



The Future of Information Discovery: Designing to Support Social Media and Exploratory Search

Ben Shneiderman *ben@cs.umd.edu*

Founding Director (1983-2000), Human-Computer Interaction Lab
Professor, Department of Computer Science
Member, Institute for Advanced Computer Studies



UNIVERSITY OF
MARYLAND





The Future of Information Discovery

Ben Shneiderman *ben@cs.umd.edu*

Founding Director (1983-2000), Human-Computer Interaction Lab
Professor, Department of Computer Science
Member, Institute for Advanced Computer Studies



UNIVERSITY OF
MARYLAND





Interdisciplinary research community

- Computer Science & Info Studies
- Psych, Socio, Poli Sci & MITH

(www.cs.umd.edu/hcil)



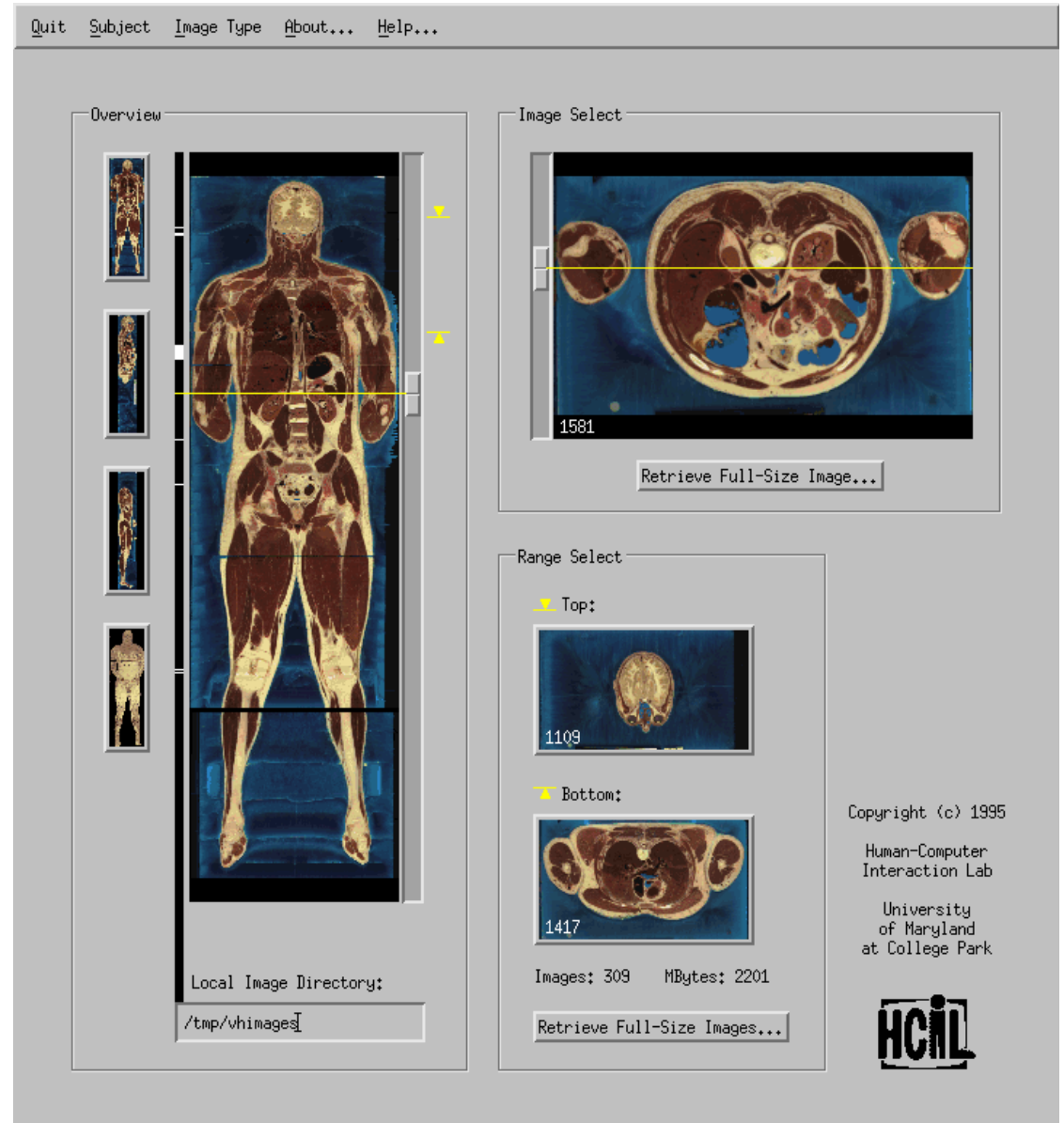
U.S. Library of Congress



- Scholars, Journalists, Citizens
- Teachers, Students

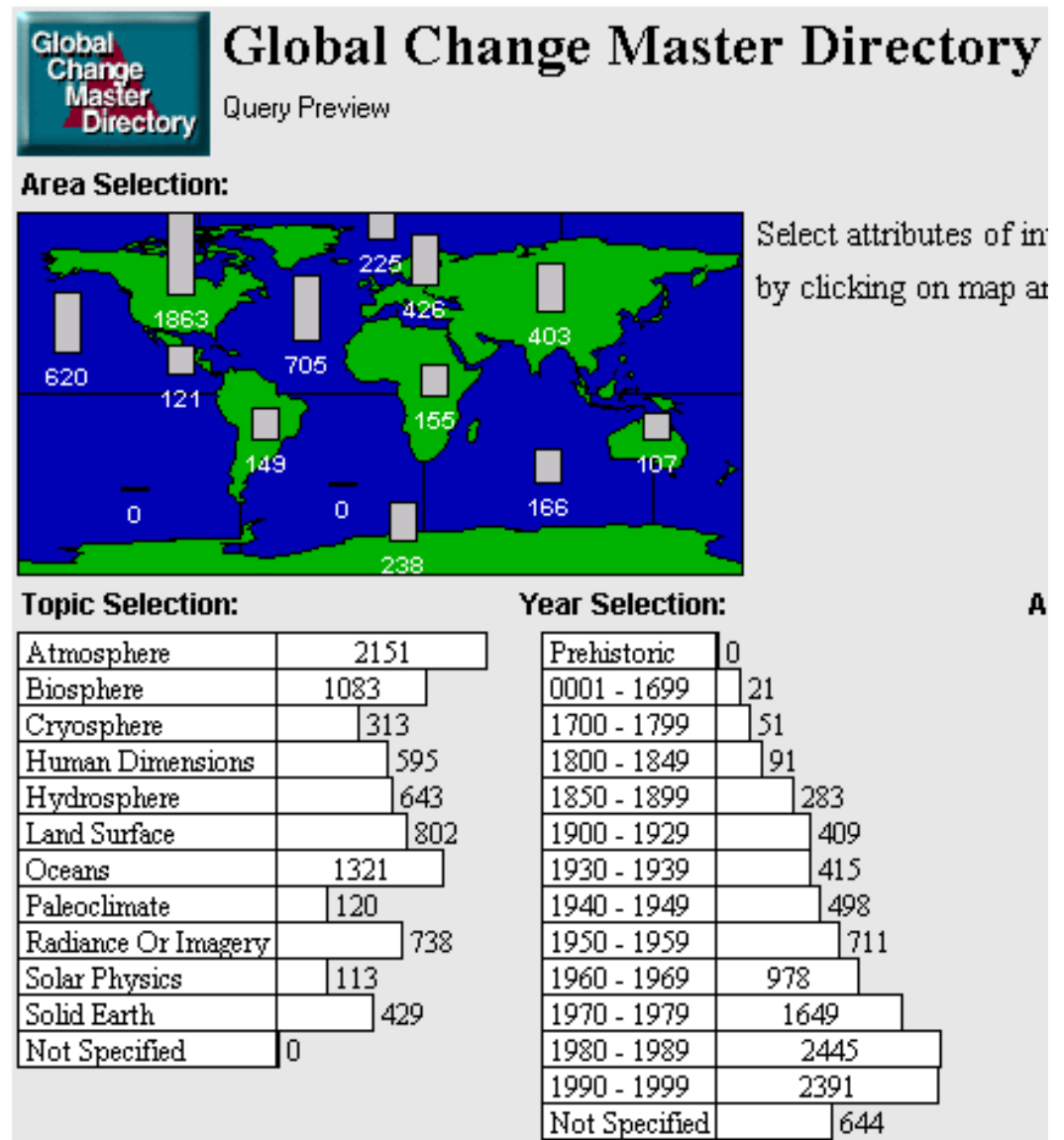
Visible Human Explorer (NLM)

- Doctors
- Surgeons
- Researchers
- Students



NASA Environmental Data

- Scientists
- Farmers
- Land planners
- Students



Bureau of the Census



- Economists, Policy makers, Journalists
- Teachers, Students

American FactFinderTM

NSF Digital Government Initiative



Census,
NCHS,
BLS, EIA,
NASS, SSA

- Find what you need
- Understand what you Find



www.ils.unc.edu/govstat/

FEDSTATS



International Children's Digital Library



INTERNATIONAL CHILDREN'S DIGITAL LIBRARY

A Library for the World's Children

Read books! About us Sponsors How to contribute Need help?

QUICK LINKS

[myICDL Account](#)

- [Register / Sign in](#)
- [Select language](#)

For first-time visitors

- [Mission & summary](#)
- [General FAQ](#)

For returning visitors

- [Recently added books](#)

For book contributors

- [Contribute books](#)
- [Policies and statements](#)
- [Scanning instructions](#)

For researchers

- [Fast facts](#)
- [Papers](#)
- [Presentations](#)

For volunteers

- [ICDL Ambassadors](#)
- [Translators](#)



Simple search



Location search

Our Mission

We are a library that provides free access to children's books from around the world. By ensuring access to books from many cultures and in diverse languages, we foster a love of reading, a readiness to learn, and a response to the challenges of world illiteracy.

We invite you to [explore our growing library](#) and learn how you can [contribute to our efforts](#).

FEATURED BOOKS


Colorful illustrations with Jeanette Marin
May 8, 2006 Selected by Jeanette Marin, a student at the University of Maryland. Jeanette has three daughters

Simple Search

[Home](#) > [Read books](#) > Simple Search

[Rainbow Covers](#) [Red Covers](#) [Orange Covers](#) [Yellow Covers](#) [Green Covers](#)

French = 16 books




[Aliou et Jean](#)
French



[The amazing adventures of...](#)
French




[The baby's doll](#)
French




[A big little girl](#)
French



[Collection of 150 prints o...](#)
French



[I'll be a stuntman!](#)
French



[I'm...](#)

[Three to Five](#) [Six to Nine](#) [Ten to Thirteen](#)

[Make Believe Books](#) [True Books](#)

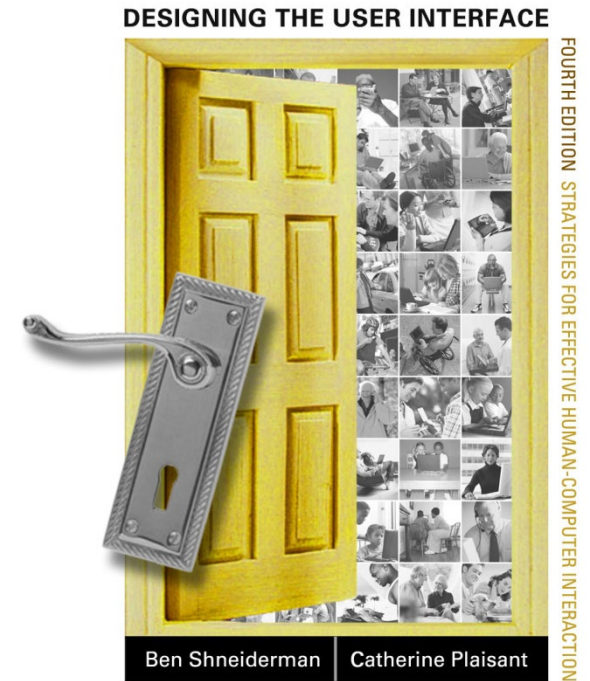
[Short Books](#) [Medium Books](#) [Long Books](#) [Recently Added Books](#) [Award Winn Books](#)

Keywords in [English](#) [Search](#)

www.childrenslibrary.org

Design Issues

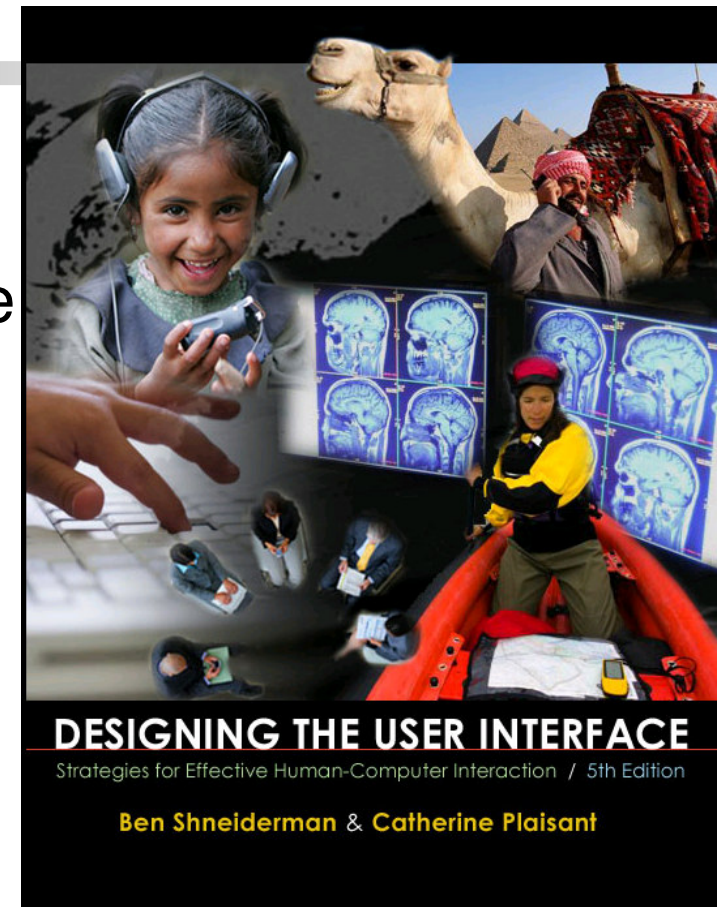
- Input devices & strategies
 - Keyboards, pointing devices, voice
 - Direct manipulation
 - Menus, forms, commands
- Output devices & formats
 - Screens, windows, color, sound
 - Text, tables, graphics
 - Instructions, messages, help
- Collaboration
- Help, tutorials, training



www.awl.com/DTUI

Design Issues

- Input devices & strategies
 - Keyboards, pointing devices, voice
 - Direct manipulation
 - Menus, forms, commands
- Output devices & formats
 - Screens, windows, color, sound
 - Text, tables, graphics
 - Instructions, messages, help
- Collaboration & Social Media
- Help, tutorials, training
- Search & Visualization

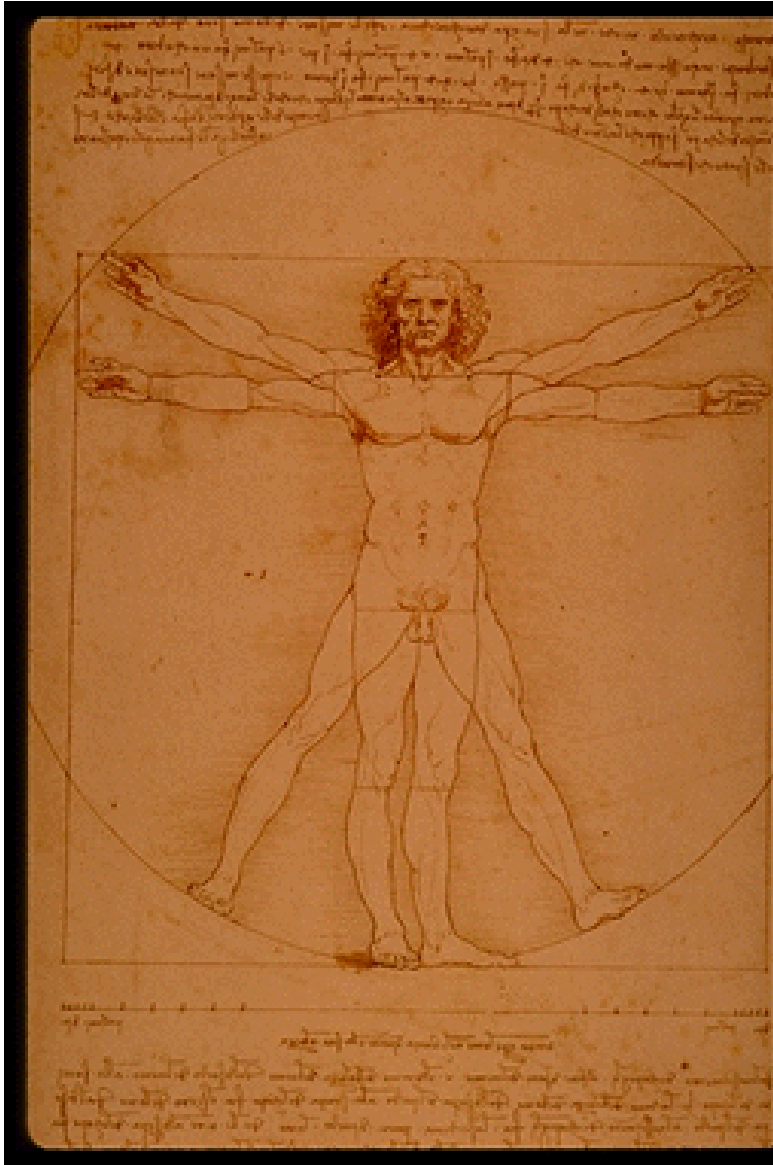


www.awl.com/DTUI

Fifth Edition: March 2009



Information Visualization

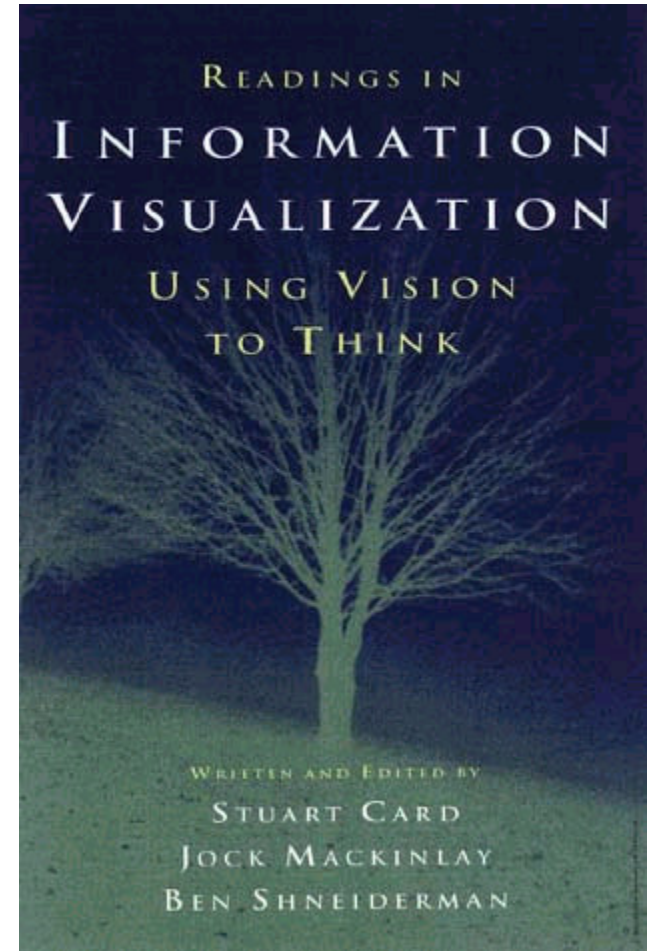


**The eye...
the window of the soul,
is the principal means
by which the central sense
can most completely and
abundantly appreciate
the infinite works of nature.**

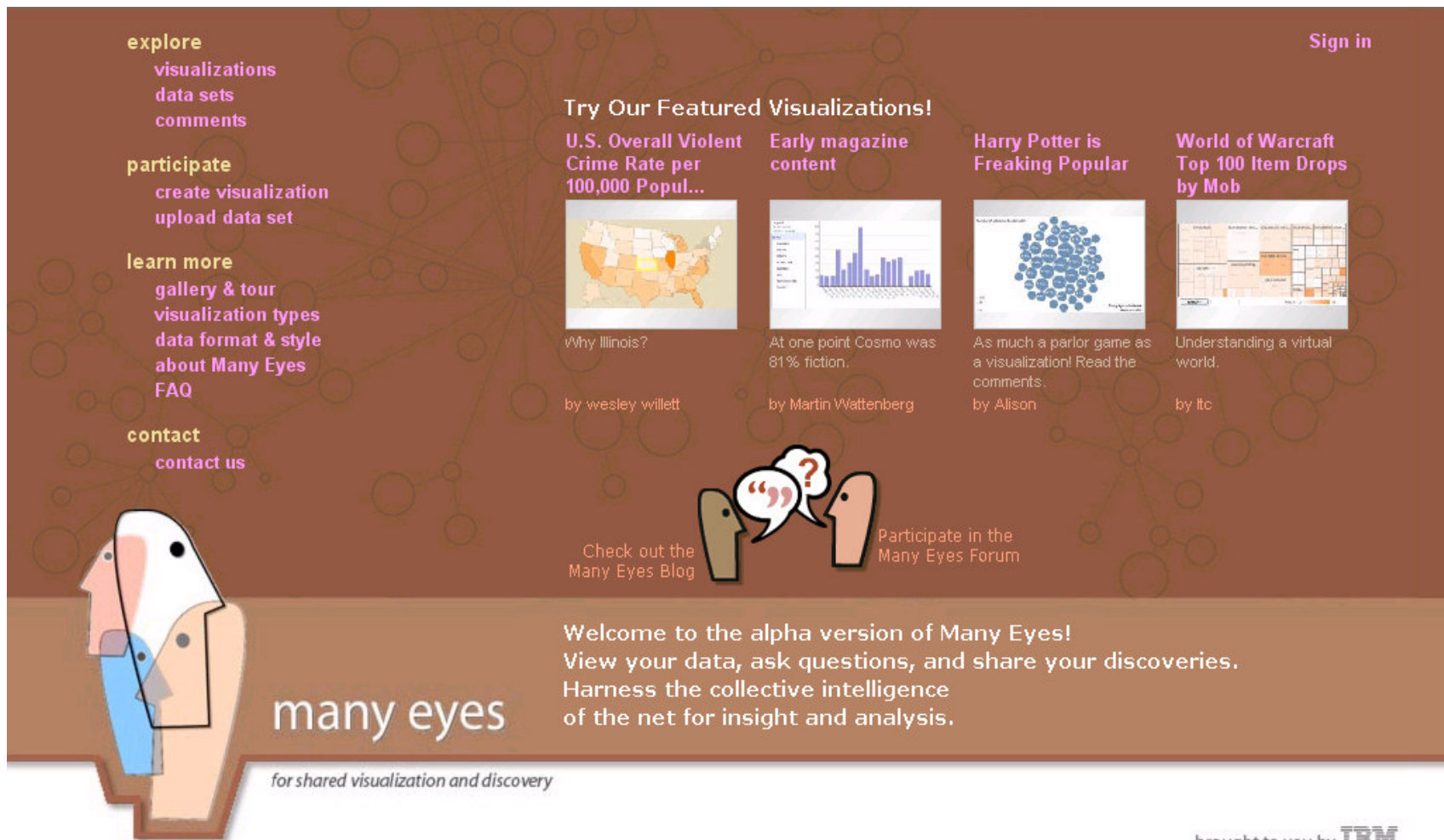
Leonardo da Vinci
(1452 - 1519)

Using Vision to Think

- **Visual bandwidth is enormous**
 - Human perceptual skills are remarkable
 - Trend, cluster, gap, outlier...
 - Color, size, shape, proximity...
 - Human image storage is fast and vast
- **Opportunities**
 - Spatial layouts & coordination
 - Information visualization
 - Scientific visualization & simulation
 - Telepresence & augmented reality
 - Virtual environments



ManyEyes: A web sharing platform



The image shows the ManyEyes website interface. On the left, there is a navigation menu with the following links: **explore** (visualizations, data sets, comments), **participate** (create visualization, upload data set), **learn more** (gallery & tour, visualization types, data format & style, about Many Eyes, FAQ), and **contact** (contact us). In the top right corner, there is a **Sign in** link. The main content area is titled **Try Our Featured Visualizations!** and displays four featured visualizations:
1. **U.S. Overall Violent Crime Rate per 100,000 Popul...** (a choropleth map of the United States) by wesley willett.
2. **Early magazine content** (a bar chart) by Martin Wattenberg.
3. **Harry Potter is Freaking Popular** (a bubble chart) by Alison.
4. **World of Warcraft Top 100 Item Drops by Mob** (a treemap) by ltc.
Below these visualizations, there is a section with two links: **Check out the Many Eyes Blog** and **Participate in the Many Eyes Forum**, accompanied by an illustration of two stylized heads in conversation. At the bottom, a large stylized head graphic is on the left, and the text **many eyes** is in the center, with the tagline *for shared visualization and discovery* below it. On the right, it says **Welcome to the alpha version of Many Eyes!** followed by **View your data, ask questions, and share your discoveries. Harness the collective intelligence of the net for insight and analysis.** In the bottom right corner, it says **brought to you by IBM**.

explore
visualizations
data sets
comments

participate
create visualization
upload data set

learn more
gallery & tour
visualization types
data format & style
about Many Eyes
FAQ

contact
contact us

Sign in

Try Our Featured Visualizations!

U.S. Overall Violent Crime Rate per 100,000 Popul...

Early magazine content

Harry Potter is Freaking Popular

World of Warcraft Top 100 Item Drops by Mob

Why Illinois?

At one point Cosmo was 81% fiction.

As much a parlor game as a visualization! Read the comments.

Understanding a virtual world.

by wesley willett

by Martin Wattenberg

by Alison

by ltc

Check out the Many Eyes Blog

Participate in the Many Eyes Forum

Welcome to the alpha version of Many Eyes!
View your data, ask questions, and share your discoveries.
Harness the collective intelligence of the net for insight and analysis.

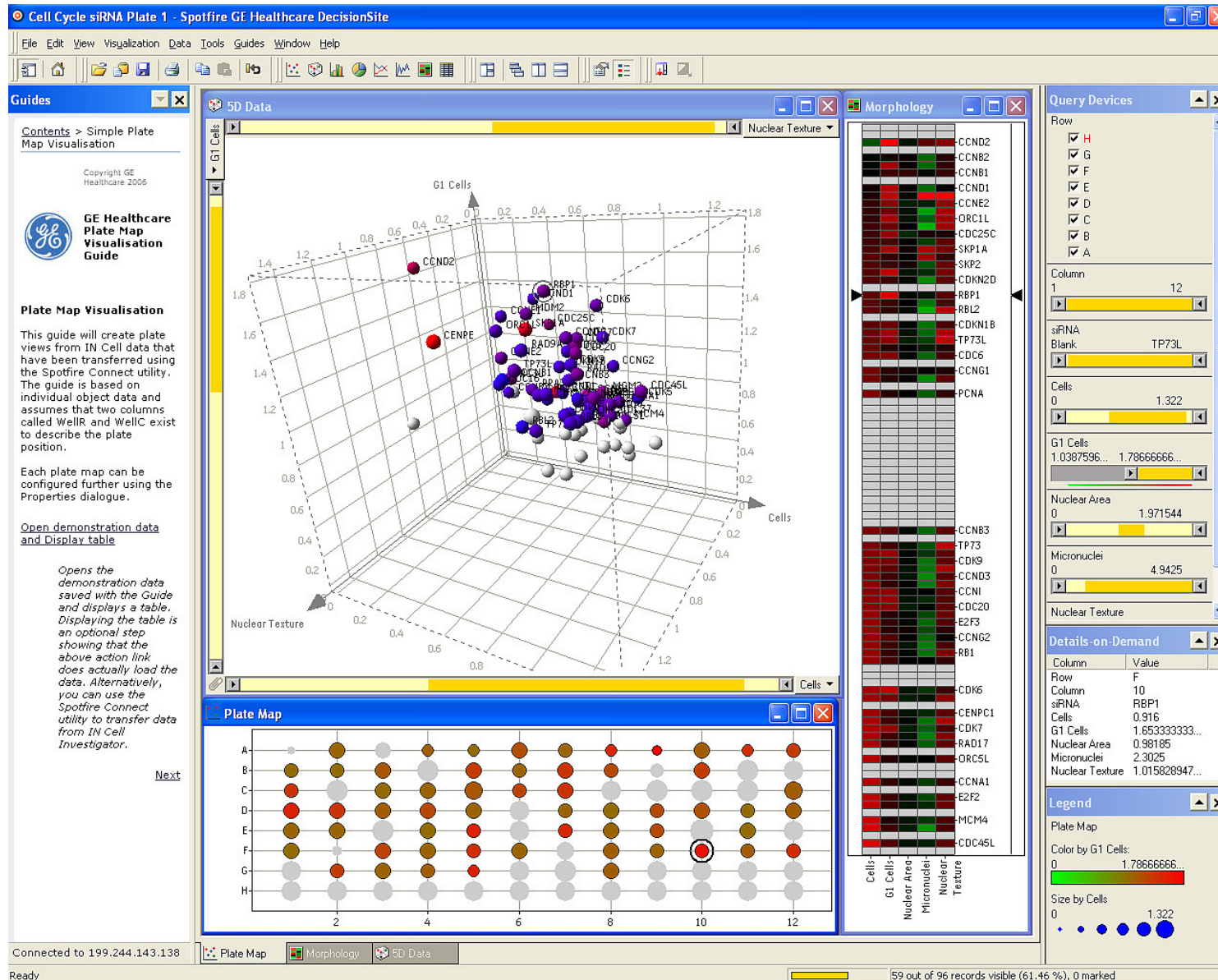
many eyes
for shared visualization and discovery

brought to you by **IBM**

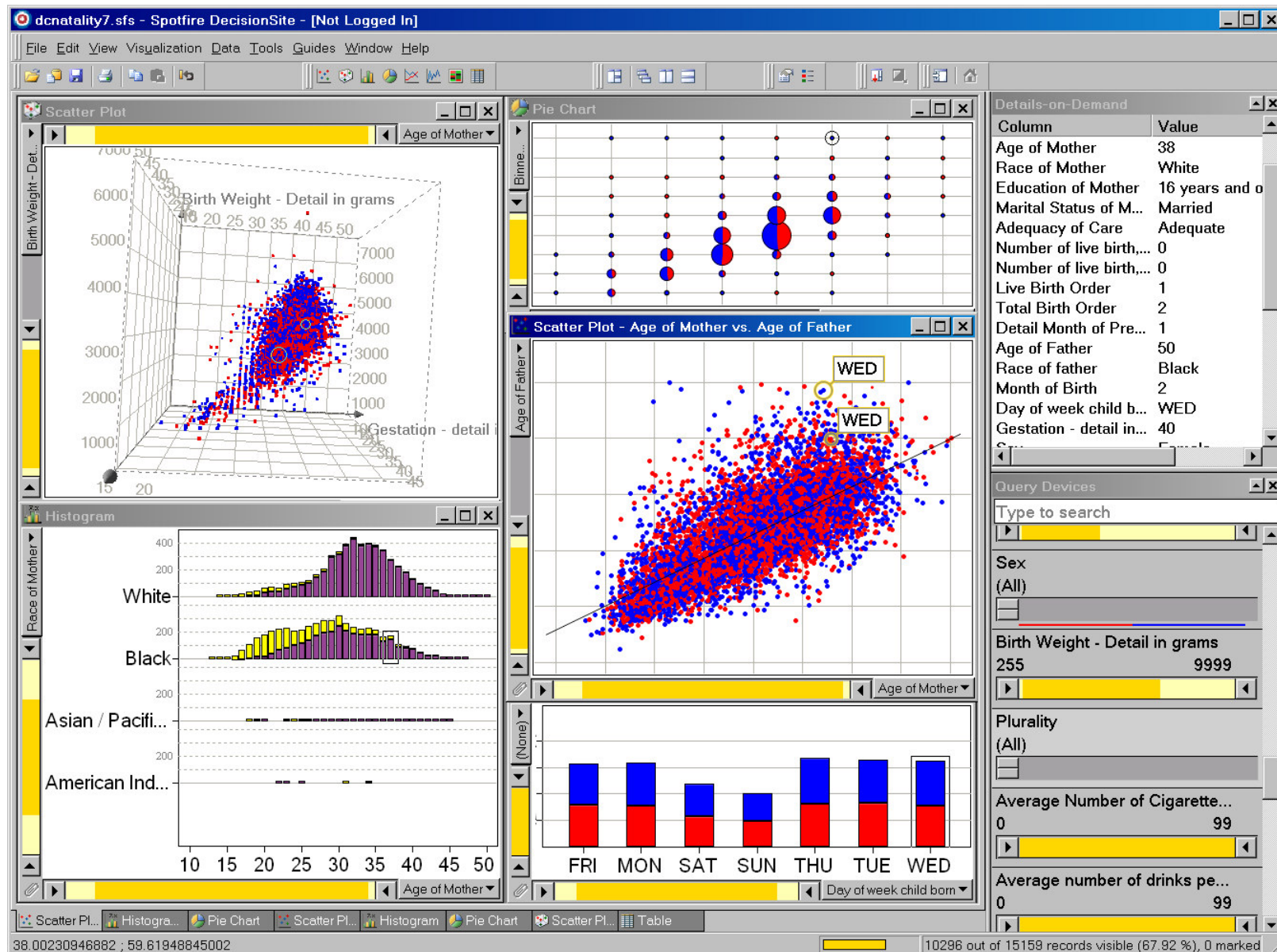
<http://services.alphaworks.ibm.com/manyeyes/app>

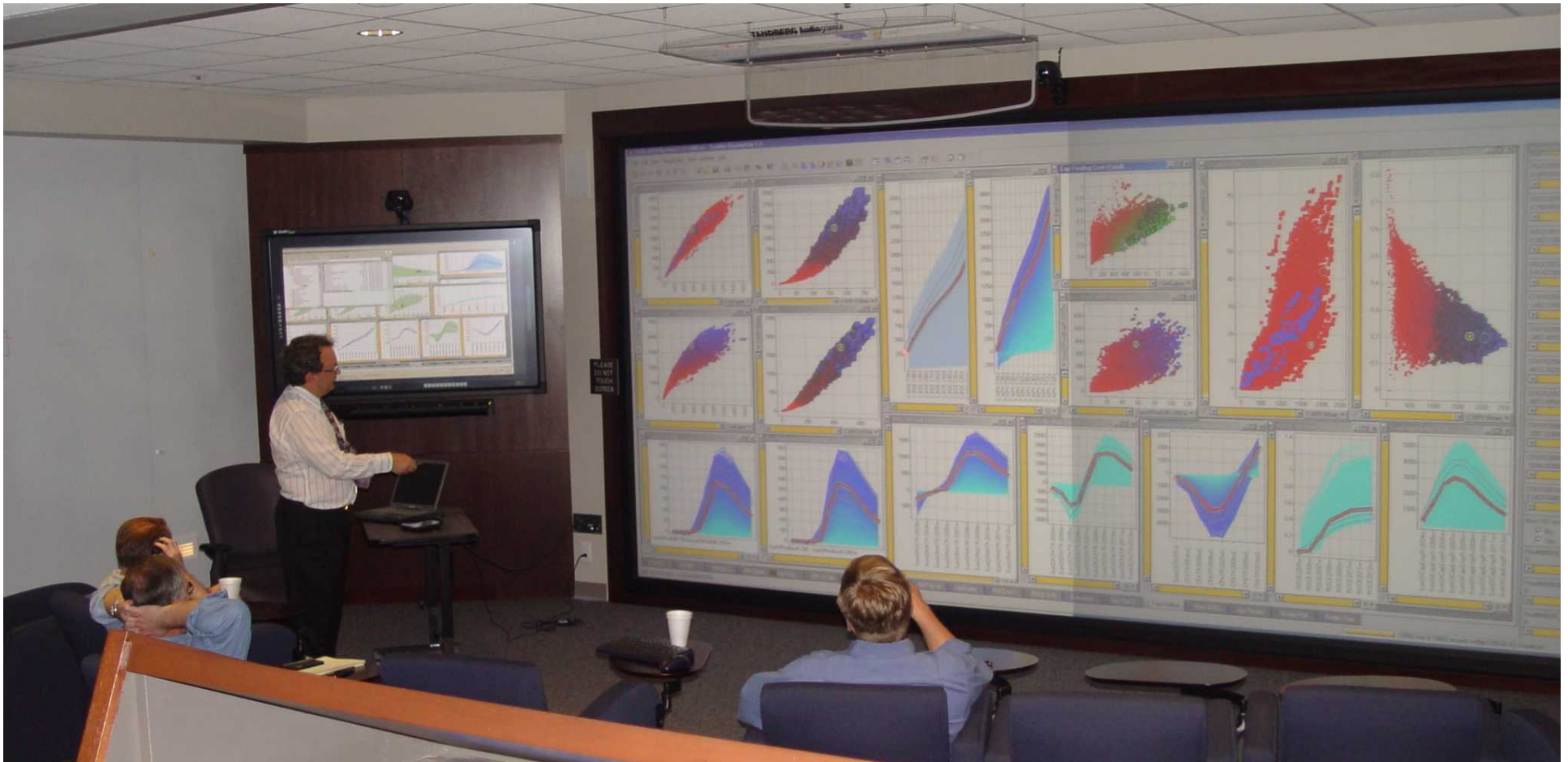


Spotfire: Retinol's role in embryos & vision



Spotfire: DC natality data





100M-pixels & more



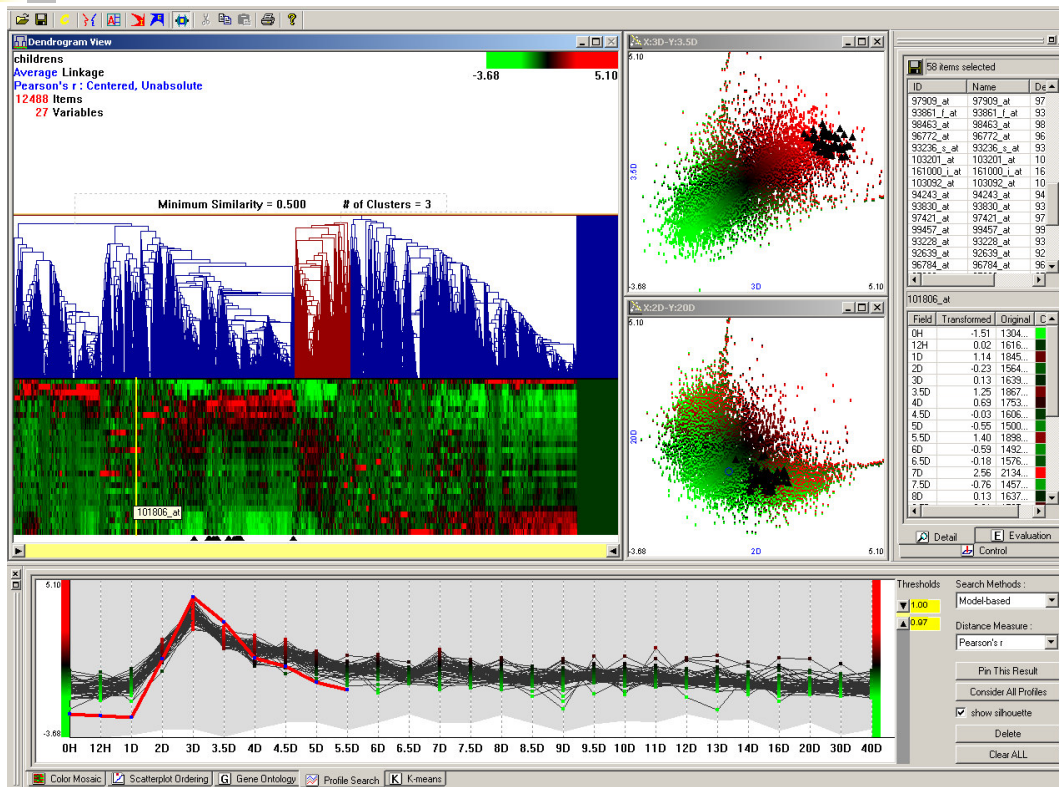
Large displays
for single users



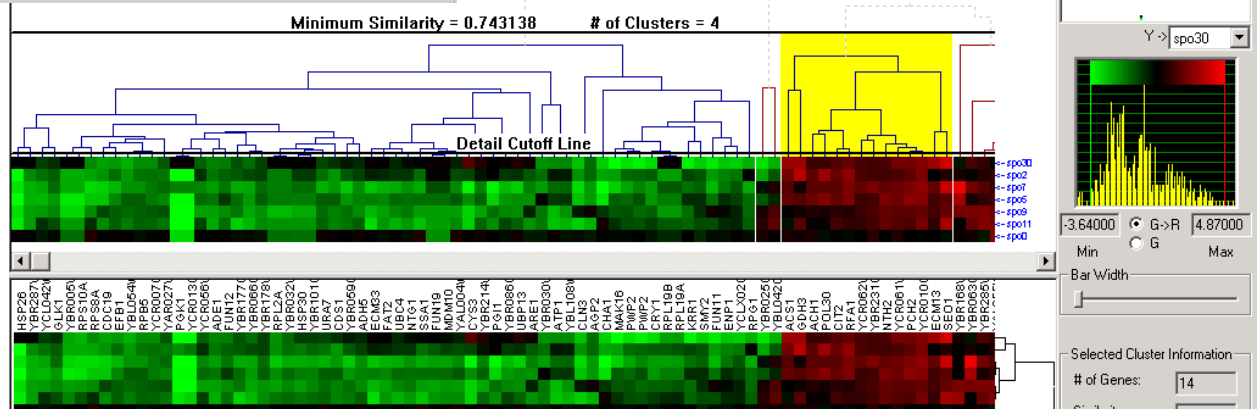
infovis.cs.vt.edu/gigapixel

Multi-Var: Hierarchical Clustering Explorer

www.cs.umd.edu/hcil/hce/



“HCE enabled us to find important clusters that we didn't know about.”
- a user



Information Visualization: Mantra



- Overview, zoom & filter, details-on-demand
- Overview, zoom & filter, details-on-demand
- Overview, zoom & filter, details-on-demand
- Overview, zoom & filter, details-on-demand
- Overview, zoom & filter, details-on-demand
- Overview, zoom & filter, details-on-demand
- Overview, zoom & filter, details-on-demand
- Overview, zoom & filter, details-on-demand
- Overview, zoom & filter, details-on-demand
- Overview, zoom & filter, details-on-demand

Information Visualization: Data Types



SciViz

- **1-D Linear**
- **2-D Map**
- **3-D World**

Document Lens, SeeSoft, Info Mural

GIS, ArcView, PageMaker, Medical imagery

CAD, Medical, Molecules, Architecture

InfoViz

- **Multi-Var**
- **Temporal**
- **Tree**
- **Network**

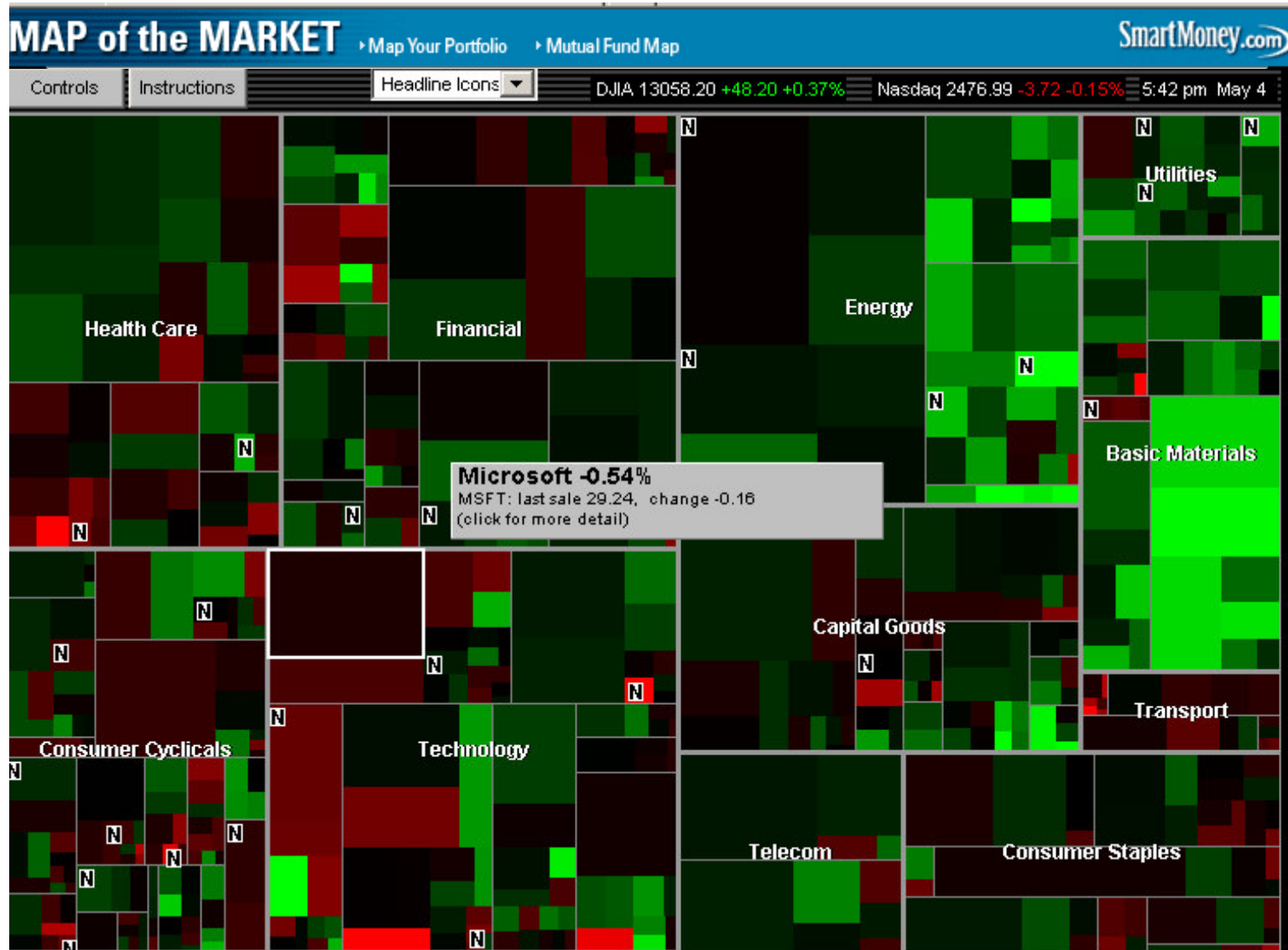
Spotfire, Tableau, XGobi, TableLens, ParCoords

LifeLines, TimeSearcher, DataSpiral, DataMontage

Cone/Cam/Hyperbolic, SpaceTree, Treemap

Pajek, JUNG, SocialAction, .netmap

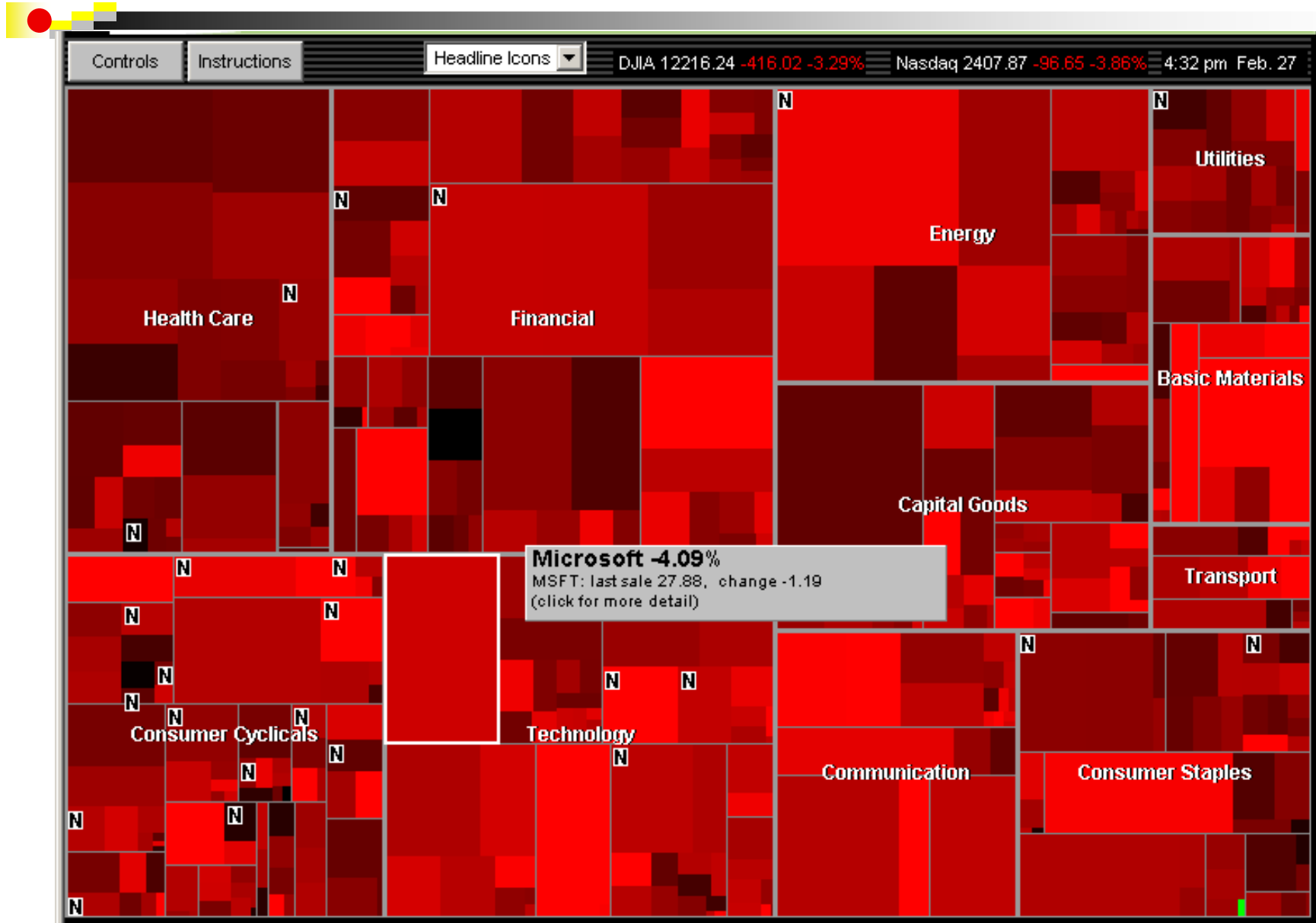
Treemap: Stock market, clustered by industry



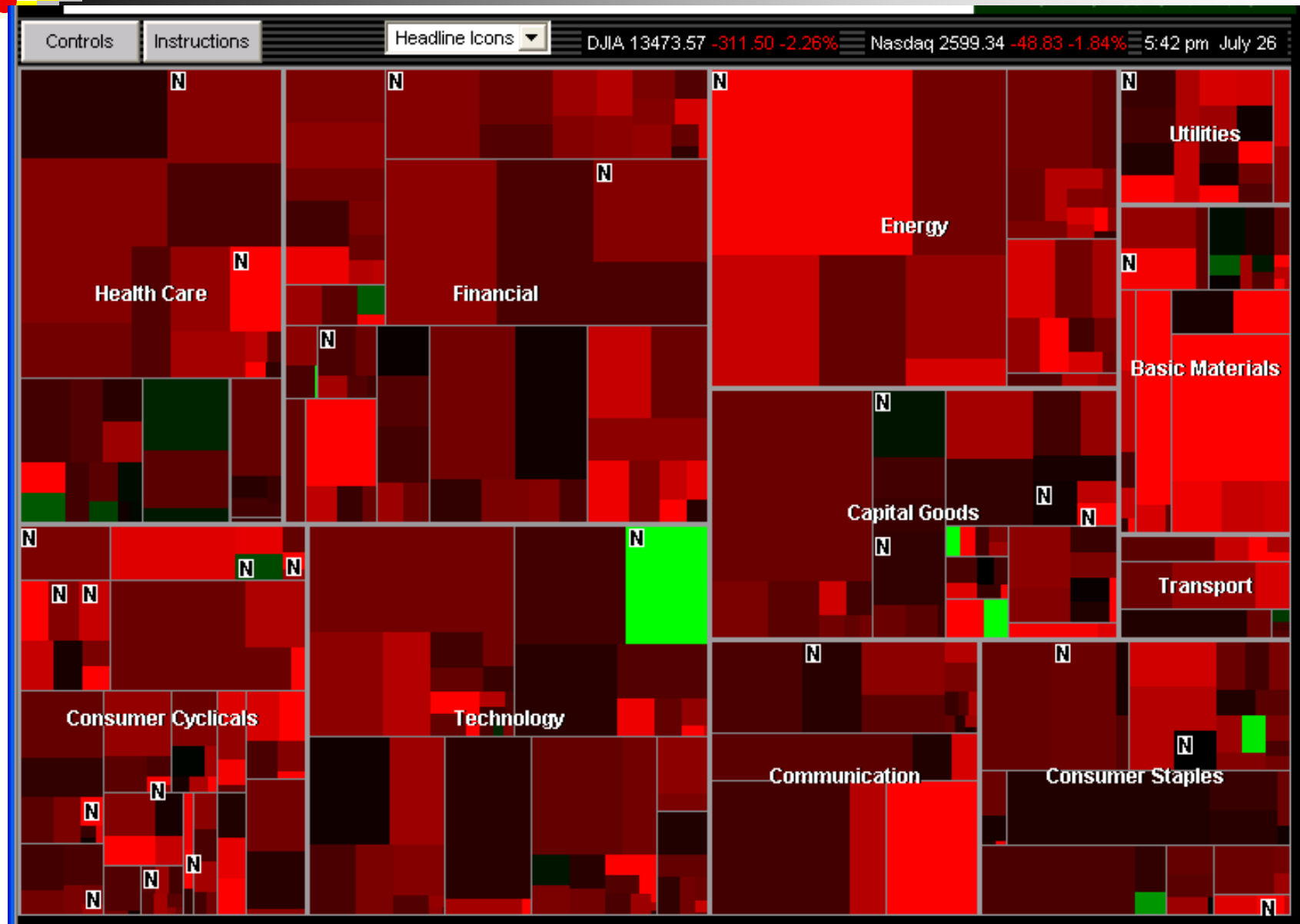
www.smartmoney.com/marketmap



Market falls steeply Feb 27, 2007, with one exception

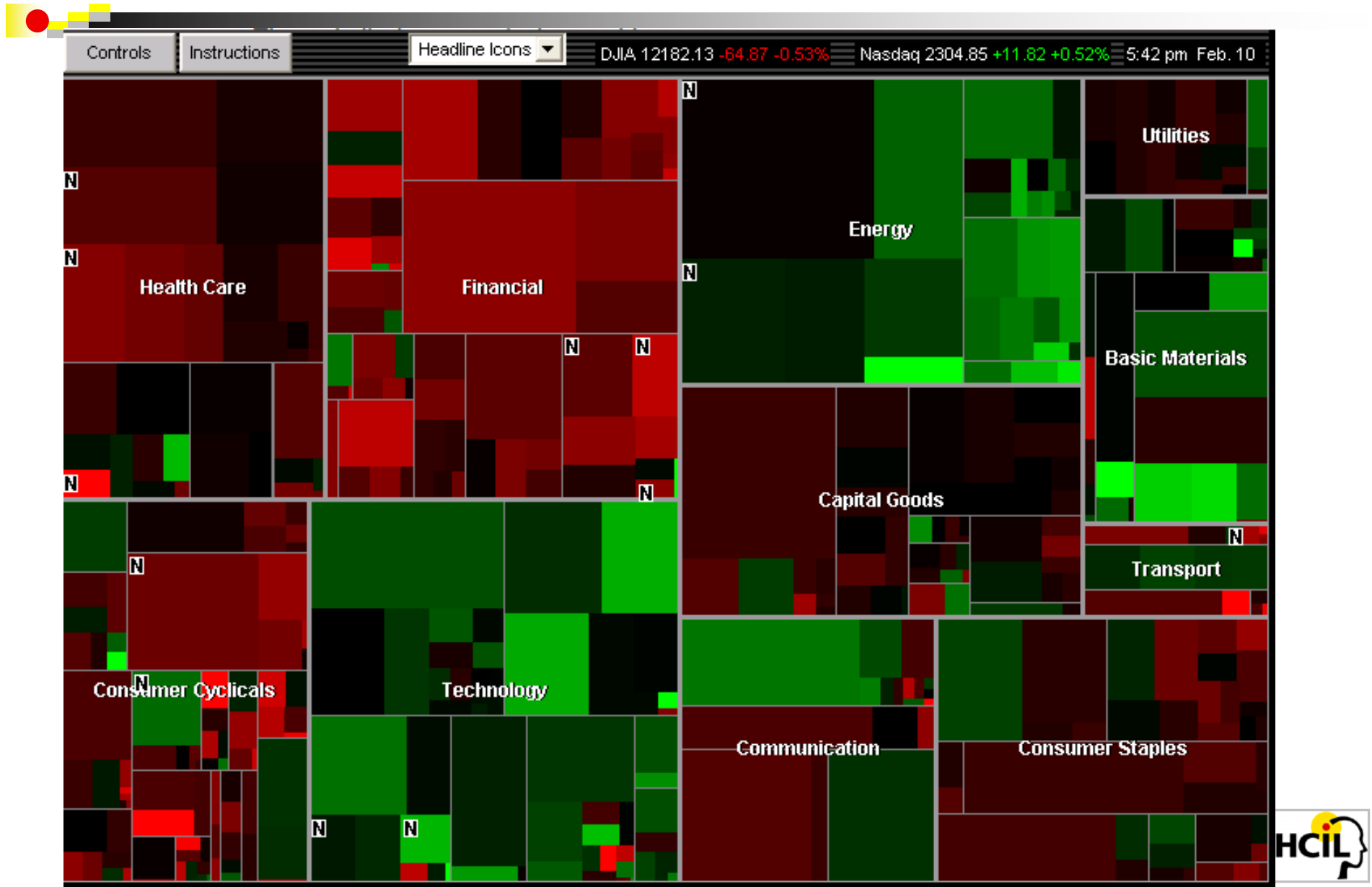


Market falls 311 points July 26, 2007, with a few exceptions

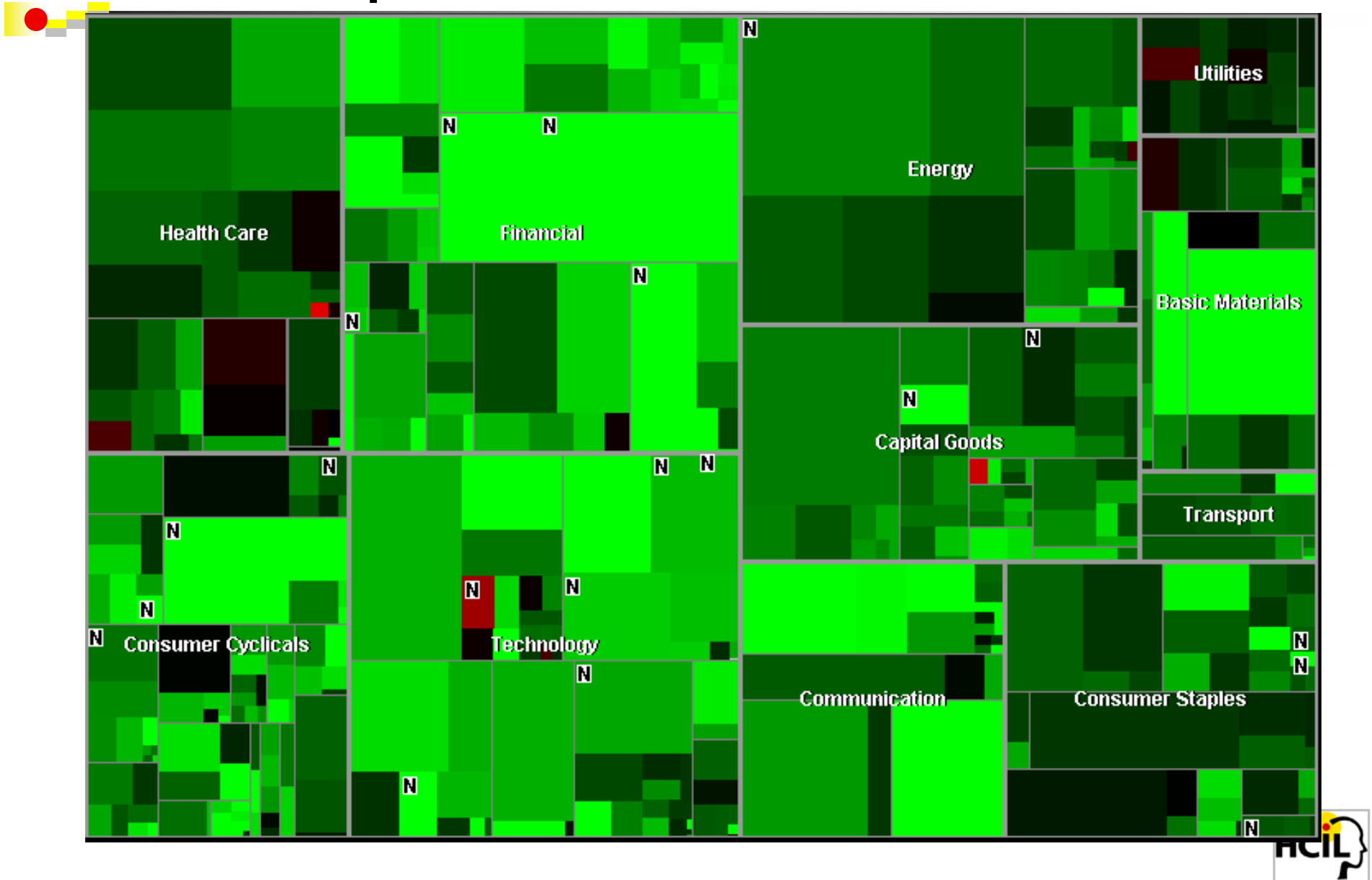


Market mixed, February 8, 2008

Energy & Technology up, Financial & Health Care down



Market rises 319 points, November 13, 2007, with 5 exceptions



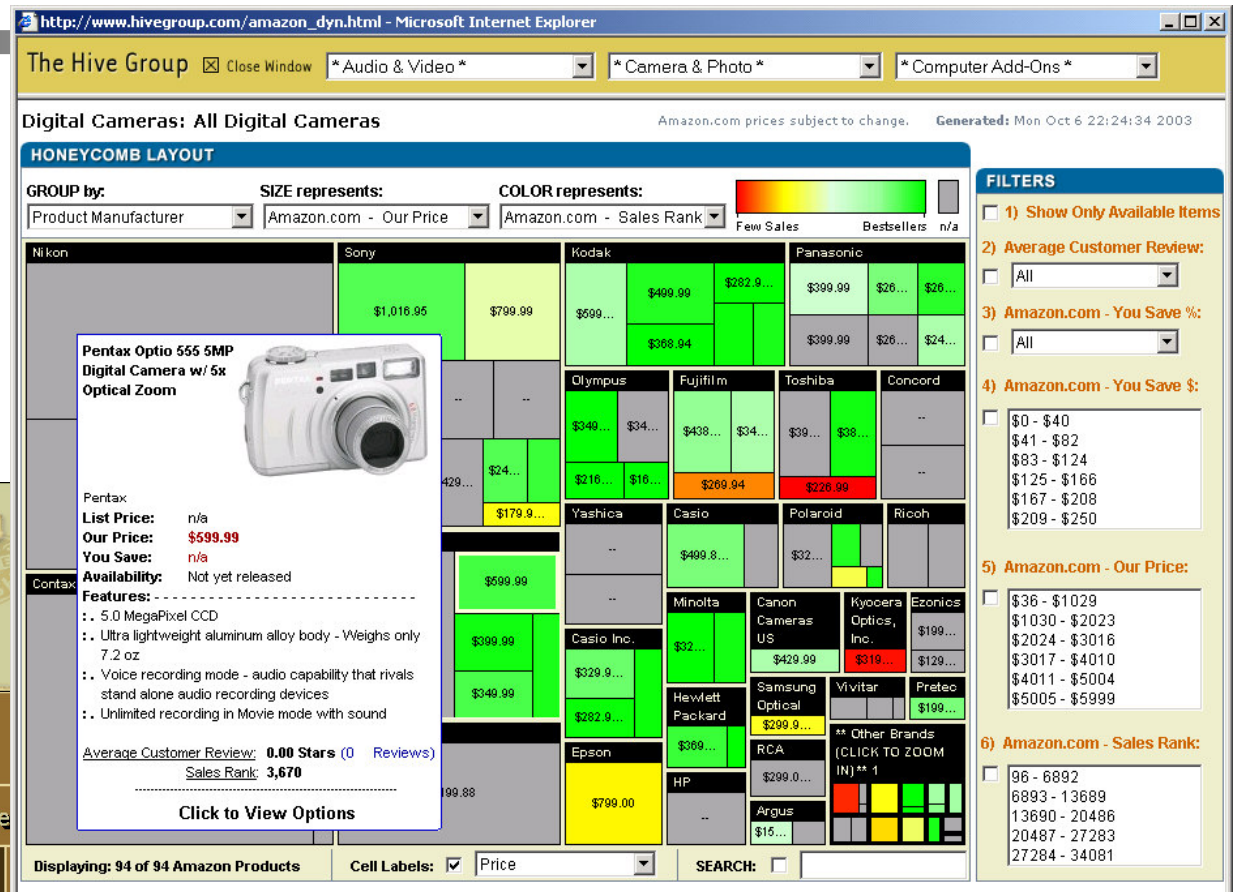
Treemap: Gene Ontology



<http://www.cs.umd.edu/hcil/treemap/>

Treemap: Product catalogs

www.hivegroup.com





MERIT

MARINE CORPS EQUIPMENT READINESS INFORMATION TOOL

USMC BY TAMCN | USMC By MEF | 1 MEF | 2 MEF | 3 MEF | MARFORPES | HAWAII | PREPOSITIONED | BPLD

[Home](#) | [Readiness by Commodity](#) | [Readiness by Functional Area](#) | [Feedback](#) | [Logout](#)

GROUP
Functional Area

SIZE
5 rating - Current

COLOR
MR rating - Current

95% 90% 100% NA

FILTER BY PROBLEMS
TAMCNs with problems in every checked area will be displayed.

	Current	This Month	This Quarter	This Year
MR > 85	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 <= 90	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8 <= 85	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

FILTER BY ITEMS
Selected items will be shown.

- 00 - Unknown
- 10 - Radios
- 11 - Communications Support Equipment
- 13 - Air Command/Control Equipment
- 14 - Air Support Radar/IFF Equipment
- 16 - Electronic Equipment
- 17 - Ground Support Radar
- 18 - Tactical Remote Sensor Equipment
- 19 - Intelligence/Surveillance Equipment
- 20 - Generators
- 21 - Environmental Control Equipment
- 23 - Earthmoving Equipment
- 26 - Materials Handling Equipment
- 29 - Engineer Support
- 30 - Trucks
- 35 - Towed Motor Transport Equipment
- 40 - Tanks
- 41 - Assault Amphibious Vehicles
- 42 - Light Armored Vehicles
- 43 - Artillery
- 45 - Infantry Weapons
- 48 - Anti-Air Weapon Systems and
- 49 - Missile Systems
- 50 - High Density/Low Deadline
- 97 - Communications Security Equipment
- 98 - Assault Crafts
- 99 - Nuclear Biological Chemical Equip

View Deadlined Items for this TAMCN
Generate Control Chart for this TAMCN
Generate Historical View for this TAMCN
Show Tabular data for this TAMCN

Track this TAMCN
Zoom in on this group
Zoom Out to view all
Close Menu

B2468
Tractor, Full-Track, W/AngleBlade, T-5

	Last Week	This Month	This Quarter	This Year
MR	101%	101%	100%	94%
S	111%	113%	112%	110%
R	91%	89%	89%	86%

Click mouse for reports and options.

Search by TAMCN #

Search by TAMCN Title

FILTER BY SEARCH CRITERIA
TAMCNs meeting search criteria will be shown.

☐ Filter by Current Excess

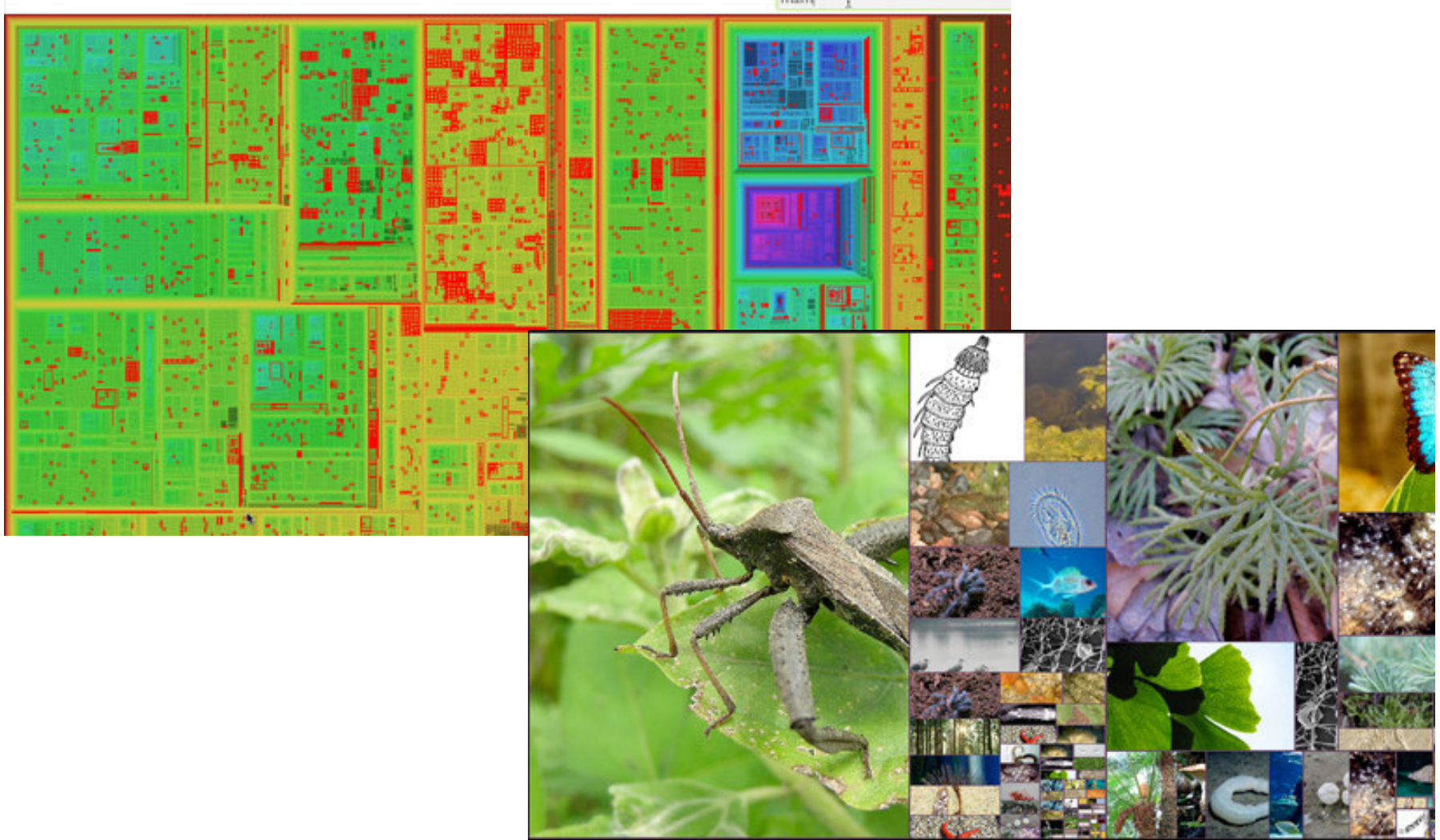
☐ Label by Current Excess

☐ Show Only Pacing Items

EXCESS FILTER & LABEL
Isolate items w/excess equipment

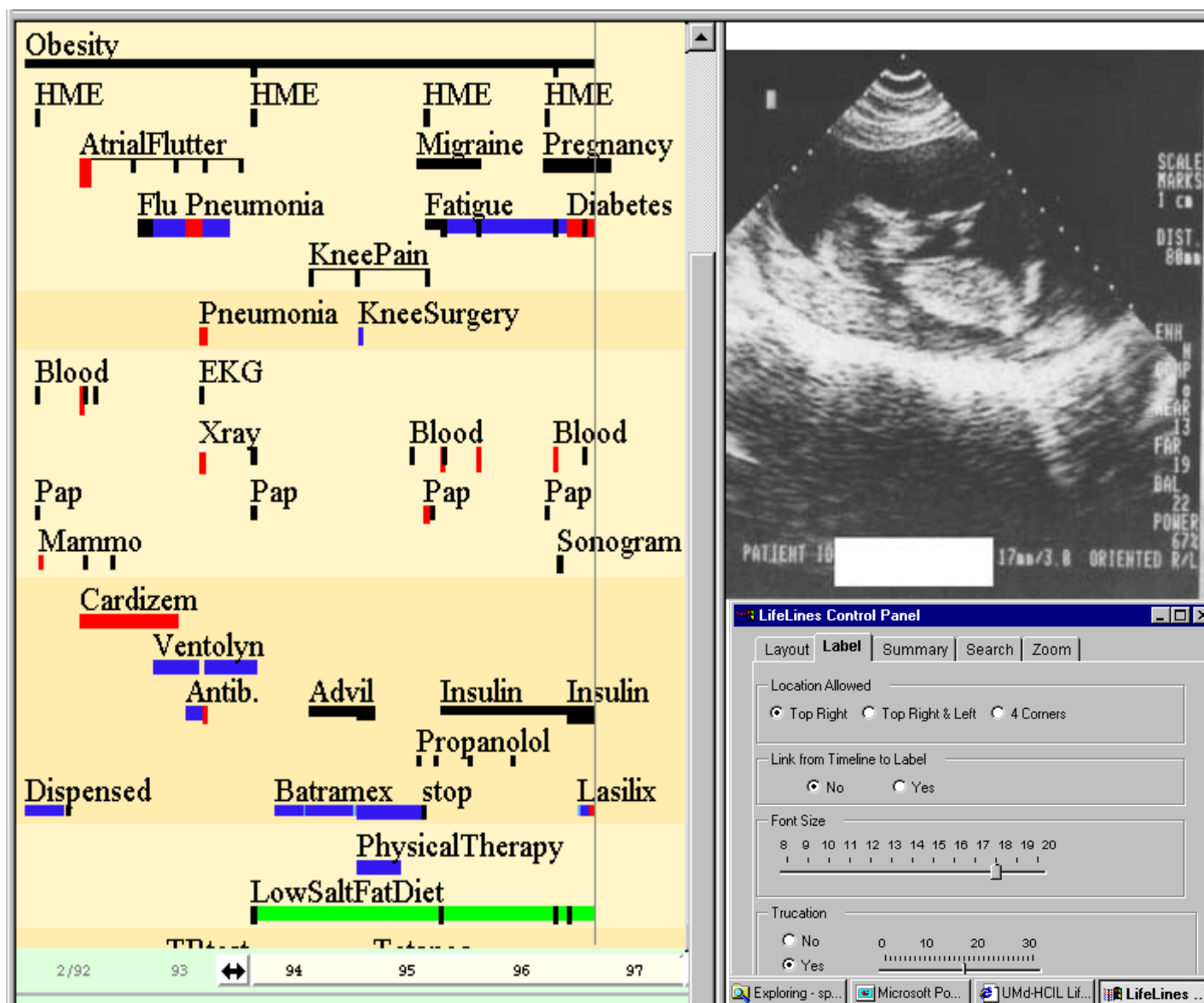
FILTER BY PACING ITEM
Pacing Items will be shown.

Treemap: Encyclopedia of Life (1.8M species)




<http://eol.org>

LifeLines: Patient Histories



LifeLines: Customer Histories



Mrs Linda Simpson
Maryland 41
Allergic to polyester

5-26-1998 black p6 **Linda** BD "url" 13

LifeLine


	10/95 96	97	98	99
▼ Catalogs	Fall95 Spring96	Fall96 Spring97	Fall97 Spring98	Fall98 Custom cata Summerspecial98
▼ Store		Store		
▼ WWW		Web	Web Web	Web
▼ PURCHASES				
▼ Clothes		\$101 \$194		\$127 \$150back
▼ Week-end		\$160		
▼ Accessories		\$152		\$27
▼ House		\$152		
▼ Specials				
▼ Return		too-small		
▼ Credit		Credit Refused		
▼ Birthday	Linda BD	Linda BD	Linda BD	

Linda Simpson ORDER#614345 (MOST RECENT)
 11-1-1997,\$150, Visa card, order by phone

[D45F224: Boots - 4 - Black](#)
 ----> **BACKORDER - estimated shipping 12-15**

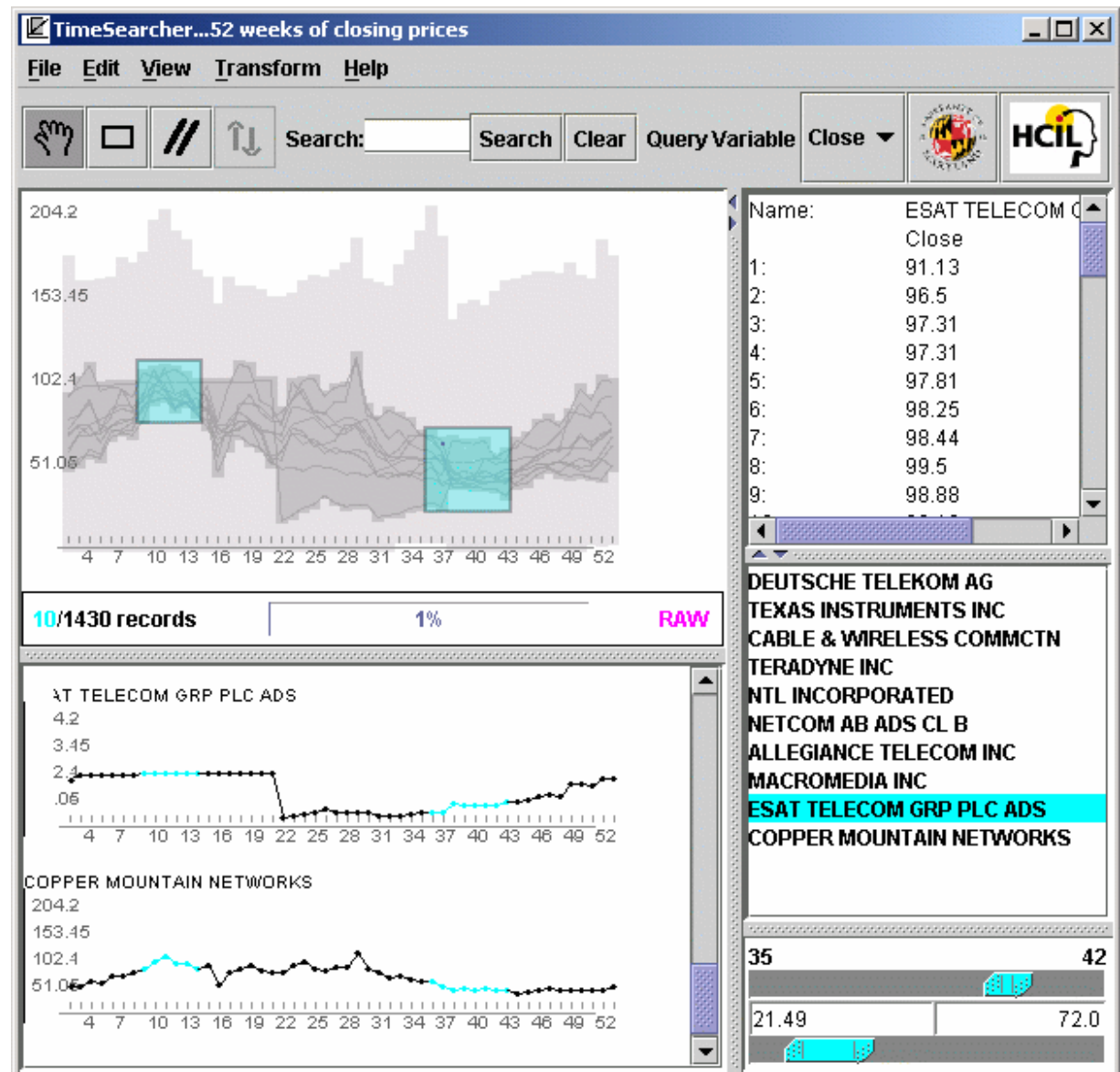
[D45F236: Gloves - Black - M](#)
[A78156: Corduroy pants - Tan - L](#)
[157826: Hat - Grey - M](#)

Kids Backcountry hiking boots
 Leather boots with super grip soles.



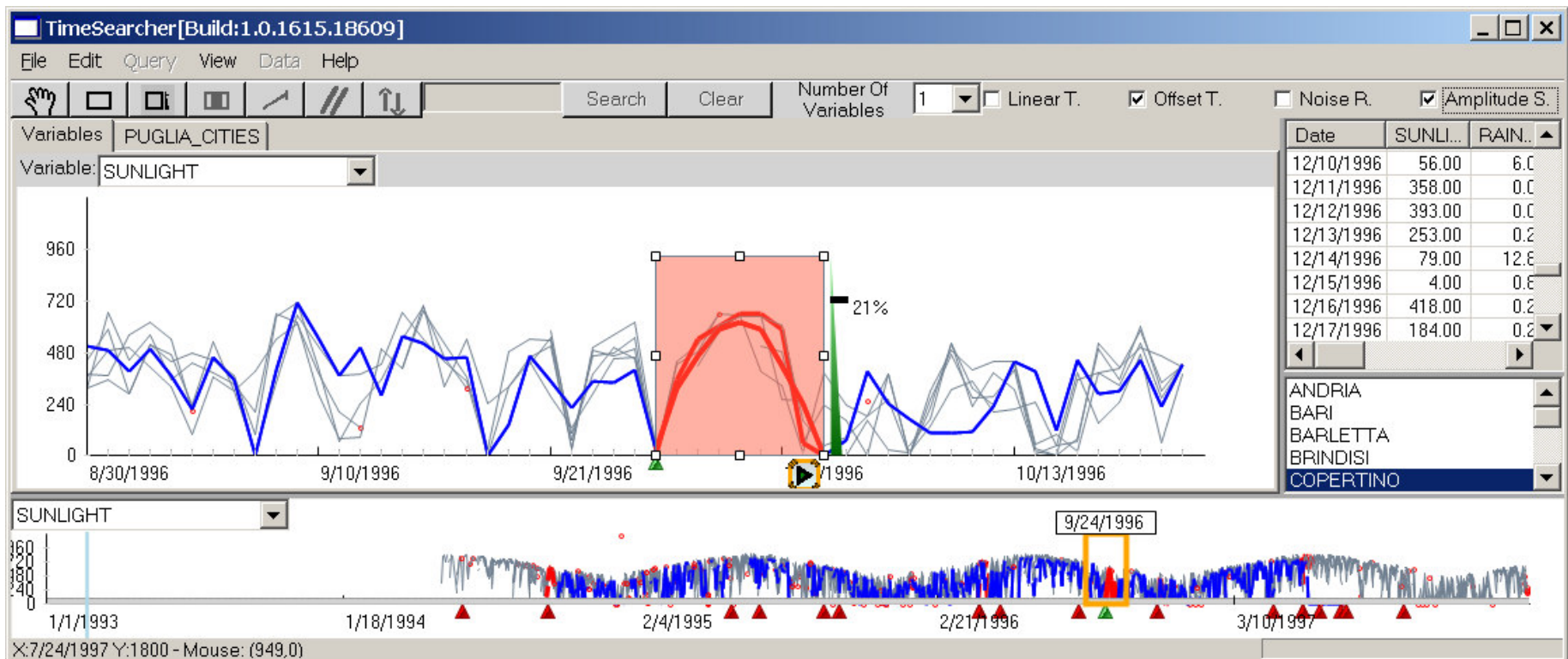
Temporal Data: TimeSearcher 1.3

- Time series
 - Stocks
 - Weather
 - Genes
- User-specified patterns
- Rapid search

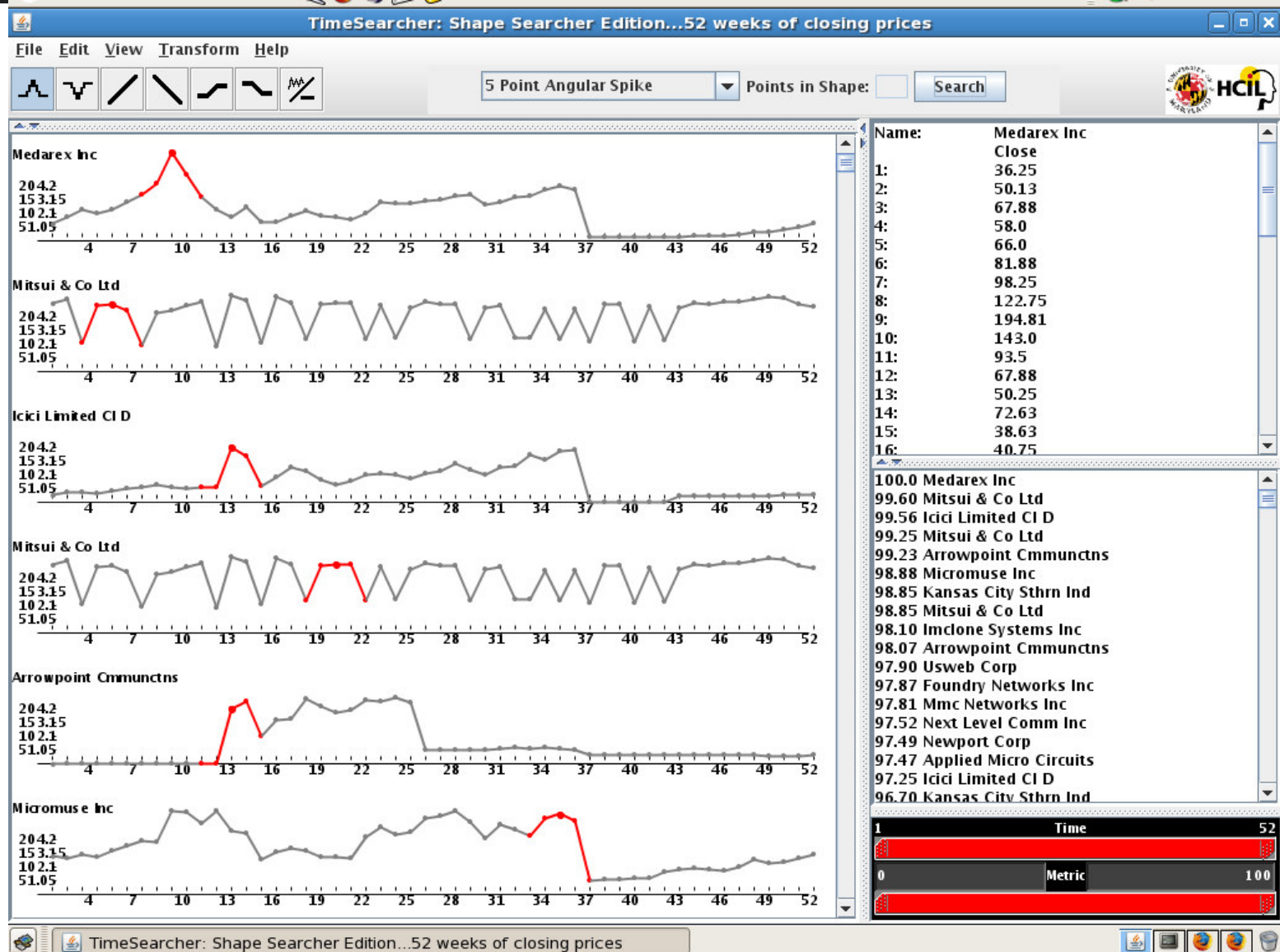


Temporal Data: TimeSearcher 2.0

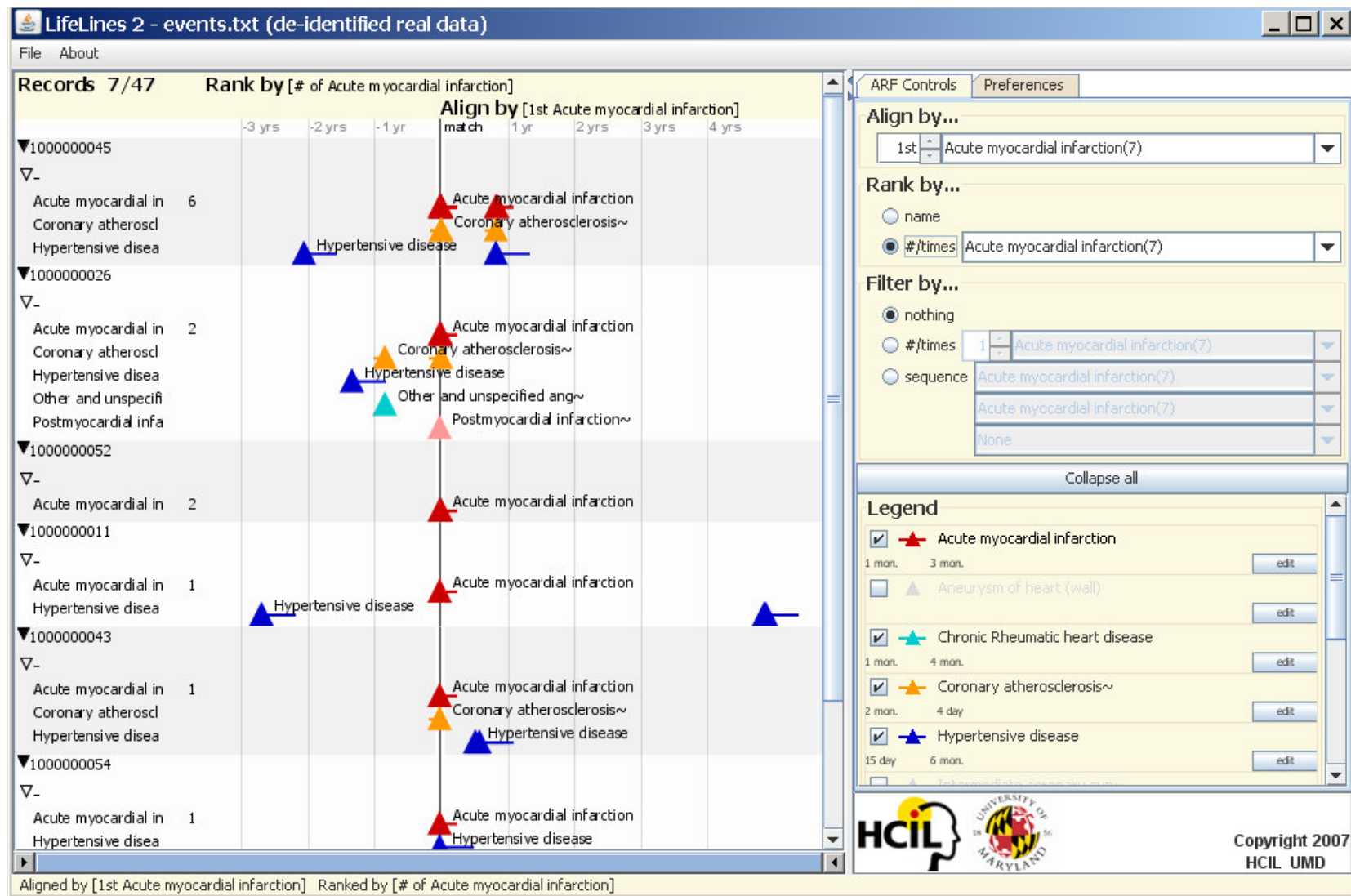
- Long Time series (>10,000 time points)
- Multiple variables
- Controlled precision in match
(Linear, offset, noise, amplitude)



TimeSearcher: Shape Searcher Edition



LifeLines2: Align-Rank-Filter



Search: Task Analysis



Web [Images](#) [Maps](#) [News](#) [Shopping](#) [Gmail](#) [more ▼](#)

[Sign in](#)



Search

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

Web

Results 1 - 10 of about 37,200 for **ibm** [research](#) [haifa](#). (0.32 seconds)

[IBM Research Lab in Haifa](#)

Perform **research** and development such as VLSI design, verification technology, storage subsystems, computer systems, programming languages and environments, ...

www.haifa.il.ibm.com/ - 12k - [Cached](#) - [Similar pages](#)

[Careers at IBM Haifa Labs](#)

[Research Careers](#)

[Haifa Research Lab](#)

[Rehovot Site](#)

[Haifa Site](#)

[IBM home](#)

[Leadership Seminars](#)

[My Account](#)

[More results from ibm.com »](#)

[IBM Research | IBM Haifa Research Lab | Formal Verification and ...](#)

IBM Haifa Research Lab | Formal Verification and Testing Technologies. ... **IBM** presents RuleBase PE at the annual DAC conferences and other industry events ...

www.haifa.il.ibm.com/projects/verification/Formal_Methods-Home/index.html - 16k -

[Cached](#) - [Similar pages](#)

[Haifa Verification Conference 2007](#)

The event will take place at the **IBM Research** Lab in **Haifa**, located on the University of **Haifa** campus, Mount Carmel, **Haifa**, Israel. ...

www.haifa.ibm.com/Workshops/verification2007/ - 19k - [Cached](#) - [Similar pages](#)

[IBM R&D Labs in Israel | IBM Haifa Research Lab](#)

The **IBM Research** Lab in **Haifa** (HRL) has conducted decades of **research** that have been vital to **IBM's** success. R&D projects are being executed today in areas ...

www.haifa.ibm.com/research.html - 11k - [Cached](#) - [Similar pages](#)

[More results from www.haifa.ibm.com »](#)



Search: Task Analysis



Web [Images](#) [Maps](#) [News](#) [Shopping](#) [Gmail](#) [more ▼](#)

[Sign in](#)



on what day was Barack Obama born?

Search

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

Web [Video](#)

Results 1 - 10 of about 4,400,000 for on what **day** was Barack Obama **born**?. (0.24 seconds)

[Barack Obama](#) - Wikipedia, the free encyclopedia

Obama was **born** on August 4, 1961 in Honolulu, Hawaii to **Barack Hussein Obama**,

[103] On October 2, 2002, the **day** Bush and Congress agreed on the joint ...

en.wikipedia.org/wiki/Barack_Obama - 467k - [Cached](#) - [Similar pages](#)

[The Biography Channel](#) - **Born on this Day**

SIGN UP FOR EMAIL: Start your **day** with **Born On This Day!** ... Election 2008: **Barack**

Obama » Election 2008: Hillary Clinton » Election 2008: Rudy Giuliani ...

www.biography.com/search/botd.do - 33k - [Cached](#) - [Similar pages](#)

[Barack Obama Biography](#) - [Biography.com](#)

Barack Hussein Obama was **born** Aug. 4, 1961, in Honolulu , Hawaii . His father, **Barack Obama**, Sr., was **born** of Luo ethnicity in Nyanza Province , Kenya

www.biography.com/search/article.do?id=12782369 - 34k - [Cached](#) - [Similar pages](#)



[YouTube](#) - **Barack Obama**: South Carolina Victory Speech

On election **day** we need foot canvassers. This means sign up ...

[Watch video](#) - 17 min - ★★★★★

www.youtube.com/watch?v=i8mG5qfDXL4

Posted Stories: [BARACK OBAMA WAS BORN ON THIS DAY](#)

BARACK OBAMA WAS BORN ON THIS DAY. 4 August 1961. **Barack Hussein Obama** is a United States Senator from Illinois and a leading candidate for the Democratic ...

postedstories.blogspot.com/2008/02/barack-obama-was-born-on-this-day.html - 99k -

[Cached](#) - [Similar pages](#)



Discovery Process: Task Analysis



Specific fact finding (known-item search)

On what day was Barack Obama born?

<Google succeeds>

Discovery Process: Task Analysis



Specific fact finding (known-item search)

On what day was Barack Obama born? <Google succeeds>

Extended fact finding (vague query)

What cities did Barack Obama live in since he became a Senator?

Exploration of availability (vague result request)

What genealogical information on Barack Obama is at the National Archives?

Discovery Process: Task Analysis



Specific fact finding (known-item search)

On what day was Barack Obama born? <Google succeeds>

Extended fact finding (vague query)

What cities did Barack Obama live in since he became a Senator?

Exploration of availability (vague result request)

What genealogical information on Barack Obama is at the National Archives?

Open-ended browsing and problem analysis (hidden assumptions)

How has Barack Obama's position on the environment changed since 2001?

Mismatch with metadata (requires exhaustive search)

How has Barack Obama's choice of clothing changed during his campaign?

Discovery Process: Task Analysis



known-item search

vague query

vague result request

hidden assumptions

requires exhaustive search

Discovery Process: Task Analysis



1-minute

known-item search

vague query

Weeks
&
Months

vague result request

hidden assumptions

requires exhaustive search

Discovery Process: Design Challenges



Enrich query formulation

Expand result management

Enable long-term effort

Enhance collaboration

Deal with special cases:

- Comprehensive: Legal, patent, medical
- Negation: Patent, pharma
- Exceptions: Outlier documents
- Bridges: Connecting

Discovery Process: Design Challenges



Enrich query formulation

Expand result management

Enable long-term effort

Enhance collaboration

Discovery Process: Design Possibilities



Enrich query formulation

Expand result management

Enable long-term effort

Enhance collaboration

Discovery Process: Design Possibilities



Enrich query formulation →

Expand result management

Enable long-term effort

Enhance collaboration

**Previous & Similar
Structured input**

Spell check

Query previews

Finding Aids

Limit:

Time

Geography

Language

Sources

Media

. . .

Discovery Process: Design Possibilities



Enrich query formulation

Expand result management →

Enable long-term effort

Enhance collaboration

**Ranking (Social, ...)
Snippets + Handles
Highlighting**

**Clustering:
Dynamic generation
Meaningful & Stable**

**Visualization:
By attributes**

Summarization

Discovery Process: Design Possibilities



Enrich query formulation

Expand result management

Enable long-term effort

Enhance collaboration



Save & Replay
Edit & Grab
Mark & Annotate
Compare

Notebooks

History-keeping

Systematic Yet
Flexible Strategies

Discovery Process: Design Possibilities



Enrich query formulation

Expand result management

Enable long-term effort

Enhance collaboration



Send email

Announce, publish...

Export: web, slides...

Record video

Comment, blog...

Wiki

Share screen

Tagging & voting

Feedback to search

Discovery Process: Design Challenges



Enrich query formulation

Expand result management

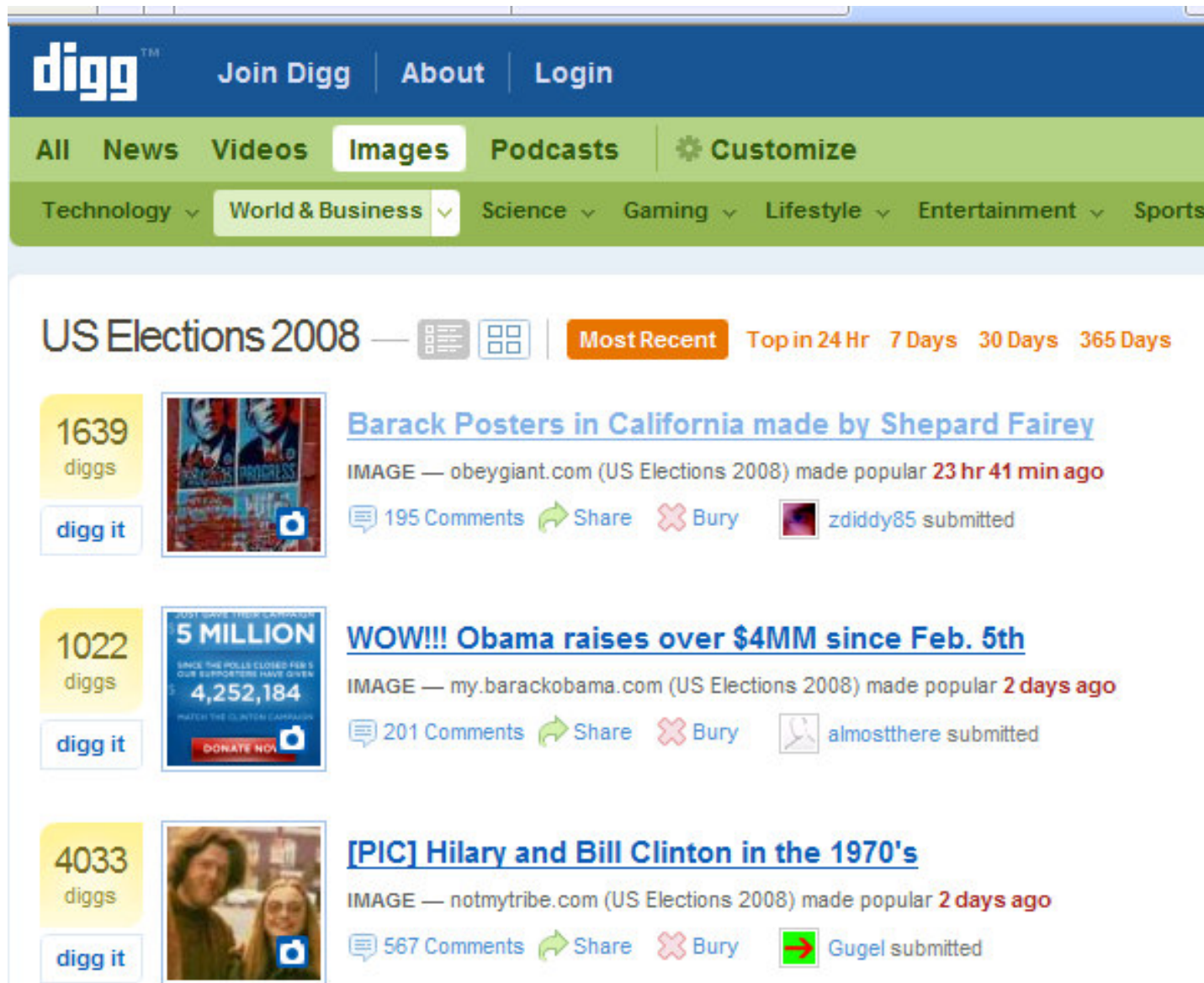
Enable long-term effort

Enhance collaboration

Deal with special cases:

- **Comprehensive: Legal, patent, medical**
- **Negation: Patent, pharma**
- **Exceptions: Outlier documents**
- **Bridges: Connecting**

Collaboration: Tagging & voting



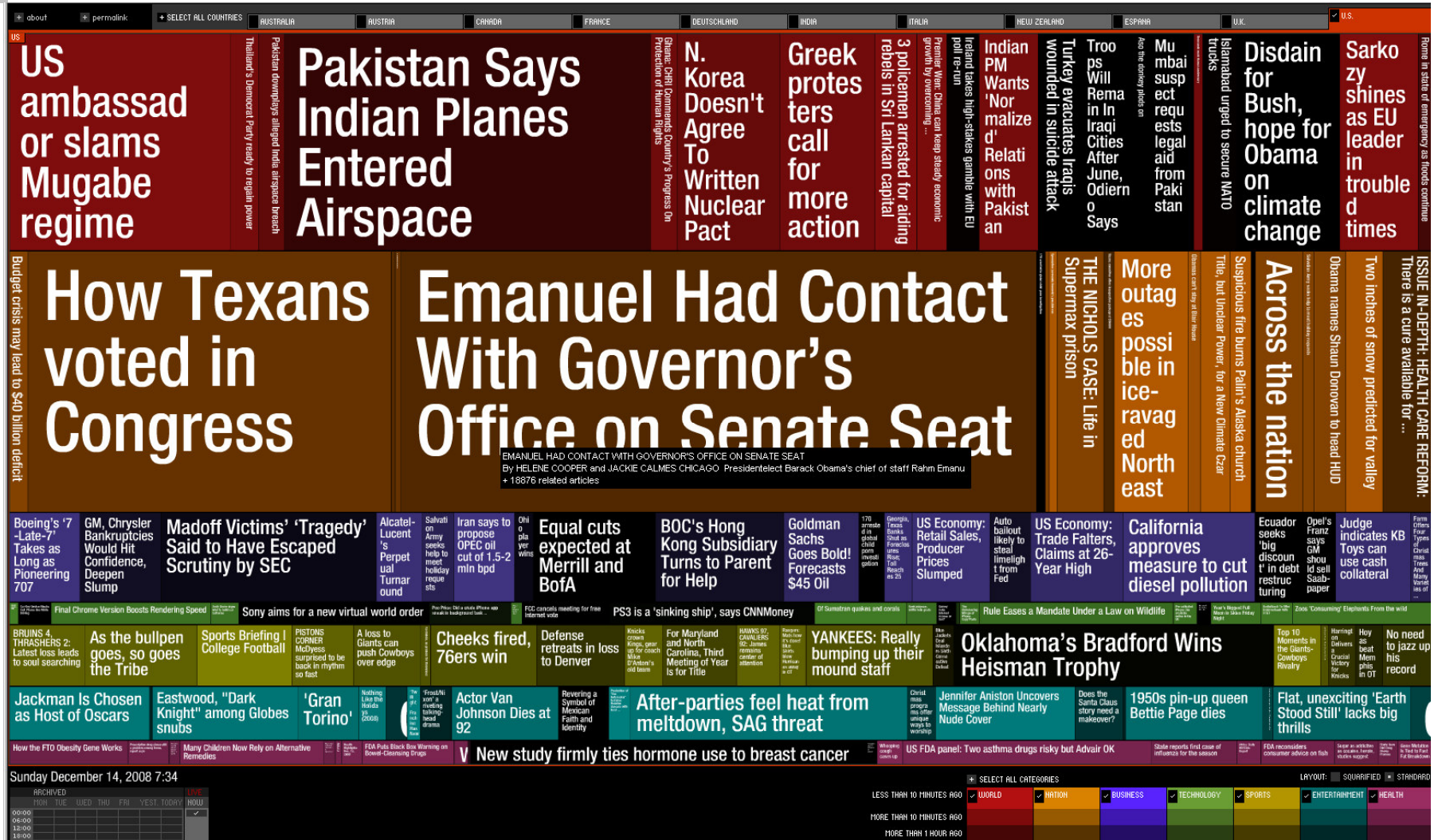
The screenshot shows the Digg website interface. At the top is a blue navigation bar with the 'digg' logo and links for 'Join Digg', 'About', and 'Login'. Below this is a green bar with category tabs: 'All', 'News', 'Videos', 'Images' (which is selected), 'Podcasts', and 'Customize'. Under the 'Images' tab, there are sub-categories: 'Technology', 'World & Business' (selected), 'Science', 'Gaming', 'Lifestyle', 'Entertainment', and 'Sports'. The main content area is titled 'US Elections 2008' and includes sorting options: 'Most Recent' (selected), 'Top in 24 Hr', '7 Days', '30 Days', and '365 Days'. Three articles are listed:

- Barack Posters in California made by Shepard Fairey**
1639 diggs
IMAGE — obeygiant.com (US Elections 2008) made popular 23 hr 41 min ago
195 Comments | Share | Bury | zdiddy85 submitted
- WOW!!! Obama raises over \$4MM since Feb. 5th**
1022 diggs
IMAGE — my.barackobama.com (US Elections 2008) made popular 2 days ago
201 Comments | Share | Bury | almostthere submitted
- [PIC] Hilary and Bill Clinton in the 1970's**
4033 diggs
IMAGE — notmytribe.com (US Elections 2008) made popular 2 days ago
567 Comments | Share | Bury | Gugel submitted

Treemap: Digg Overview



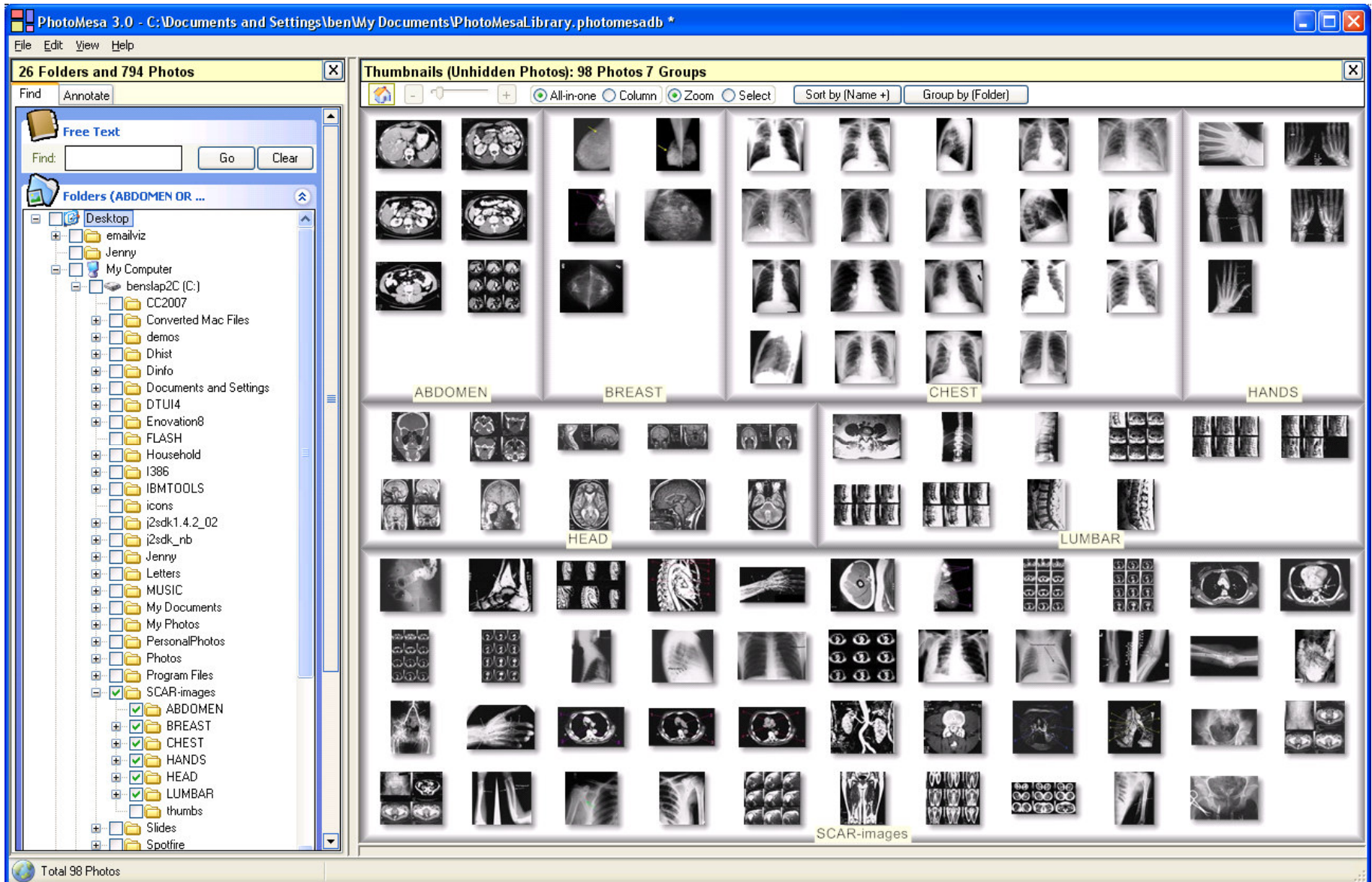
Treemap: Newsmap



marumushi.com/apps/newsmap/newsmap.cfm



PhotoMesa: Zooming Exploration





PUNCHSTOCK

[Rights Managed](#) [Royalty Free](#)
[CD Store](#) [Promotions](#) [Valueline](#)

New image search

☐ Within☒ Images ☐ CDs[Options](#)

All Results

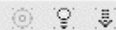
Royalty Free

Rights Managed

Valueline

132,460 results 20 per page Sort by Relevance Page 1 of 6623 preview balloons are on

RF 1804920



RF SB10063101R-001



RF 76415495



RF GWG114081



RF GWT174005



RF 572045



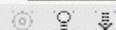
RF GWG114039



RF SEF00011



RF KS129649



RF PER022



RF GWT216006



RF PH170_280



You Searched For:

tree

Guided Search

People

- + Number of People 79282
- + Activity 65490
- + Age 47276
- + Ethnicity 40725
- + Appearance 39764
- + Gender 32277
- + Emotion 28549
- + Relationships 19649
- + Role 18933
- + Occupation 5976

Concepts

- + Idea 90252
- + Topic 46168
- + Industry 39119
- + Lifestyles 31842

Style

- + Composition 63745
- + Viewpoint 46775
- + Image Technique 16546
- + Image Type 13122
- + Color Manipulation 5132

Setting

- + Location 116604
- + Buildings And Architecture 36481
- + Places 23730
- + Event 10838

Things

- + Everyday Things 35367
- + Clothing And Accessories 34152
- + Professional Equipment 19170
- + Foods And Drink 10358
- + Vehicles 10047
- + Number of Things 8844

Nature

- + Plants And Vegetation 119874
- + Natural Phenomenon 92823
- + Animals And Wildlife 12536



Discovery Process: Strategies



The image shows a screenshot of the Vivísimo search engine interface. At the top, there's a navigation bar with links: about | products | solutions | press | partners | support. Below this is the Vivísimo logo and a search bar containing "john mccain". To the right of the search bar is a dropdown menu set to "the Web" and a "Search" button. Further right are links for "Advanced Search" and "Help". Below the search bar, a message says "NEW search the Wikipedia at Clusty.com".

The main content area is titled "Clustered Results" and shows "Top 185 results of at least 9,163,000 retrieved for the query john mccain (Details)". On the left side, there's a sidebar with a tree view of results:

- ▶ [john mccain \(187\)](#)
 - ▶ [Website of John McCain's 2008 Campaign for President \(38\)](#)
 - ▶ [Candidate \(23\)](#)
 - ▶ [Vote \(9\)](#)
 - ▶ [Presidential campaign \(6\)](#)
 - ▶ [Review \(8\)](#)
 - ▶ [Photos \(6\)](#)
 - ▶ [John Sidney McCain III \(6\)](#)
 - ▶ [Arizona Senator John McCain \(6\)](#)
 - ▶ [War hero \(5\)](#)
 - ▶ [Navy \(5\)](#)
 - ▶ [More](#)

Below the sidebar, there's a section "Find in clusters:" with a text input field "Enter Keywords" and a "Go" button.

The main results area displays three sponsored links and three organic results:

- John McCain 2008** (Sponsored Link)
Get Involved and Support Senator **John McCain**
[JohnMcCain.com](#) - Sponsored Listings 1
- Who Should Be President?** (Sponsored Link)
Candidate Quiz! Will you vote for the right candidate in 2008?
[QuizRocket.com/who-should-i-vote](#) - Sponsored Listings 2
- 1. United States Senator John McCain :: Home ::**
[new window] [frame] [cache] [preview] [clusters]
Official site features his biography, issue positions, legislation, speeches, constituent services, calendar and information about Arizona. Includes pork barrel section, audio ...
[mccain.senate.gov](#) - *Open Directory 1, Gigablast 1, Ask 2, Gigablast 3, Live 3*
- 2. John McCain 2008 - John McCain for President**
[new window] [frame] [preview] [clusters]
Official presidential campaign site provides news, issue positions, speeches, biography, and information for volunteers and making donations.
[www.johnmccain.com](#) - *Ask 1, Open Directory 2, Live 2*
- 3. John McCain 2008 - John McCain for President**
[new window] [frame] [cache] [preview] [clusters]
John McCain 2008 - The Official Website of **John McCain's** 2008 Campaign for President
[www.exploremccain.com](#) - *Live 1, Ask 5, Live 5, Gigablast 6, Live 9,*

Vivisimo & Exalead: Dynamic overviews



search.vivisimo.com

about | products | solutions | press | partners | support

john mccain the Web

NEW search the [Wikipedia](#) at [Clusty.com](#)

Clustered Results

Top 185 results of at least 9,163,000 retrieved for the [\(Details\)](#)

- ▶ [john mccain](#) (187)
 - ▶ [Website of John McCain's 2008 Campaign for President](#) (38)
 - ▶ [Candidate](#) (23)
 - ▶ [Vote](#) (9)
 - ▶ [Presidential campaign](#) (6)
 - ▶ [Review](#) (8)
 - ▶ [Photos](#) (6)
 - ▶ [John Sidney McCain III](#) (6)
 - ▶ [Arizona Senator John McCain](#) (6)
 - ▶ [War hero](#) (5)
 - ▶ [Navy](#) (5)
 - ▶ [More](#)

Find in clusters:
 Enter Keywords

John McCain 2008
 Get Involved and Support Senator John McCain
[JohnMcCain.com](#) - Sponsored Listings 1

Who Should Be President?
 Candidate Quiz! Will you vote for the right candidate in 2008?
[QuizRocket.com/who-should-i-vote](#) - Sponsored

- United States Senator John McCain**
[\[new window\]](#) [\[frame\]](#) [\[cache\]](#) [\[preview\]](#) [\[clusters\]](#)
 Official site features his biography, issue positions, speeches, constituent services, calendar and information. Includes pork barrel section, audio ...
[mccain.senate.gov](#) - [Open Directory 1](#), [Gigablast 3](#), [Live 3](#)
- John McCain 2008 - John McCain**
[\[new window\]](#) [\[frame\]](#) [\[cache\]](#) [\[preview\]](#) [\[clusters\]](#)
 Official presidential campaign site provides new speeches, biography, and information for volunteer donations.
[www.johnmccain.com](#) - [Ask 1](#), [Open Directory 1](#)
- John McCain 2008 - John McCain**
[\[new window\]](#) [\[frame\]](#) [\[cache\]](#) [\[preview\]](#) [\[clusters\]](#)
 John McCain 2008 - The Official Website of John McCain's 2008 Campaign for President ... Upcoming Events Get your McCain Gear Register to Vote A Cause ...
[www.exploremccain.com](#) - [Live 1](#), [Ask 5](#), [Live 1](#)



Customize your homepage

Web | [Images](#) | [Wikipedia](#) | [Video](#) | [More »](#)

john mccain

Results 1-10 of about 1,975,010 for john mccain

All results - [Only recent results](#) | View:

Do you want [audio results](#) for **john mccain** ?

John McCain 2008 SPONSORED RESULTS
 Learn more about John McCain. Get involved today.
[www.JohnMcCain.com](#)

Political Poll - John McCain
 Political Quiz! Cast your vote and get a FREE T-Shirt. Act Now.
[2008presidentialelection.com](#)

John McCain 2008 Store
 McCain Bumper Stickers, Hats, Shirts, Buttons and More.
[www.FreedomHQ.com](#)

[http://mccain.senate.gov/](#)
[mccain.senate.gov](#) - [Add to shortcuts](#) - [More results from this site »](#)

John McCain 2008 - John McCain for President
 John McCain 2008 - The Official Website of John McCain's 2008 Campaign for President ... Upcoming Events Get your McCain Gear Register to Vote A Cause ...
[www.johnmccain.com](#) - 103k - [Add to shortcuts](#) - [More results from this site »](#)

Narrow your search

Related terms

- [Senator John McCain](#)
- [Arizona Republican](#)
- [Arizona senator](#)
- [Senator John](#)
- [Mitt Romney](#)

Site type BETA

- [Blog](#)
- [Forum](#)

Multimedia

[Audio](#) [Video](#) [RSS](#)

Languages

- [English](#)
- [French](#)

Directory

- [Society and Culture](#)
- [Opposing Views](#)
- [Government](#)

File types

- [Acrobat \(.pdf\)](#)
- [Text \(.txt\)](#)
- [Word \(.doc\)](#)

[More choices »](#)

SERVICE: Categorized Overviews

Query:

Search

Help

Click below to filter results

Topic Category

News (48)

Society (22)

Arts (16)

Business (6)

Computers (6)

Science (6)

Shopping (4)

Reference (2)

Kids and Teens (2)

Geography

North America (32)

Europe (10)

Middle East (4)

Caribbean (2)

Africa (2)

US Government

US Senate (2)

Top 200 results containing **Obama**

[News results for obama](#)

Republican adviser declares interest in **Obama**

news.google.com/news?q=obama&filter=1&um=1&ie=UTF-8

[News results for obama](#)

Republican adviser declares interest in **Obama**

news.google.com/news?q=obama&filter=1&um=1&ie=UTF-8

[Welcome to Obama for America](#)

Official site for the presidential campaign featuring

www.barackobama.com/

[Welcome to Obama for America](#)

Official site for the presidential campaign featuring

www.barackobama.com/

[Barack Obama | Change We Can Believe In](#)

Barack **Obama** understands the immense

www.barackobama.com/issues/technology/

[Barack Obama | Change We Can Believe In](#)

Barack **Obama** understands the immense

www.barackobama.com/issues/technology/

[Barack Obama - Wikipedia, the free encyclopedia](#)

Hyperlinked encyclopedia entry provides an extensive

en.wikipedia.org/wiki/Barack_Obama

[Barack Obama - Wikipedia, the free encyclopedia](#)

Hyperlinked encyclopedia entry provides an extensive

en.wikipedia.org/wiki/Barack_Obama

Query:

Search

Help

Click below to filter results

Topic Category

News (23)

Society (9)

Arts (8)

Business (5)

Science (5)

Computers (3)

Shopping (1)

Reference (1)

Kids and Teens (1)

Geography

North America (14)

Europe (4)

US Government

US Senate (1)

Top 100 results containing **McCain**

[News results for McCain](#)

McCain's Focus Is on General Election -

news.google.com/news?q=McCain&filter=1&um=1&ie=UTF-8

[John McCain 2008 - John McCain](#)

John **McCain** 2008 - The Official Website

www.johnmccain.com/

[john mccain](#)

John **McCain** - Donate Today - Click

www.johnmccain.com/landing/?sid=gorganic

[John McCain - Wikipedia, the free encyclopedia](#)

John Sidney **McCain** III (born August 29, 1936)

en.wikipedia.org/wiki/John_McCain

[US Senator John McCain](#)

Official site features his biography, issues p

mccain.senate.gov/

[MySpace.com - John McCain - 71](#)

MySpace profile for John **McCain** with pict

www.myspace.com/johnmccain

[Primary Choices: John McCain - N](#)


Jan 25, 2008 ... The senator from Arizona i

www.nytimes.com/2008/01/25/opinion/25fri2.html

Grokker: Overviews & Maps

See how Grokker can help your business

News & Events | Blogs | Contact Us | Feedback | Help | Home



Selected Sources [2 of 3] [Add/Remove](#)
Yahoo!, Wikipedia

barack obama [GROK](#) [Search Options](#)

Outline View [Map View](#) 250 total results

[Expand Outline](#) | [Collapse Outline](#)

barack obama (250 results)

- General (27)
 - ✚ Senator from Illinois (22)
 - ✚ Presidential Candidate (16)
 - ✚ Barack Obama's (15)
 - Barack Obama News (14)
 - Sponsored Legislation (14)
 - ✚ State Senate (14)
 - Community Organizer (13)
 - Hawaii to Barack Obama (13)
 - ✚ U.S. Senate (13)
 - ✚ Democratic Presidential (12)
 - ✚ Law School (12)
 - ✚ New York (12)
 - Presidential Campaign (11)
 - Born in Nyanza Province (10)
 - ✚ Harvard Law (10)
 - Iraq War (10)
 - 110th Congress (9)
 - United States (9)
 - Hillary Clinton (8)
 - State Legislator (8)
 - Votes (8)
 - Columbia University (7)
 - ✚ Democratic Primary Run (7)
 - Photos (7)
 - Democratic Primary (6)

Detail: [Less](#) [Medium](#) [More](#)

barack obama

[George W. Bush's first term as President of the United States](#)
[Add to Working List](#) | [Post to del.icio.us](#) | [Bookmark](#) | [Email](#)
...Questioning the Bush administration's management of the Iraq War, Obama spoke of an enlisted Marine, Corporal Seamus Ahern from...
http://en.wikipedia.org/wiki/George_W._Bush%27s_first_term_as_Presi... - Wednesday, February 13, 2008
Source: Wikipedia

[Barack Obama - Wikipedia, the free encyclopedia](#)
[Add to Working List](#) | [Post to del.icio.us](#) | [Bookmark](#) | [Email](#)
Hyperlinked biography of Barack Obama, Democratic U.S. Senator from Illinois and candidate for the 2008 Democratic Presidential nomination.
http://en.wikipedia.org/wiki/Barack_Obama - 478k - Tuesday, February 12, 2008
Source: Yahoo!

[University of Chicago](#)
[Add to Working List](#) | [Post to del.icio.us](#) | [Bookmark](#) | [Email](#)
...discrimination claims, and voting rights cases.[29] He was a lecturer of constitutional law at the University of Chicago Law School from 1993 until his election to the U.S. Senate in 2004. [30]...
http://en.wikipedia.org/wiki/University_of_Chicago - Wednesday, February 13, 2008
Source: Wikipedia

[Barack Obama - U.S. Senator for Illinois](#)
[Add to Working List](#) | [Post to del.icio.us](#) | [Bookmark](#) | [Email](#)
Official U.S. Senate site for Barack Obama, Democratic senator from Illinois.
<http://obama.senate.gov/> - 15k - Tuesday, February 12, 2008
Source: Yahoo!

[Constitutional law](#)
[Add to Working List](#) | [Post to del.icio.us](#) | [Bookmark](#) | [Email](#)
...he represented community organizers, discrimination claims, and voting rights cases.[29] He was a lecturer of constitutional law at the University of Chicago Law School from 1993 until his election to the U.S....
http://en.wikipedia.org/wiki/Constitutional_law - Wednesday, February 13, 2008
Source: Wikipedia

Working List
0 items in your list
[View your list](#)

[Email Outline...](#)
[Export Outline...](#)

Search within the outline:
by keyword
 ☐ Exclude

by date
 all most recent

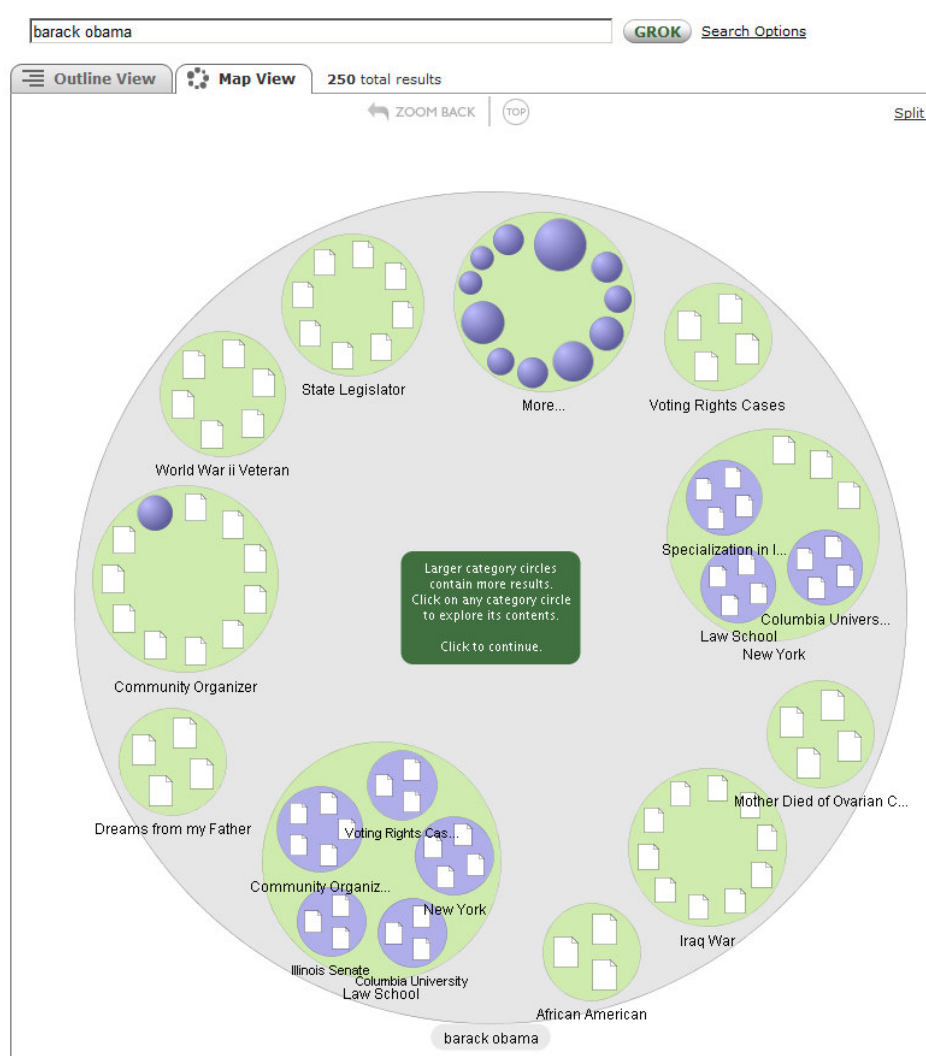
by source
<All sources>

by domain
<All domains>

[Hide Tools](#)

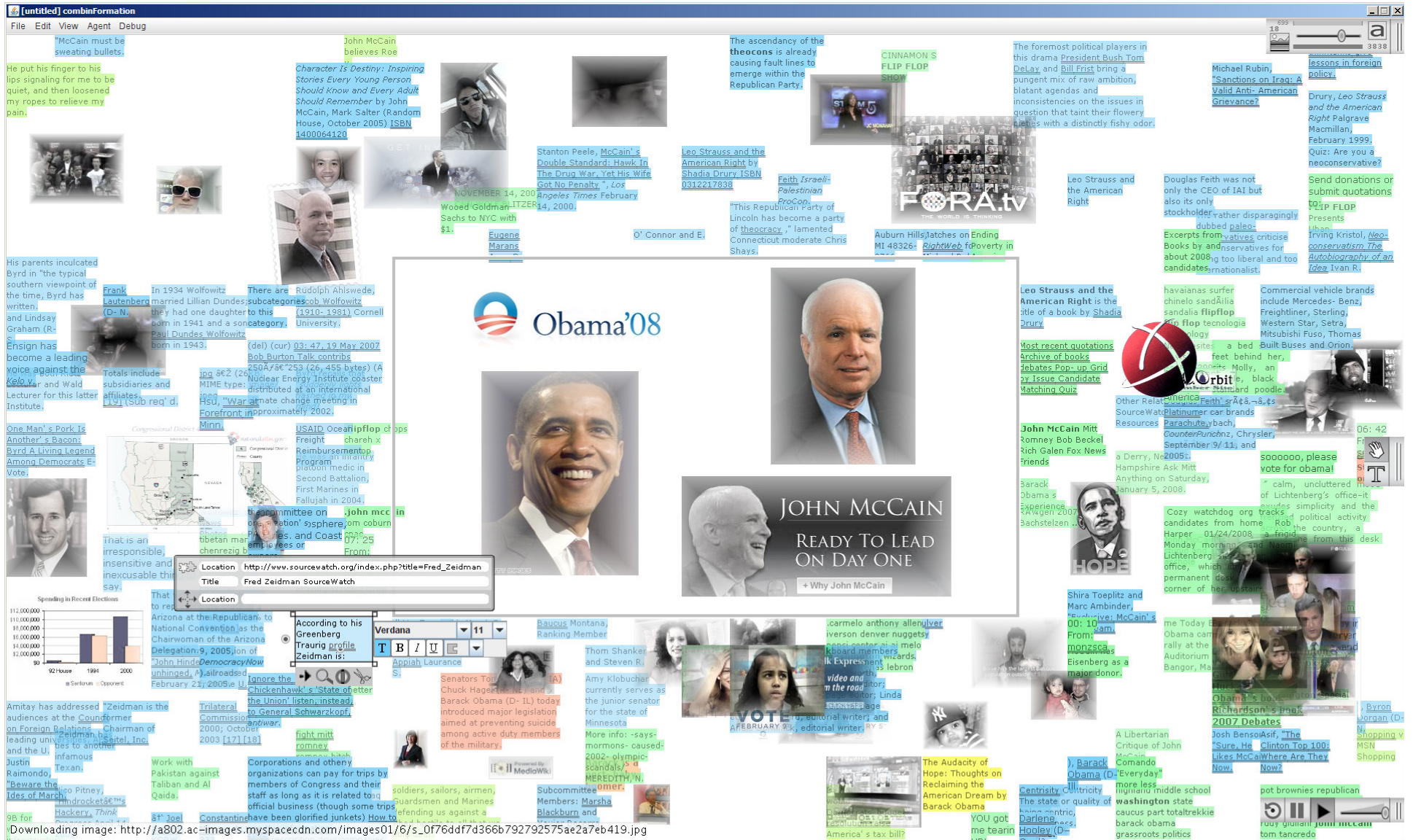
©2006 Groxis Inc., All Rights Reserved.

Grokker: Overviews & Maps



The screenshot shows a web browser window with a complex, cluttered collage of various web pages, images, and text related to the 2008 US Presidential election, specifically focusing on Barack Obama and John McCain. The collage includes numerous small images of the candidates, campaign logos, news snippets, and social media-like elements. A prominent search bar is visible in the center, and a large image of Barack Obama is in the lower center. The browser's address bar shows a URL starting with 'http://i.ytimg.com/vi/VWzR8x4hKI/default.jpg'.

Discovery Process: Combinformation



Discovery Process: Design Challenges



Enrich query formulation

Expand result management

Enable long-term effort

Enhance collaboration

Deal with special cases:

- **Comprehensive: Legal, patent, medical**
- **Negation: Patent, pharma**
- **Exceptions: Outlier documents**
- **Bridges: Connecting**

Research Methods



Controlled experiments

Repeated interventions

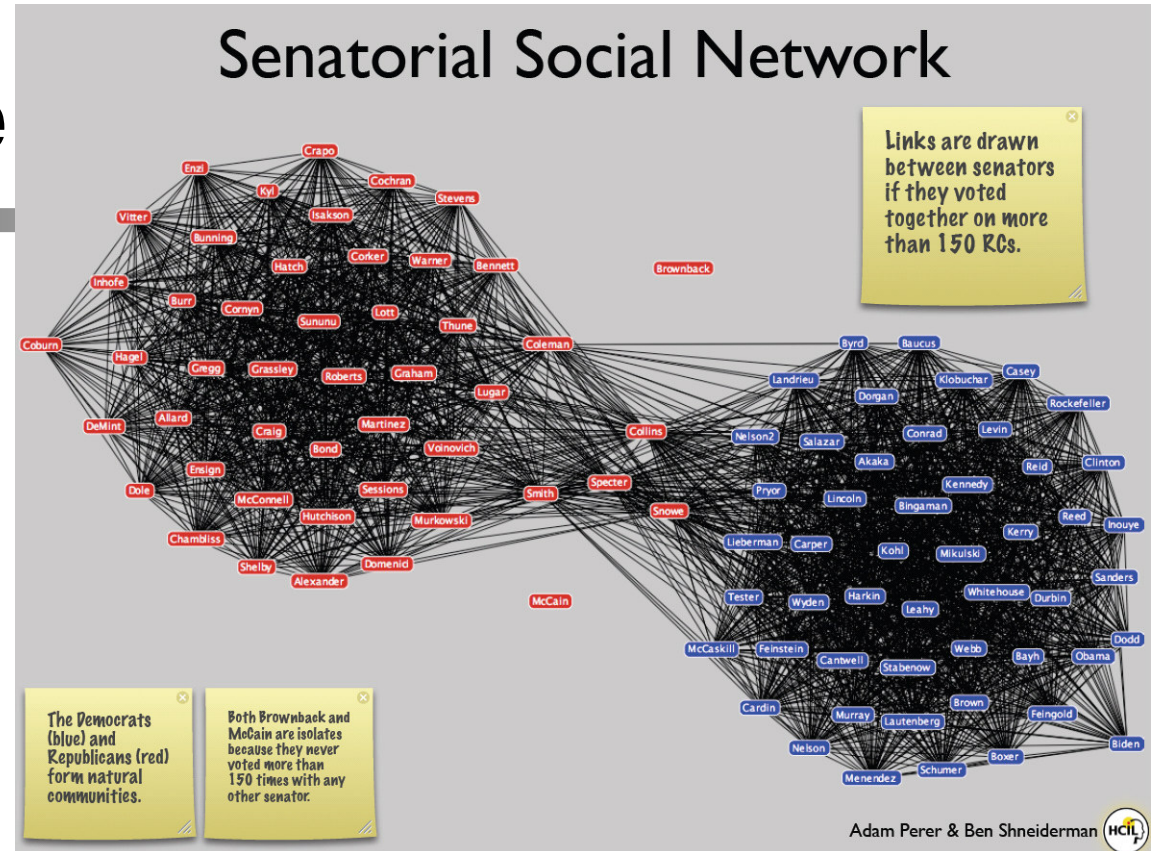
Logging usage patterns

Multi-dimensional In-Depth Long-Term Case Studies
(MILCs)

Domain experts doing their own work
for weeks & months

MILC example

- Evaluate SocialAction



- Focused on integrating statistics & visualization
- 4 case studies, 4-8 weeks (journalist, bibliometrician, terrorist analyst, organizational analyst)
- Identified desired features, gave strong positive feedback about benefits of integration

(Perer & Shneiderman, *CHI2008*)

Science 1.0

- Reductionist
- Controlled Experiments
- Laboratory
- Natural World

Science 1.0

+

Science 2.0

- Reductionist → Integrated
- Controlled Experiments → Interventions + Case Studies
- Laboratory → Situated
- Natural World → Made World

Science 1.0

+

Science 2.0

- Reductionist → Integrated
- Controlled Experiments → Interventions + Case Studies
- Laboratory → Situated
- Natural World → Made World
- Hypothesis Testing → Hypothesis Testing
- Predictive Theories → Predictive Theories
- Replications → Replications



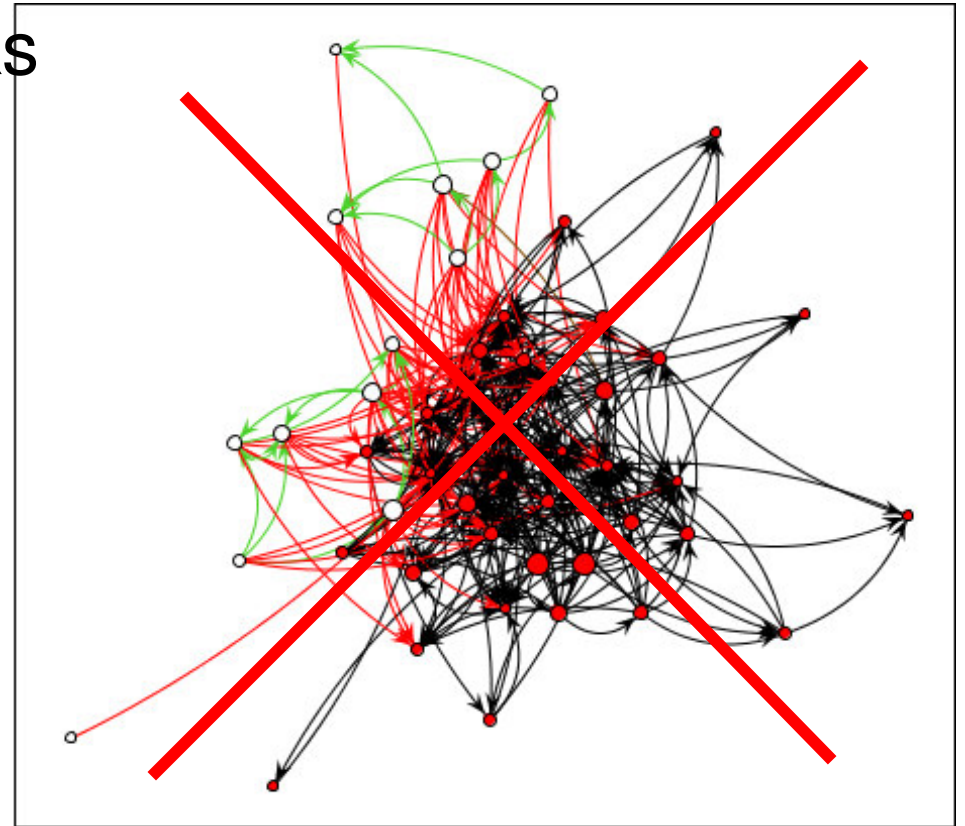
26th Annual Symposium
May 28-29, 2009

www.cs.umd.edu/hcil



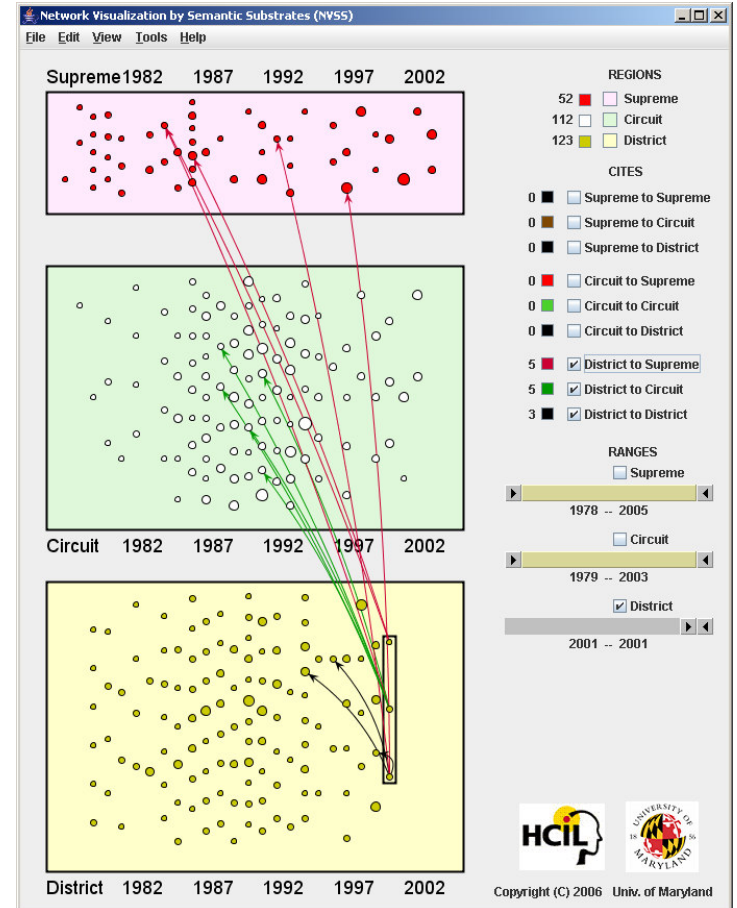
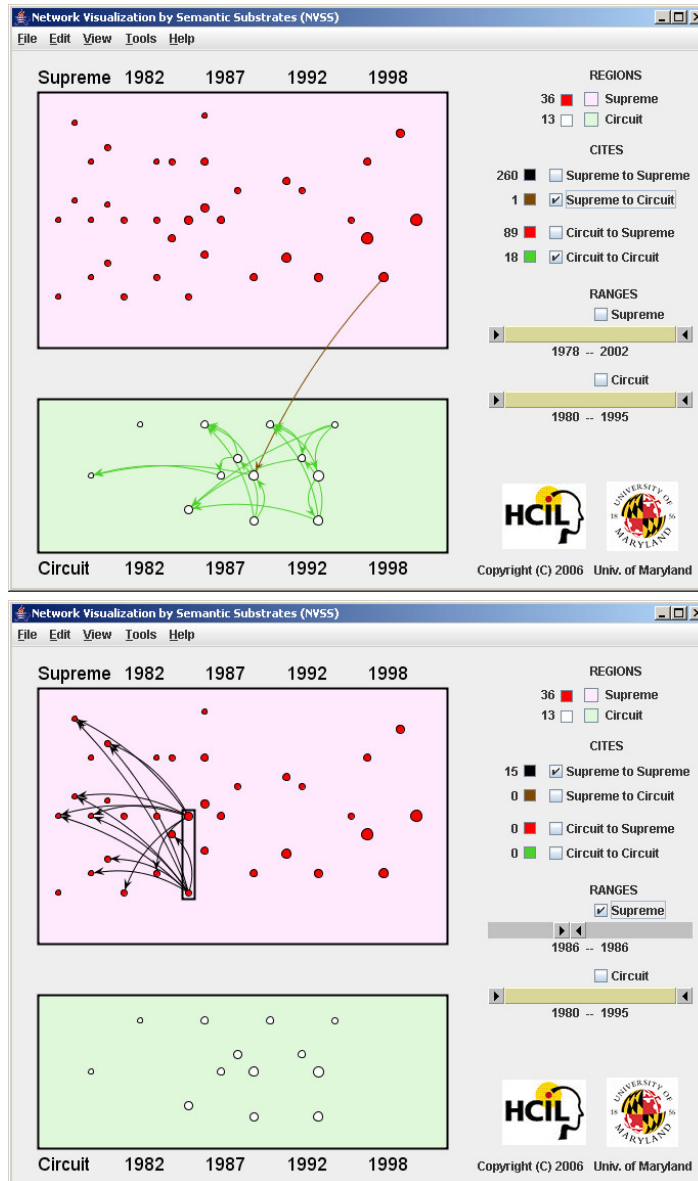
Network Data

- Nodes & Links
 - Relationships & communication
 - Scientific/legal citations
- Difficult to complete tasks
 - Occlusion
 - Complexity

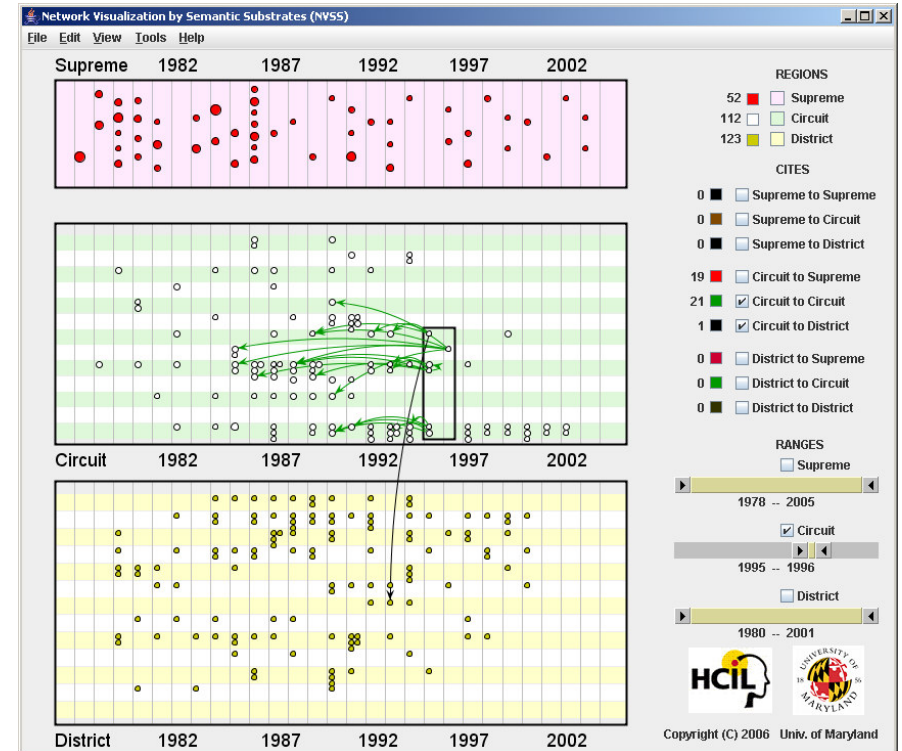
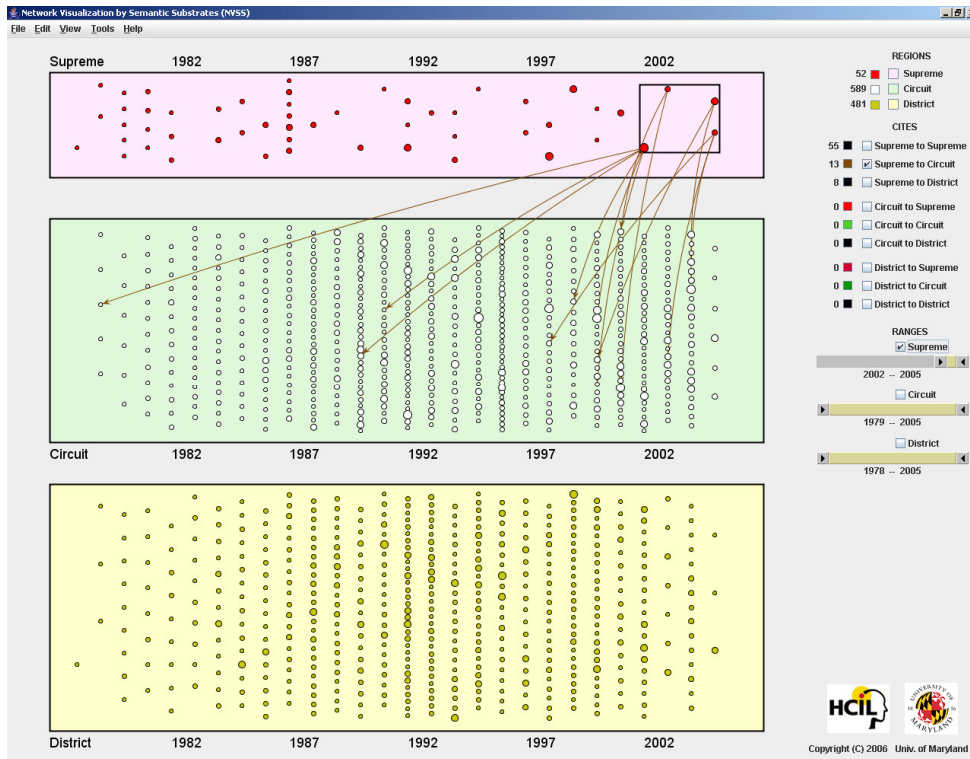


Network Visualization with Semantic Substrates

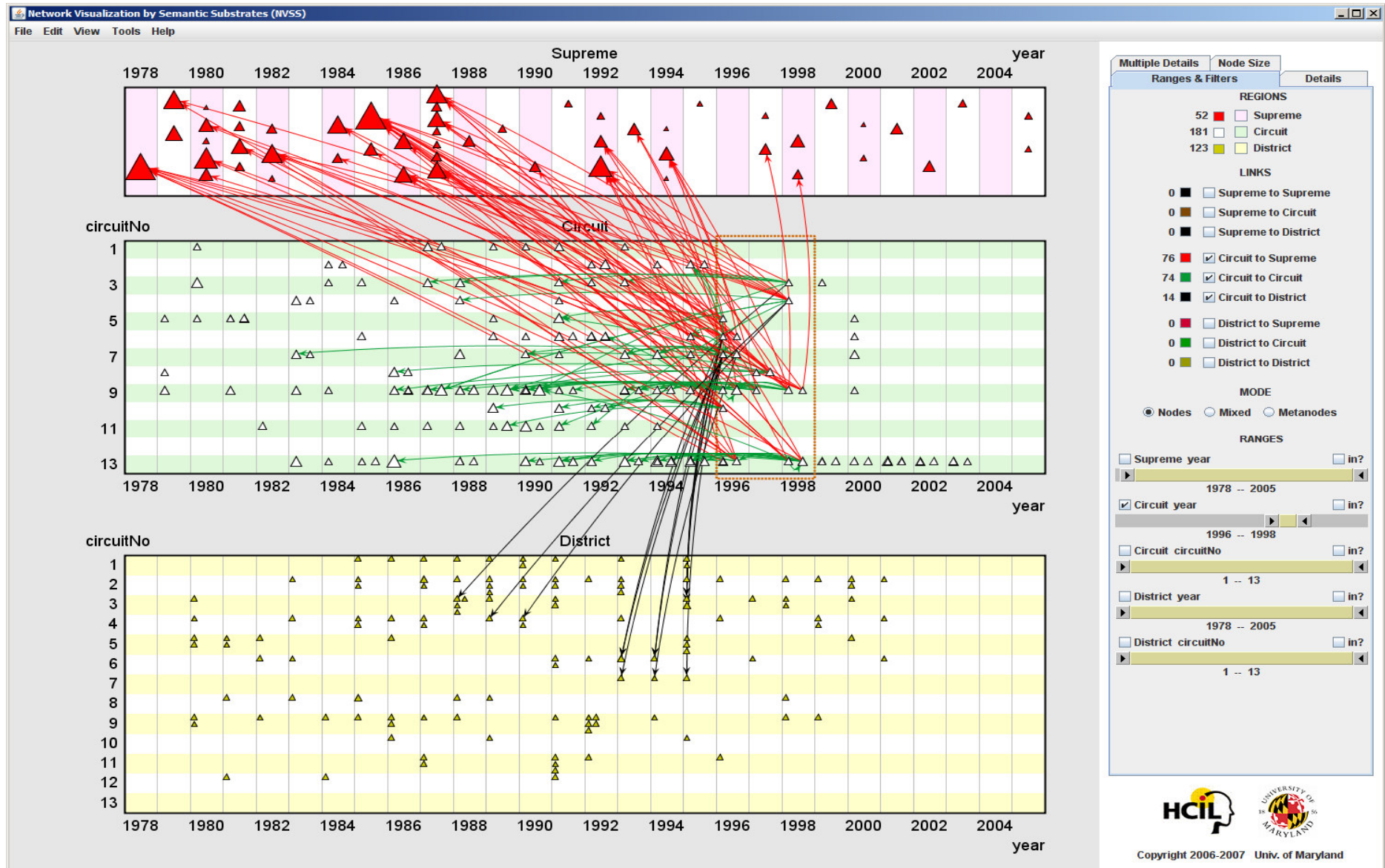
- Meaningful layout of nodes
- User controlled visibility of links



Network Visualization with Semantic Substrates

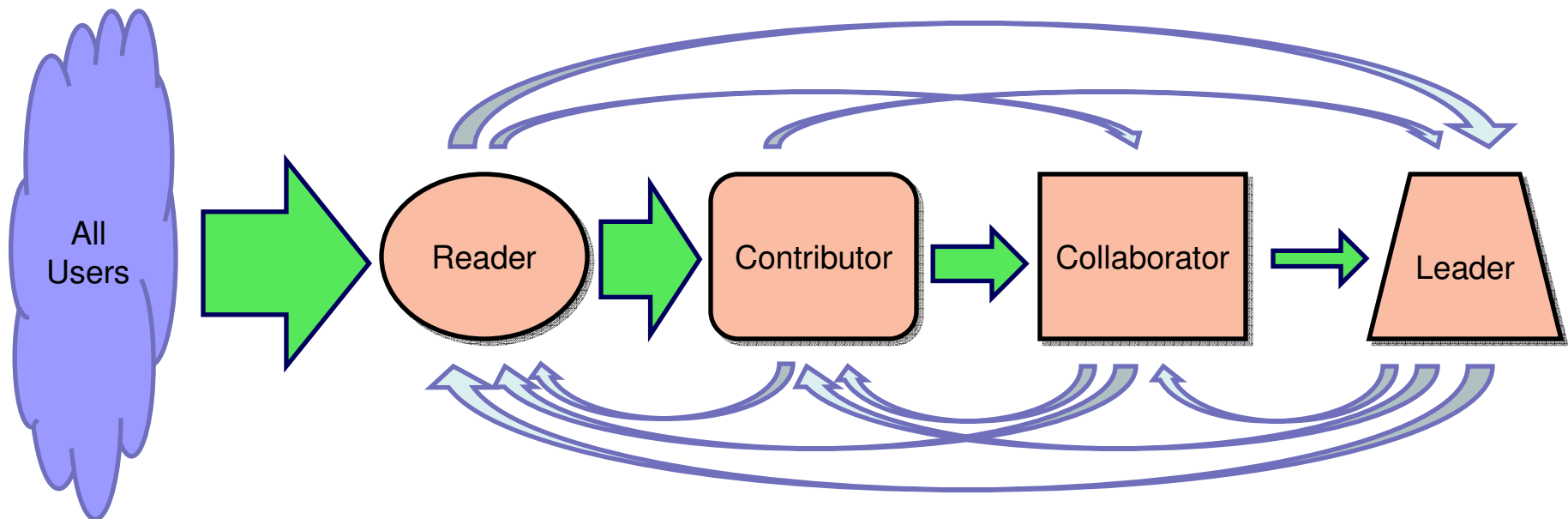


NVSS: Citation Historiographs



The Reader-to-Leader Framework:

Motivating Technology-Mediated Social Participation



(Preece & Shneiderman, *AIS Trans. on HCI*, 2009)

Research Methods



Controlled experiments

Repeated interventions

Logging usage patterns

Multi-dimensional In-Depth Long-Term Case Studies
(MILCs)

Domain experts doing their own work
for weeks & months

Case Study Methodology



- 1) Interview (1 hr)
- 2) Training (2 hr)
- 3) Early Use (2-4 weeks)
- 4) Mature Use (2-4 weeks)
- 5) Outcome (1 hr)



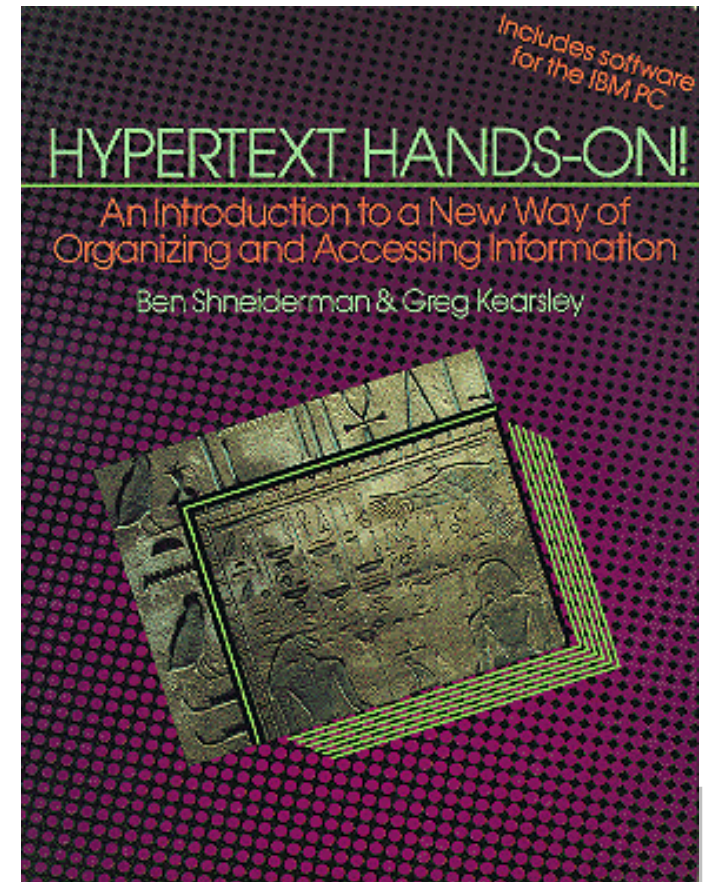
26th Annual Symposium
May 28-29, 2009

www.cs.umd.edu/hcil



World-Wide Web links

- Developed & tested embedded menus (1983) that became “hot spots” (Berners-Lee, 1989)
- First electronic book (1989):
Hypertext-Hands On



Hypertext on Hypertext – CACM July'88

Hypertext on Hypertext

Special Section
of the
July, 1988
Communications
of the ACM

Prepared by the Human-Computer Interaction Laboratory, University of Maryland, College Park, Maryland.

© Association for Computing Machinery, Inc., 1988.
ACM order number 217880

Hyperties™ © Cognetics Corporation and the University of Maryland.
55 Princeton-Hightstown Road, Princeton Jct., NJ 08550

[Click mouse button to start (or press '?' for instructions)]

communications
of the acm

Papers from the
HYPERTEXT '87
workshop

SPECIAL
EDITION

BACK

EXIT

INTRODUCTION

PAGE 1 OF 3

COMMUNICATIONS OF THE ACM SPECIAL SECTION (JULY 1988)

Welcome to the Communications of the ACM July 1988
Special Section on Hypertext Systems. This Hyperties disk enables you
to experience hypertext system by browsing our database (i.e. select
the Table of Contents to get a guide to the entire issue).

You simply press the left and right arrow keys (or drag the Mouse
if you have one) to move the selector box onto one of the highlighted
words embedded in the text or the commands at the bottom of the
screen. Try moving the selector box onto the NEXT PAGE command and
then press ENTER.

NEXT PAGE

EXTRA

TABLE OF CONTENTS

PAGE 1 OF 3

TABLE OF CONTENTS

Communications of the ACM

Special Section on Hypertext Systems : Ben Shneiderman

Hypertext 87 Workshop : Ben Shneiderman

Hyperties : An Overview

ACM Press Database and Electronic Products

Table of Topics

Table of Figures

NEXT PAGE

RETURN TO "SPECIAL SECTION ON HYPERT..." EXTRA

