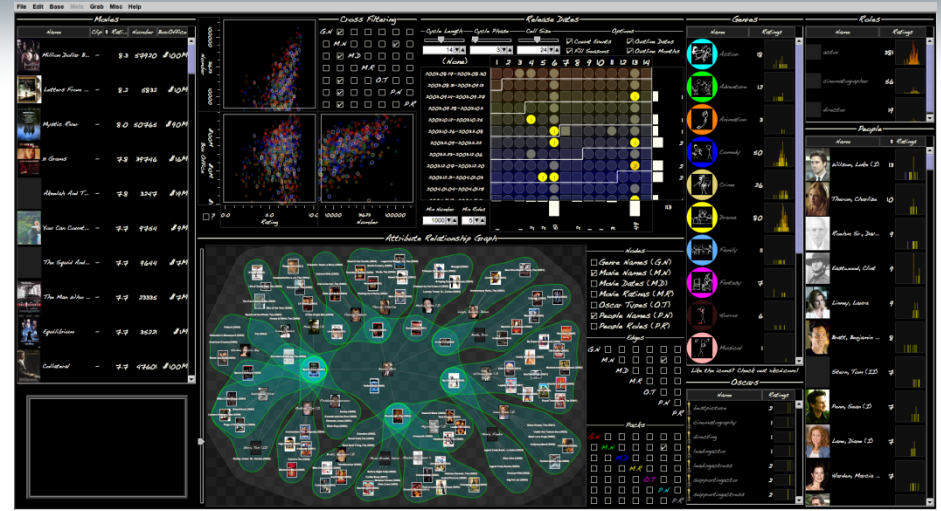
## Questions?

[maceachren@psu.edu](mailto:maceachren@psu.edu)



# Impacts: Visual Relationship Analysis

- Prototype tool: *Cinegraph*
  - InfoVis 2007 Contest Winner
  - Multiple data sets from IMDB
  - Built in 2 days by one person
  - Drill-down into movies, genres, release dates, people, awards, ratings, box office numbers



Movies for each actor who has worked with Kevin Bacon since 2001.

- Future Impact
  - Analogous application to problems of interest to the community
  - Drill-down into events and activities in terms of occurrences, categories, dates, actors, responses, measurable effects, **etc.**
  - Plans
    - Demonstrate on data sets extracted from synthetic intelligence reports in Frank Hughes' exercises, using NEVAC text extraction research
    - One possible element of our VAST 2008 Contest solution strategy [?]





# Data-to-knowledge and back: Integrating knowledge management with visual analytics

Problem: interpreting data to identify a disease event

The screenshot displays a software interface titled "penn51.viz" with a menu bar (File, Edit, Misc, Base, Meta, Help). The interface is divided into several panels:

- Left Panel:** A list of Pennsylvania counties (Wayne, Susquehanna, Bradford, Tioga, Pike, Potter, Erie, Lackawanna, Wyoming, Mc Kean, Warren, Sullivan, Lycoming, Luzerne, Monroe, Crawford, Cameron, Elk, Columbia, Clinton, Forest, Carbon, Venango, Northampton, Northumberland, Montour, Union, Clarion, Jefferson, Mercer, Centre, Schuylkill, Clearfield, Lehigh, Snyder, Berks) and two charts: "County Demographics" (Population Density (2000)) and "Disease cases" (Age).
- Top Center Panel:** "Concept Map" showing a network of nodes. Nodes include "Cases" (yellow), "West Nile Virus" (yellow), "Influenza (Flu)" (yellow), "Viral Pneumonia" (yellow), and "Dr. Stephen Guptill" (white). Red nodes represent individual cases (e.g., Case 001, Case 002, Case 003, Case 009, Case 014, Case 015, Case 017, Case 019, Case 022, Case 023, Case 024, Case 027, Case 031, Case 032, Case 036, Case 038). Relationships are labeled with terms like "type", "member", "subClassOf", and "member".
- Top Right Panel:** "Concept Hierarchy" showing a tree structure of classes: "West Nile Virus", "Geographic Spread", "Cases (2002)", "Cases (2003)", "Institution", "Acambis", "CDC", "FDA", "NASA".
- Bottom Right Panel:** "Resources" window showing a web resource: "Address: ntology/Stephen\_Guptill/West\_Nile\_Virus.htm". The content includes a photograph of a mosquito and text: "West Nile virus was first isolated from a febrile adult woman in the West Nile District of Uganda in 1937." and "The ecology was characterized in Egypt in the 1950s. The virus became recognized as a cause of severe human meningoencephalitis (inflammation of the spinal cord and brain) in elderly patients during an outbreak in Israel in 1957."

Approach: visual group, select, and filter of data linked to disease-focused concept maps, ontologies, and web resources



# Health GeoJunction: place, time, concept filtering of health science in PubMed

Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.personal.psu.edu/mzs114/HealthGeoJunction/GeoJunction10.html

amforl

Health GeoJunction

overall tag cloud

filtered tag cloud

about

from

Indonesia

14 PubMed abstracts about Indonesia in selected date range.

First event: Nov/2006  
Last event: Jun/2007

Click symbol for event details.

Legend

Number of PubMed Abstracts

60  
45  
30  
15

About country  
From country

Choose filter interval: 3m 6m 9m 1Y Max

Update Document List

Filter Selection Nov/2005 - Nov/2007

Timeline

Tag Clouds

MeSH Geographic Hierarchy

Geonames Geographic Hierarchy

PubMed abstract set

disease outbreak avian influenza influenza virus influenza vaccinated  
influenza viruses chick embryo antiviral agent poultry disease virus replicated  
h5n1 virus cell line base sequence world health h5n1 influenza human influenza  
viral protein united states species specific influenza pandemic pandemic influenza  
bird flu hong kong avian flu virus strain middle aged risk factor virus infect  
monoclonal antibodies hemagglutination test reassortant viruses neutralization test  
viral vaccination international cooperation wild bird influenza outbreak public health sialic acid  
risk assessment virus disease gene segment immune sera mdck cell avian species

Tags: One Two Yahoo MeSH Sort: Descending Count

Set term frequency threshold: 0

974

Apply Filters: Place Tag Time

Filtered PubMed abstract set published between Nov/2006 - Nov/2007 about Indonesia

avian influenza disease outbreak h5n1 virus influenza vaccinated h5n1 influenza antiviral agent  
base sequence develop countries h5n1 vaccine international cooperation virus infect

More like this

Place(s)

Abstract

Date

Title

Author(s)

More like this	Place(s)	Abstract	Date	Title	Author(s)
More like this	Places	Abstract	Oct 2006	Avian influenza, Indonesia--update.	
More like this	Places	Abstract	Oct 2006	[Development of attenuated H5N1 avian influenza vaccines using reverse genetic tech...	T Odaqiri
More like this	Places	Abstract	Oct 2006	Outbreak news. Avian influenza, Indonesia--update.	
More like this	Places	Abstract	Mar 2007	Susceptibility of highly pathogenic A(H5N1) avian influenza viruses to the neuraminida...	IG Barr R Shaw, L...
More like this	Places	Abstract	Nov 2006	Three Indonesian clusters of H5N1 virus infection in 2005.	KH Chang Sama
More like this	Places	Abstract	Jan 2007	Identification of A/H5N1 influenza viruses using a single gene diagnostic microarray.	DM Dankbar RD K...
More like this	Places	Abstract	Jan 2007	Epidemiology. Indonesia: base village widens to fight bird flu.	D. Norville

Articles for dates Nov/2005 - Nov/2007 about Indonesia related to disease outbreak 14 articles returned. Current page results: 1-14

10/11/2007

PENNSYLVANIA STATE UNIVERSITY

# Health GeoJunction: place, time, concept filtering of health science in PubMed

Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.personal.psu.edu/mzs114/HealthGeoJunction/GeoJunction10.html

amforl

Health GeoJunction

Legend

Number of PubMed Abstracts

120  
90  
60  
30

About country  
From country

Tag Clouds MeSH Geographic Hierarchy Geonames Geographic Hierarchy

PubMed abstract set

disease outbreak avian influenza influenza virus influenza vaccinated  
 influenza viruses chick embryo antiviral agent poultry disease virus replicated  
 h5n1 virus cell line base sequence world health h5n1 influenza human influenza  
 viral protein united states species specific influenza pandemic pandemic influenza  
 bird flu hong kong avian flu virus strain middle aged risk factor virus infect  
 monoclonal antibodies hemagglutination test reassortant viruses neutralization test  
 viral vaccination international cooperation wild bird influenza outbreak public health sialic acid  
 risk assessment virus disease gene segment immune sera mdck cell avian species

Tags: One Two Yahoo MeSH Sort: Descending Count

Set term frequency threshold: 0

974

Apply Filters: Place Tag Time

Filtered PubMed abstract set published between Nov/2006 - Nov/2007 about Indonesia

avian influenza disease outbreak h5n1 virus influenza vaccinated h5n1 influenza antiviral agent

base sequence develop countries h5n1 vaccine international cooperation virus infect

Tags: One Two Yahoo MeSH Sort: Descending Count Rank Change: +100

Set term frequency threshold: 2

Choose filter interval: 3m 6m 9m 1Y Max

Update Document List Filter Selection Nov/2006 - Nov/2007

PubMed Abstract List Annotations Document Details

More like this	Places	Abstract	Date	Title	Author
More like this	Places	Abstract	Oct 2006	Avian influenza, Indonesia--update.	
More like this	Places	Abstract	Oct 2006	Development of attenuated H5N1 avian influenza vaccines using reverse genetic tech...	T Odaqiri
More like this	Places	Abstract	Oct 2006	Outbreak news. Avian influenza, Indonesia--update.	
More like this	Places	Abstract	Mar 2007	Susceptibility of highly pathogenic A(H5N1) avian influenza viruses to the neuraminidase...	IG Barr R Shawl
More like this	Places	Abstract	Nov 2006	Three Indonesian clusters of H5N1 virus infection in 2005.	KH Chang Sama
More like this	Places	Abstract	Jan 2007	Identification of A/H5N1 influenza viruses using a single gene diagnostic microarray.	DM DankbarRD
More like this	Places	Abstract	Jan 2007	Epidemiology. Indonesia taps village wisdom to fight bird flu.	D Normile
More like this	Places	Abstract	May 2007	Rapid diagnosis of H5N1 avian influenza virus infection by newly developed influenza ...	M ImaINT TienM
More like this	Places	Abstract	Feb 2007	[Since Bruxelles, Tokyo, Pekin and Diskarta]	JY Nau
More like this	Places	Abstract	Apr 2007	Avian influenza. Indonesia to share flu samples under new terms.	D Normile

# GeoDiscoverer

- A Flexible map-based interface that supports overview + detail analysis of cross connections of social networks
- Web-based UI using Flex/Flash on the client and PHP and Java web services on the server
- Multi-view interface including Tag Clouds for displaying search results, map, network graph, timeline and detailed publication view of data



# GeoDiscoverer – Analysis Scenario

- Search for an Individual through a flexible search tool
- Show names/aliases which match the search
- Select individual names/aliases or multiple to visualize network graphs, maps, timelines of individual locations and attributes
- Resolve names/aliases which are believed to be the same person





# GeoDiscoverer

Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.apps.geovista.psu.edu/flex/GeoDiscoverer20/GeoDiscovererNew.html

GeoDiscoverer20

title	date
IgM anti-ganglioside antibodies induced by melanoma cell vaccine correlate with...	1999
Active specific immunotherapy with polyvalent melanoma cell vaccine for patie...	1999
Vaccine therapy for patients with melanoma.	2000
Sentinel node detection in malignant melanoma.	2000
Serum TA90 antigen-antibody complex as a surrogate marker for the efficacy ...	2001
CancerVax, an allogeneic tumor cell vaccine, induces specific humoral and cellul...	2001
Lymphatic mapping and sentinel lymphadenectomy for melanoma: past, presen...	2001
Cytoreductive surgery and adjuvant immunotherapy in the management of met...	2001
Induction of a systemic immune response by a polyvalent melanoma-associated...	2002
Active immunotherapy by reinduction with a polyvalent allogeneic cell vaccine ...	2002
Enhanced humoral immune response correlates with improved disease-free an...	2002
Prolonged survival of patients receiving active immunotherapy with Canvaxin th...	2002
Prolonged survival after complete resection of disseminated melanoma and acti...	2002
Humoral immune response to a therapeutic polyvalent cancer vaccine after com...	2003
Determinant spreading associated with clinical response in dendritic cell-based...	2003
Immunotherapy of malignant melanoma.	2003
Serum total ganglioside level correlates with clinical course in melanoma patie...	2003
Molecular tumor markers in the blood: early prediction of disease outcome in ...	2003
Melanoma: is immunotherapy of benefit?	2003
Melanoma-inhibiting activity assay predicts survival in patients receiving a ther...	2003

**Antigen-based immunotherapy of melanoma: Canvaxin therapeutic polyvalent cancer vaccine.**

**2004-03-05**

As yet there are no FDA-approved cancer vaccines for malignant melanoma, but encouraging response rates and low toxicities reported in phase I/II trials suggest that antigen-based active immunotherapy may complement current treatment modalities. The cumulative data for Canvaxin therapeutic polyvalent cancer vaccine represent the largest phase II clinical trial of any cancer vaccine. Univariate and multivariate analyses of these data have demonstrated the prognostic significance of this allogeneic whole-cell preparation as a postoperative adjuvant treatment for patients with stage III and IV melanoma. The vaccine has also been shown promising results after resection of stage II melanoma and in patients with regional in-transit disease. The consistent correlation between immune and clinical responses to the vaccine suggests that immune parameters may be used to monitor a patient's response to vaccine therapy.

**Search** Tags

count Descending

Adenocarcinoma Cytotoxicity, Immunologic Risk Assessment

DNA, Neoplasm Survival Lymphoma Forecasting Coloring Agents

Cytokines Tumor Markers, Biological Colonic Neoplasms

Antibodies, Anti-Idiotypic Tumor Stem Cells Immunohistochemistry

Immunoglobulin G Lymph Node Excision Radionuclide Imaging

Terminology Chemotherapy, Adjuvant Peptides Cancer Care Facilities

Combined Modality Therapy Mice Tumor Cells, Cultured

Follow-Up Studies Sensitivity and Specificity BCG Vaccine

Hypersensitivity, Delayed Neoplasm Proteins Animals

Survival Analysis California Female

Enzyme-Linked Immunosorbent Assay Neoplasm Metastasis

Antibodies, Neoplasm Disease-Free Survival Predictive Value of Tests

Randomized Controlled Trials Gangliosides Retrospective Studies

Radiopharmaceuticals Quality Control Immunotherapy, Active

Multivariate Analysis Adolescent Cats Postoperative Care

Dendritic Cells Treatment Outcome Adult Melanoma

Aged, 80 and over Lymphatic Metastasis Proportional Hazards Models

Epitopes Cancer Vaccines Immunity

Neoplasm Invasiveness Survival Rate Clinical Trials

Humans Immunotherapy, Adoptive Neoplasm Staging

Immunotherapy Risk Factors Antibody Formation Aged

Time Factors Reverse Transcriptase Polymerase Chain Reaction Male

Zoom 2d 3d M... Nov 15, 2000 - Jun 13, 2003



## applying the typology

*structure:* given  $X \rightarrow$  **determine**  $Y$

*example – elementary* when  $\rightarrow$  what + where

- given when  $\rightarrow$  **determine** what + where
  - *ID task:* given 1999  $\rightarrow$ 
    - **determine** which county has the highest rate
  - *Compare task:* given 1997 and 2001
    - **determine** which county ... increased the most



## general tasks (with respect to time)

when → what + where

- identify behaviors over time interval(s)
  - elementary for what, where, or both
  - general for what, where, or both
- Compare behaviors over same interval
  - two instances of one “thing”
  - two different, potentially related “things”
- Compare behaviors between/among time intervals: e.g., one year to another



## applying the typology

*structure:* given  $X \rightarrow$  **determine**  $Y$

*example* – general what + where  $\rightarrow$  when

- given what + where  $\rightarrow$  **determine** when
  - *ID task:* given ?  $\rightarrow$ 
    - **determine ?**
  - *Compare task:* given ?
    - **determine ?**





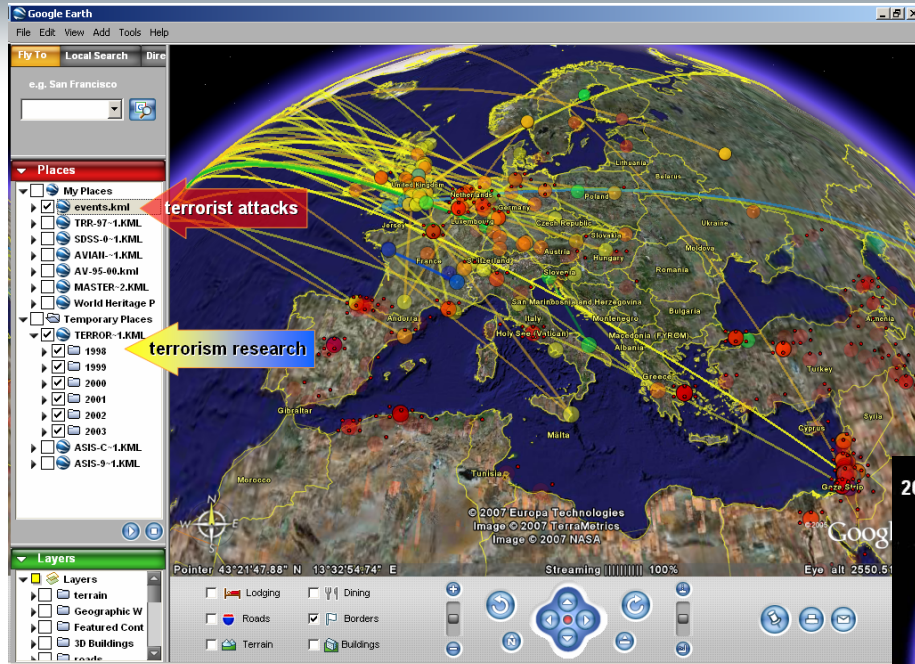
## general tasks (with respect to time)

what + where → when

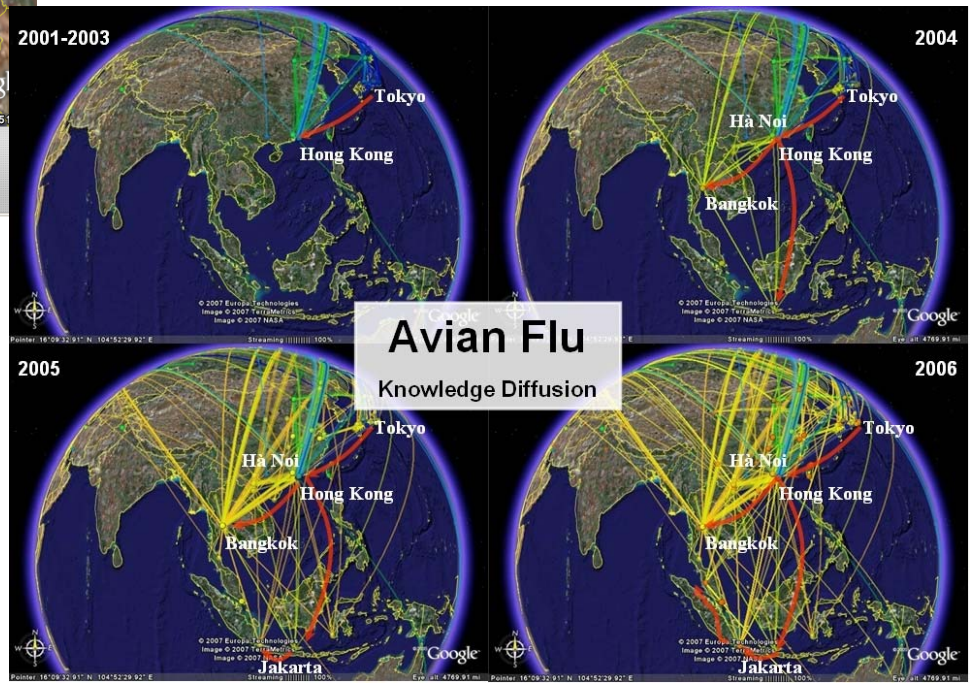
- determine time interval(s) during which a specific behavior took place
  - elementary what + where: during what time interval did **stork X** fly to **location Y**
  - general what + where: during what time interval did **most of the storks** fly **north**



# Integration of geospatial and abstract structural-temporal visualization



overlapping layers depicting terrorist attacks (event location) and terrorism research (expert location)



movement of co-citation behavior related to avian flu research



# What is the CDA?

- Context Discovery Application (CDA)
- Geovisual Analytic environment
- Production of geographical and historical context from implicit sources
- Context analysis and situation assessment activities in humanitarian crisis management



# Tools

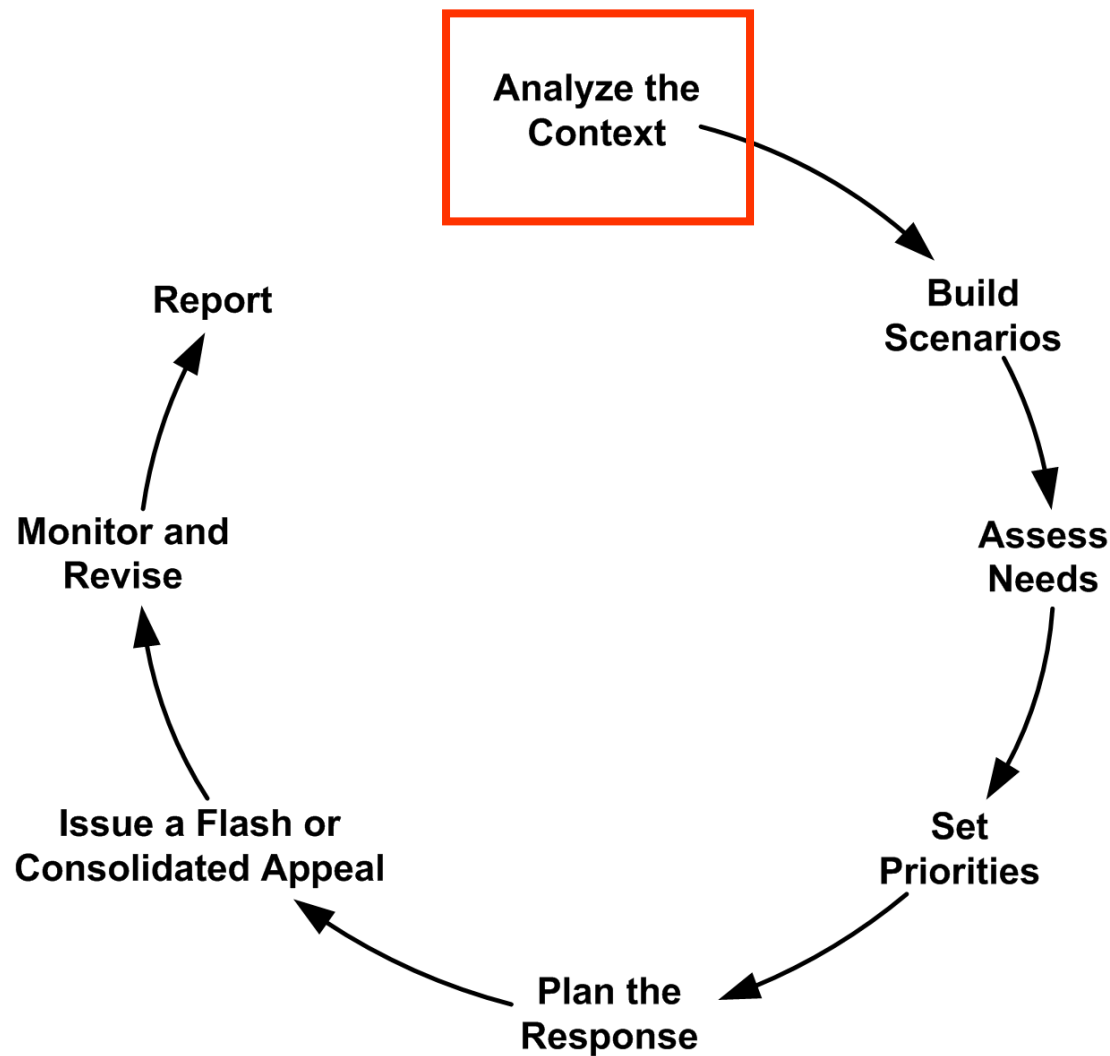
- The Context Discovery Application (CDA)
- Visual representation of and reasoning with GHC
- Geocollaboration
- Geographic Information Retrieval
  - RSS feeds from Google News
- Crisis Management application domain





# Consolidated Appeals Process (CAP) Cycle

## OCHA 2007



Context analysis is meant to “outline the root cause of the crisis and its evolution, including any regional or historical dimensions”



Google Earth

File Edit View Tools Add Help

Search

Fly To Find Businesses Directions

Fly to e.g., 37 25' 19.1"N, 122 05' 06"W

Places Add Content

- My Places
  - Store
  - Google Earth Context Discovery Root (localhost) v.2
    - Google Earth Tools used with Context Discovery Web Client (localhost)
    - Context Discovery
      - Context Discovery Network links - used for interface synchronization and data streaming
        - Get Output KML
          - Get output KML returned from process
            - QA: Better to be safe than sorry (Color:Green)
              - Context Discovery results from story titled: Q&A: Better to be safe than sorry
            - Sudan: UN officials meet with Government on operations of Darfur peacekeepers (Color:Aqua)
              - Context Discovery results from story titled: Sudan: UN officials meet with Government
            - Sudan: Attacked UNAMID convoy completes trip back to base (Color:Pink)
              - Context Discovery results from story titled: Sudan: Attacked UNAMID convoy complete
            - Nutrition information in crisis situations - Report number 15 (Color:Red)
              - Context Discovery results from story titled: Nutrition information in crisis situations -
            - Sudan "bombs" Darfur rebels as violence hampers aid (Color:Red)
              - Context Discovery results from story titled: Sudan "bombs" Darfur rebels as violence
            - Sudan: Newsletter Nov 2007 vol. 20 (Color:Aqua)
              - Context Discovery results from story titled: Sudan: Newsletter Nov 2007 vol. 20

Layers

Pointer 14°07'48.60" N 24°58'52.57" E Streaming 100% Eye alt 4163.20 mi

© 2007 Tele Atlas  
© 2007 Europa Technologies  
© 2007 AND  
Image NASA

© 2007 Google™



Google Earth

File Edit View Tools Add Help

Search

Places Add Content

- Concept {UNAMID}**  
Concept Reference Snippets
- Concept {Armed Forces}**  
Concept Reference Snippets
- Concept {Sudan}**  
Concept Reference Snippets
- Geonames Qry**  
Context Discovery results for geographical dimension: Geonames Qry
- Countries**  
Context Discovery results for geographical dimension: Countries
- Country\_SD**  
Context Discovery results for geographical dimension: Country\_SD
- Unity**  
Location of: Unity
- Unity link to origin**  
Connection to: Unity
- For**  
Location of: For
- For link to origin**  
Connection to: For
- Eastern**  
Location of: Eastern
- Eastern link to origin**  
Connection to: Eastern
- Ei**

Image © 2008 DigitalGlobe  
Image © 2008 TerraMetrics  
© 2007 Europa Technologies

Pointer 13°01'23.09" N 25°00'09.59" E elev 2615 ft Streaming 100% Eye alt 4514 ft





Output Visualization Parameters

Load Search Support Ontology

Linked Tools and Functions

Content

Select web view option:

Welcome Screen/Information | **Map** | Search Results | FEMA Situation Report Extractor (FEM...

Get GeoSandbox Data

Chad

NORTHERN DARFUR

WESTERN DARFUR

Al Junaynah

Al Fashir

Nyala

25.74856, 12.87690

5 Errors

Google Earth

File Edit View Tools Add Help

Search

Fly To Find Businesses Directions

Fly to e.g., 1600 Pennsylvania Ave., 20006

Places Add Content

- My Places
- Store
- Google Earth Context Discovery Root (localhost) v.2
  - Google Earth Tools used with Context Discovery Web Client
  - Context Discovery
    - Context Discovery Network links - used for interface
    - Get Output KML
      - Get output KML returned from process
    - Synchronize Google Map and Google Earth
      - Synchronize Google Map in Web Client with Google Earth
    - Linked functions KML
      - Get linked functions KML
  - Geocollaboration (localhost)
    - Geocollaboration Interface links - used for interface
  - Temporary Places

Tine

Location of: Tine

[Send Location to GeoSandbox](#)

Directions: [To here](#) - [From here](#)

El Geneina

Geneina

Concept (Military)

Zalingei

Garsila

Nyala

Darfur

Concept (UNAI)

Shamāl Dārūr (Northern Darfur)

Janūb Dārūr (Southern Darfur)

Image © 2008 TerraMetrics  
© 2007 Europa Technologies

Image © 2008 DigitalGlobe

Google

Pointer 13°51'43.79" N 23°21'18.63" E elev 2937 ft Streaming 100% Eye alt 335.15 mi





Mozilla Firefox  
 http://localhost:8700/flex/CDA\_Flex/CDA\_Flex-debug.html?debug=true

Getting Started | Latest Headlines | PSU Webmail | Welcome to Google C...

Google News Search  
 RSS Feed  
 Flat Files  
 Ontology Search  
 File -> Ontology -> Geography (FDG) Search

Geographic Scope  
 World Cities  
 World Country Names

Output Visualization Parameters  
 Load Search Support Ontology  
 Linked Tools and Functions  
 ReliefWeb Sudan Update

Data Views  
 Search Results | Time | Map Synchronization | GeoCollaboration | Document Visualiz... | Stored Documents

Repulsion

Content  
 Select web view option:  
 Welcome Screen/Information | Map | Search Results | FEMA Situation Report Extractor (FEM...)

Get GeoSandbox Data

25.57214, 4.24971

Timeline  
 May Agreement Signed | Sudan rejects UN force | Women Raped

**Women Raped**  
 in the Darfur town of [Kalma near Nyala](#), seven women, who ventured out of a refugee camp to gather firewood, were gang-raped, beaten and robbed by the Janjaweed (src-



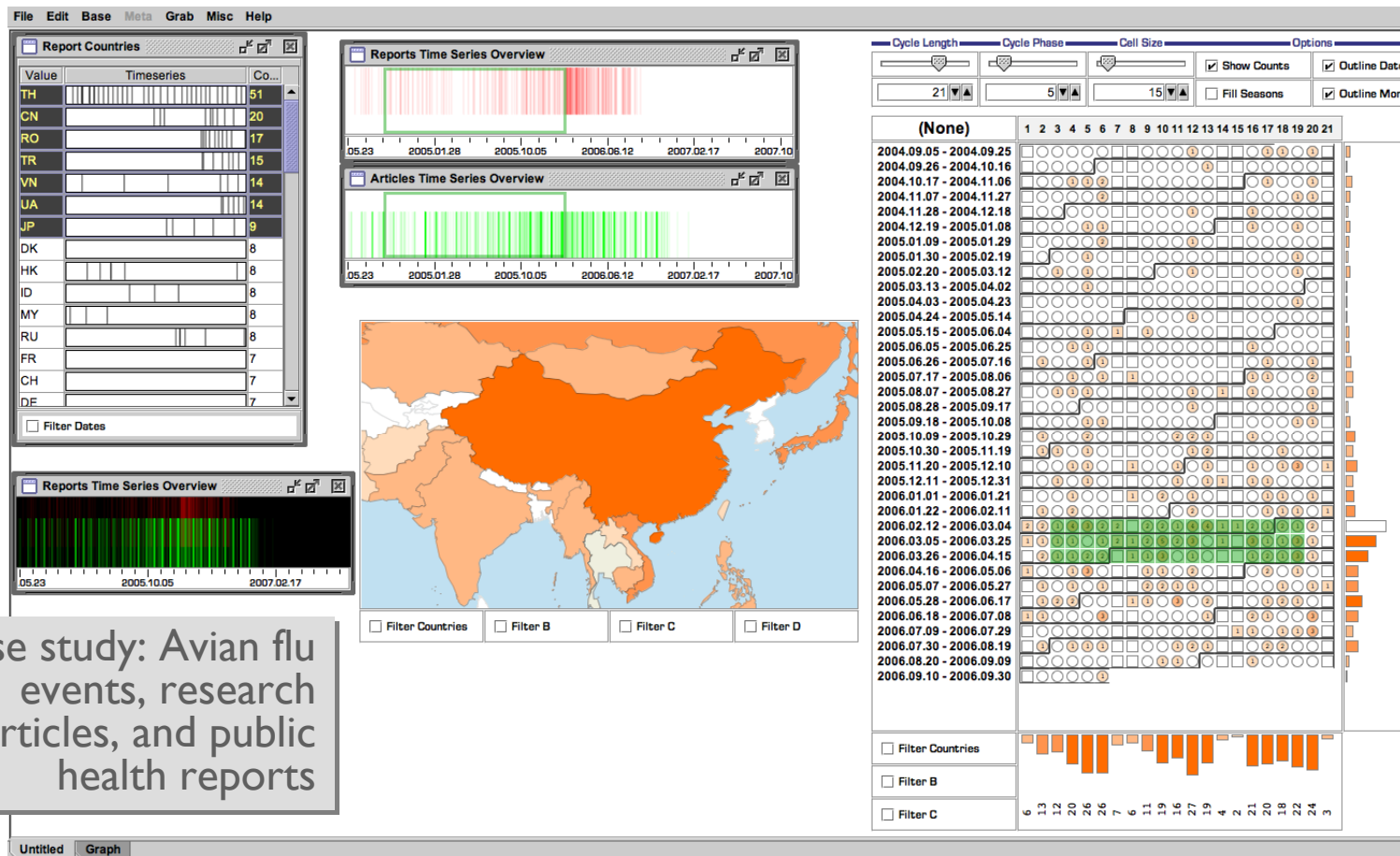
# Geo-contextualizing to enable situation assessment → Situation Awareness

- cross-filtering & attribute-relation graphs
- geocontextualization of social networks
- supporting exploration of space-time-attribute connections in document collections:  
TexPlover
- knowledge enabled information foraging and geographical contextualization



# Geo-temporal relationships among multiple data channels

Problem: How can we contextualize events and risks, geo-temporally, in evolving scientific knowledge?



Etien Koua and  
Chris Weaver

# FEMARepViz

- example info review session

The screenshot displays the Google Earth interface with a focus on the Caribbean region. A timeline at the top indicates a period from 3 FEB 2007 7:00pm to 6 FEB 2007 6:59pm. A 'Places' panel on the left lists several earthquake events, with 'earthquake - Cuba' selected. A detailed information popup for this event is shown on the right, providing the date (2007-02-05), magnitude (6.1), and location (south of Bayamo, Cuba). The popup also includes a description of the earthquake's effects and a link to classify the article. The map shows various earthquake activity markers (yellow triangles and blue circles) across the Caribbean region.

**earthquake - Cuba**

Date: 2007-02-05  
Earthquake Activity  
At 3:57 PM EST there was a strong (magnitude 6.1) earthquake in the Cuba Region, about 125 miles south of Bayamo, Cuba and 116 miles north of Lucea, Jamaica. The quake caused mild tremors along Cuba's southwestern coast. No tsunami bulletins issued. The Caribbean Area Office reports no damage and no request for assistance in Puerto Rico or the US Virgin Islands.  
[Classify this article](#)

Directions: [To here](#) - [From here](#)

Presenjit Mitra & ChiChun Pan

PENNSTATE



© Alan M. MacEachren, 2008



# Problem: Help analysts retrieve relevant info and contextualize complex events

Approach: Concept Discovery Application (CDA) – knowledge enabled information foraging and geographical contextualization

The screenshot illustrates the CDA process across four numbered steps:

- 1**: A ConceptVISTA window displays an ontology of classes (California, Caribbean\_Sea, Carlisle, Central\_Valley, FEMA\_HQ, Fillmore, Frankfort, Franklin\_County, Gulf\_of\_Mexico, Hardin\_County) and a ConceptGraph showing relationships between entities like 'mentioned\_in' and 'related\_to'.
- 2**: A Google News search interface shows a search for 'floods' with a geographic scope set to 'Missouri'.
- 3a**: A search result snippet for 'Floods force them from their homes - but doesn't break their spirits' is shown.
- 3b**: A map view of the search results, showing a map of the United States with a focus on the Midwest region.
- 4**: A detailed map view showing the results of the search, with various locations marked and labeled, including 'Concept (Missouri)', 'Concept (Kentucky)', 'Concept (Madrid)', 'Concept (Missouri)', 'Concept (reported)', 'Concept (Missouri)', 'Nevada', 'Lebanon', 'Caledonia', 'Cuba', 'Republic', 'New Madrid', 'Cape Girardeau', 'Sikeston', and 'Campbell'.

## CDA process

1. apply *entity-relation extractor (ERE)* to FEMA National Situation Report → generate: people, places, organizations
2. use ERE results to ID places of interest
3. supplement Google News query on floods, in located places, with ERE derived Owl (web ontology language) file
4. map results & relations

see poster

Brian Tomaszewski, Alan MacEachren

