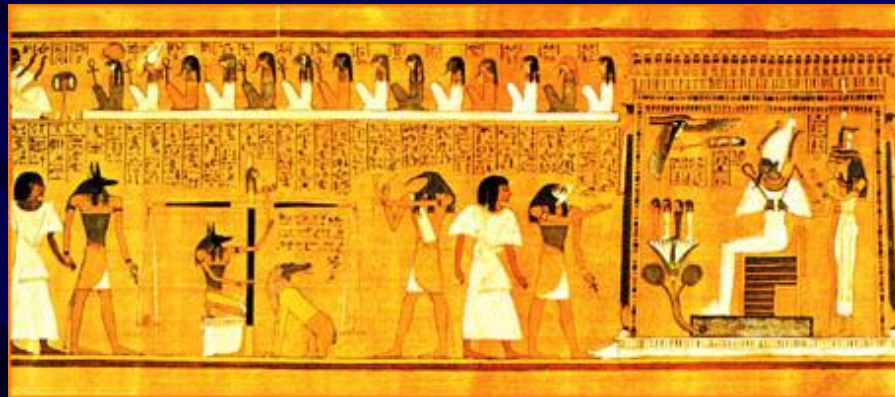


Human Knowledge Seeking and Information Visualization

Exploring New Possibilities



Dr. Ray Uzwysyn
[University of West Florida Libraries](#)



Information Systems: Biological and Historical

Success in the Information
System is dependent on
both sender and receiver,
addresser and addressee

Problem: How does the baby
begin to convey its needs?
(informational)
How are we able to better
understand baby?



Sumerian Cuneiform Tablet
3000 B.C.



Baby, 2006

Signifier → Signified

Baby Cries
(Free Floating Signifier)
Language Unfixed



One to Many

- Hungry
- Wet
- Gas
- Soiled
- Tired

Language as Shared Information System (Community of Practice)



Codes

English

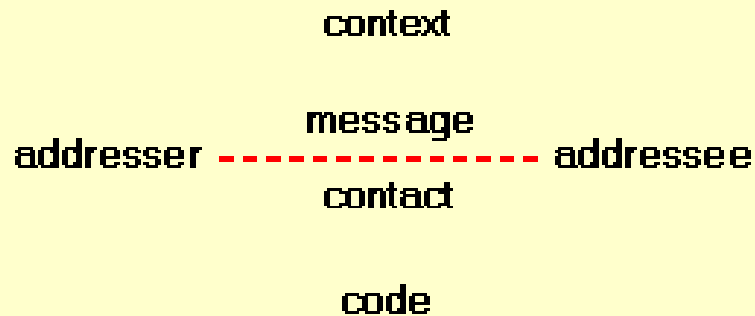
French

Spanish

Russian

- I'm Hungry
I'm wet
Je suis
fatigue I
need to be
changed
Ya khochu
isty!

Jakobson's Model of Communicative Functions (1963)



- Structuralist Model for our own information systems
- Storage System Modeled on : Human Memory
- Symbiotic Relationship between Sender and Receiver

How do we materialize or codify human memory?

Sumerian Catalog (4000 B.C.)

Technology: Baked Clay Tablet, Hammer

Problem Solved : Limitation of Human Memory (temporal, 'codified')

First Catalogs Relate to Property Rights

Innovation: Visually Iconic Script



New Technology Challenges

Information Retrieval,
Medium storage limitations
The Bricks are heavy



New Technology, Medium Possibility

Technology: Papyrus (2500 BC),
rolled into scrolls,
placed in Libraries
lightweight



Development of Phonetic
Alphabet (1800 BC)
reduced character set

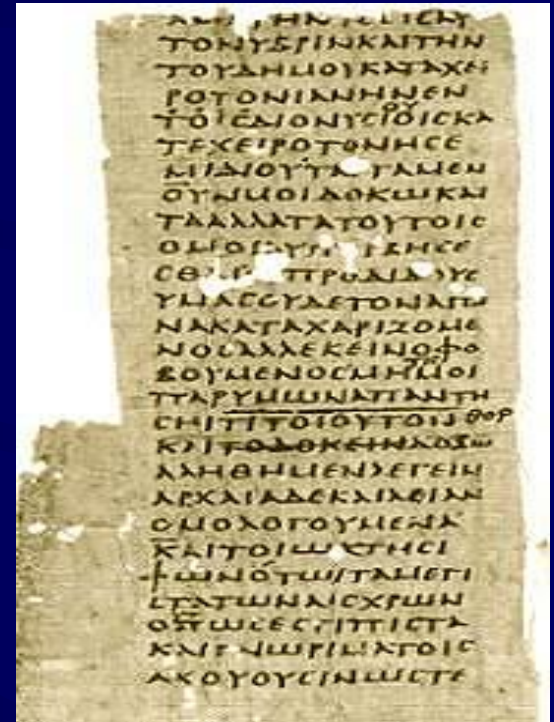


Historical Technology Dialectic

Kata + Logos (Greek)
(list of words)

Technology Cycle:

Augments Human Intelligence
Solves Problem of Previous
Technology,
Generates New Problem horizon
IR (List of Scrolls)



Metadata
Papyrus List of Scrolls

Challenges of Paradigm Shift

Can the clay tablet be
developed further?

Isn't this technological path
enough?

Infrastructures
skillsets
experts



Uruk III

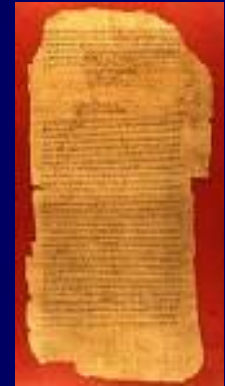
Cuneiform Tablet Digital Library Initiative
(UCLA and Max Planck History of Science)

<http://cdli.ucla.edu>

Disruptive Technologies



Egyptian Scribe



Sitting, Repose, Control

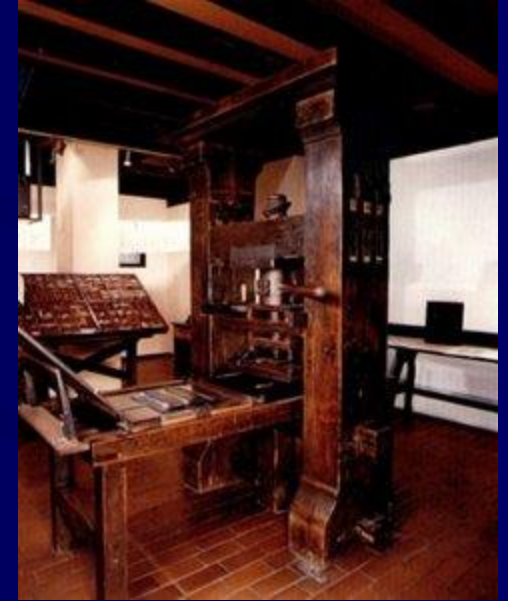
New Industry and Infrastructure
Scribes and Copyists



First Information Renaissance

- Gutenberg (Mechanical Reproduction, Moveable Type, 1452)

Technology: Printed Book



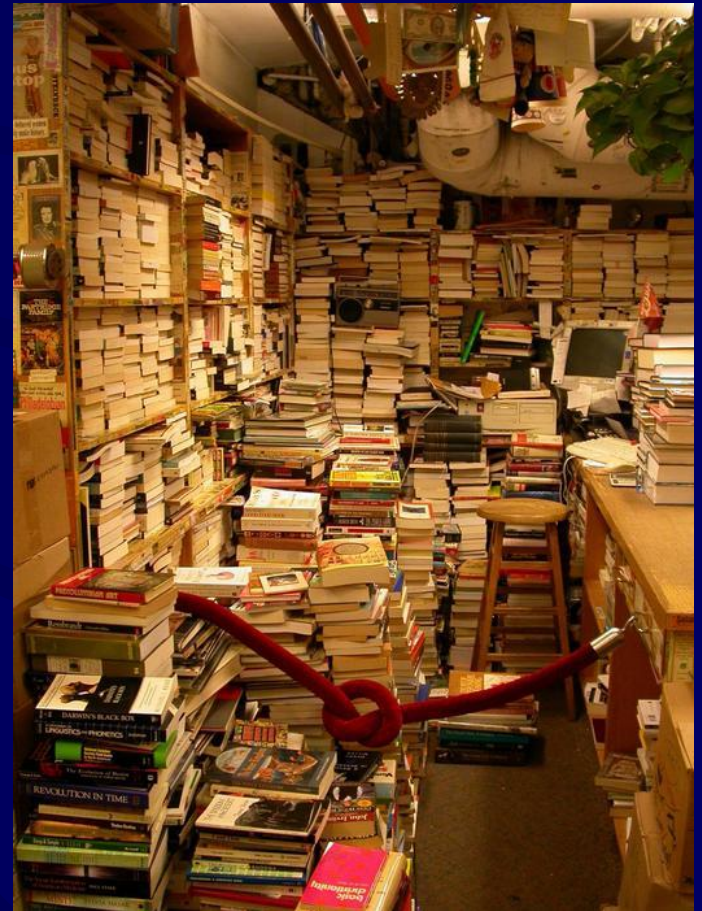
Solves Problem
Dissemination
Copies
Displaces Copyists



Augmenting Human Intelligence



Gutenberg's information explosion creates new knowledge infrastructures, new problem sets:
Information retrieval, organizing relationships between bodies of Information



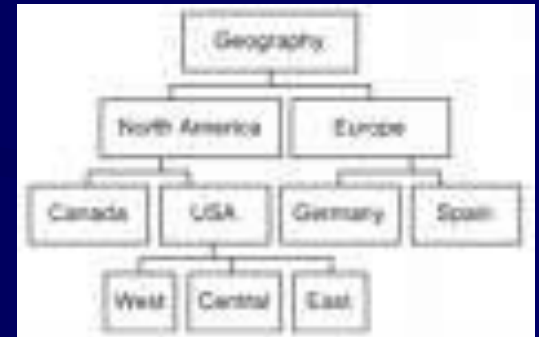
Flashforward, 1876-1985

Information Design Systemization

- System wide classification of expanding universe of knowledge

Melvil Dewey: Dewey Decimal Classification System (1876)
Origin of Species (Darwin, 1860)
Age of hierarchical tree Taxonomies, systems

- Library of Congress Printed Cards (1901)

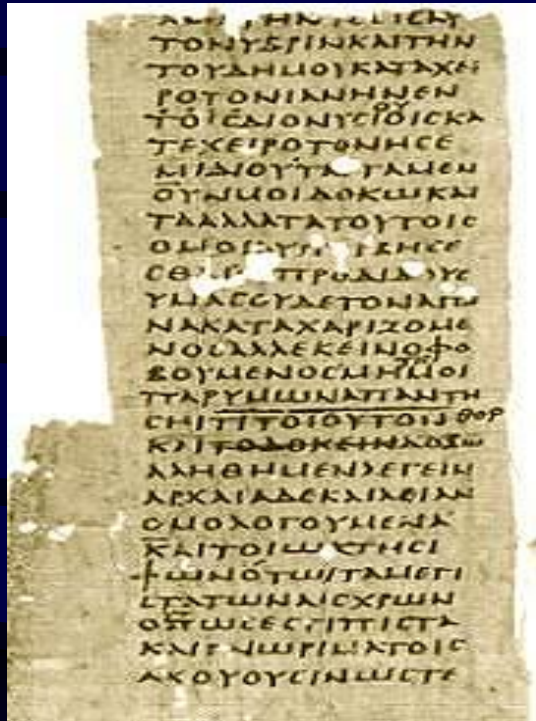


Folio 636.6865 Sod Soderberg, Percy Measday, 1901-
All about lovebirds / P. M.
Soderberg. -- Hong Kong ; Neptune City,
N.J. : T.F.H. Publications, c1977.
96 p. : ill. (some col.) ; 21 cm.
Includes index.
ISBN 0-87666-957-7

1. Lovebirds. I. Title

OCOLC 19981124 #5370389 OCLDsl

Metadata Container: Advantages and Disadvantages



Catalog: List of Scrolls 200 B.C

Catalog: 1975

Metadata Containers

- Metadata Container Become Physically Large (Intractable)
- Problem: Unseen/Fluid Interdisciplinary Relationships among Larger Bibliographic Universe is Lost
- How do you search?

Innovation: Stack of Cards Gives Physical Dimensionality to Collection Size.



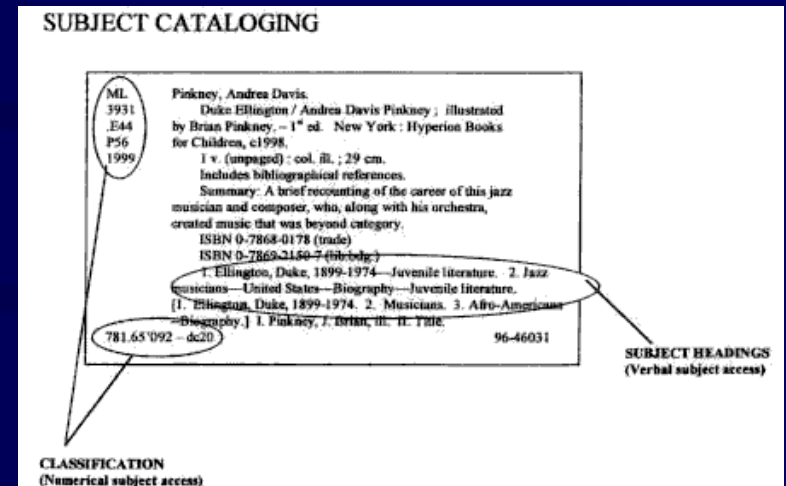
Subject Search



Author Search

1960 - 1980's Automating 19th Century Innovation

- Microfiche and Microfilm:
Card Catalogue on Microfiche,.
- Innovation: Reduction Entire Printed card catalog (cabinets) to a smaller searchable machine space
- New Problem Set - Lost Larger Context, Non-linear searching impossible
- Remapping 19th Century Innovation onto 20th Century Technology (manual scrolling through microfilm)



1980s Microcomputer Revolution

- Reducing Printed card catalog (cabinets) to a smaller non-linearly searchable machine space
- Keyword Innovation

"text box"

Search



The Overview of the System is now Lost



Catalog

Catalog

"text box"

Search

1990's - Academic OPAC Catalog & Google: Current Large Scale Information Retrieval Models

Next Page

Extended Display

New Search

Another Search

Limit/Sort Search

Search as Words

(Search History) ▾

TITLE ▾

cell biology

Search

Num	Mark	TITLES (1-12 of 48)	Year	Entries 140 Found
1	☐	Cell Biology		87
2	☐	Cell Biology A Comprehensive Treatise V 1 : Taylor	1977	1
3	☐	Cell Biology A Comprehensive Treatise V 2 : Taylor	1979	1
4	☐	Cell Biology A Comprehensive Treatise V 3 : Taylor	1980	1
5	☐	Cell Biology A Comprehensive Treatise V 4 : Taylor	1980	1
6	☐	Cell Biology A Laboratory Handbook : Taylor	1994	1
7	☐	Cell Biology A Laboratory Text : RDL	1965	1
8	☐	Cell Biology A Molecular Approach		4
9	☐	Cell Biology And Genetics : Taylor	1998	1
10	☐	Cell Biology And Histology		3
11	☐	Cell Biology And Immunology Of Leukocyte Function Proceedings : Taylor	1979	1
12	☐	Cell Biology And Toxicology : Internet		1

Save Marked Records

JUMP TO AN ENTRY

48

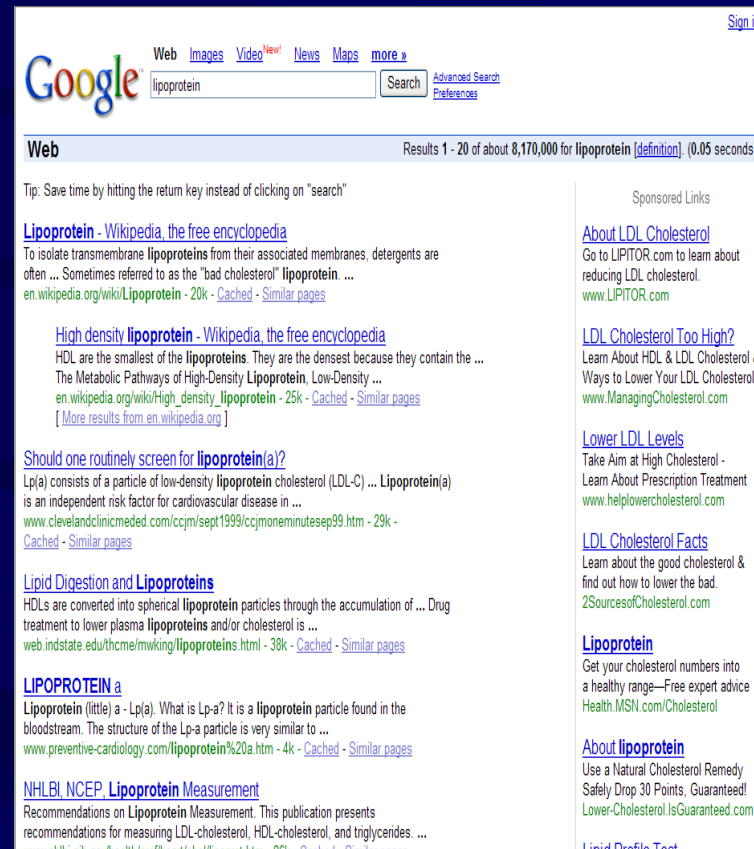


Partially solves Linear A- Z analog Search either scanning microfiche or cards, infinite copies

Google Search Results: 1-10 of about 8,170 000 results for Lipoprotein

Lost Context of
Larger Information Universe

New Problem: Infinite Scrolling
List Syndrome. Not Scalable,



The screenshot shows a Google search results page for the query "Lipoprotein". The search bar at the top contains the word "Lipoprotein" and the Google logo. Below the search bar, the results are listed. The first result is from Wikipedia, titled "Lipoprotein - Wikipedia, the free encyclopedia". The second result is from Wikipedia, titled "High density lipoprotein - Wikipedia, the free encyclopedia". The third result is from Cleveland Clinic, titled "Should one routinely screen for lipoprotein(a)?". The fourth result is from WebMD, titled "Lipid Digestion and Lipoproteins". The fifth result is from Preventive Cardiology, titled "Lipoprotein (little) a - Lp(a)". The sixth result is from NHLBI, titled "NHLBI, NCEP, Lipoprotein Measurement". On the right side of the page, there are sponsored links for "About LDL Cholesterol", "LDL Cholesterol Too High?", "Lower LDL Levels", "LDL Cholesterol Facts", "Lipoprotein", and "About lipoprotein".

Sign in

Web Images Video ^{New!} News Maps more »

lipoprotein Search Advanced Search Preferences

Web Results 1 - 20 of about 8,170,000 for lipoprotein [definition]. (0.05 seconds)

Tip: Save time by hitting the return key instead of clicking on "search"

Lipoprotein - Wikipedia, the free encyclopedia
To isolate transmembrane **lipoproteins** from their associated membranes, detergents are often ... Sometimes referred to as the "bad cholesterol" **lipoprotein** ...
[en.wikipedia.org/wiki/Lipoprotein](#) - 20k - [Cached](#) - [Similar pages](#)

High density lipoprotein - Wikipedia, the free encyclopedia
HDL are the smallest of the **lipoproteins**. They are the densest because they contain the ...
The Metabolic Pathways of High-Density Lipoprotein, Low-Density ...
[en.wikipedia.org/wiki/High_density_lipoprotein](#) - 25k - [Cached](#) - [Similar pages](#)
[More results from en.wikipedia.org]

Should one routinely screen for lipoprotein(a)?
Lp(a) consists of a particle of low-density lipoprotein cholesterol (LDL-C) ... Lipoprotein(a) is an independent risk factor for cardiovascular disease in ...
[www.clevelandclinicmeded.com/ccjm/sept1999/ccjmoneminutesep99.htm](#) - 29k - [Cached](#) - [Similar pages](#)

Lipid Digestion and Lipoproteins
HDLs are converted into spherical lipoprotein particles through the accumulation of ... Drug treatment to lower plasma lipoproteins and/or cholesterol is ...
[web.indstate.edu/thcmel/mwking/lipoproteins.html](#) - 38k - [Cached](#) - [Similar pages](#)

Lipoprotein a
Lipoprotein (little) a - Lp(a). What is Lp-a? It is a lipoprotein particle found in the bloodstream. The structure of the Lp-a particle is very similar to ...
[www.preventive-cardiology.com/lipoprotein%20a.htm](#) - 4k - [Cached](#) - [Similar pages](#)

NHLBI, NCEP, Lipoprotein Measurement
Recommendations on Lipoprotein Measurement. This publication presents recommendations for measuring LDL-cholesterol, HDL-cholesterol, and triglycerides. ...
[www.nhlbi.nih.gov/health/heart/cholesterol/lipoprotein.htm](#) - 26k - [Cached](#) - [Similar pages](#)

Sponsored Links

About LDL Cholesterol
Go to LIPITOR.com to learn about reducing LDL cholesterol.
[www.LIPITOR.com](#)

LDL Cholesterol Too High?
Learn About HDL & LDL Cholesterol & Ways to Lower Your LDL Cholesterol.
[www.ManagingCholesterol.com](#)

Lower LDL Levels
Take Aim at High Cholesterol - Learn About Prescription Treatment
[www.helpowercholesterol.com](#)

LDL Cholesterol Facts
Learn about the good cholesterol & find out how to lower the bad.
[2SourcesOfCholesterol.com](#)

Lipoprotein
Get your cholesterol numbers into a healthy range—Free expert advice
[Health.MSN.com/Cholesterol](#)

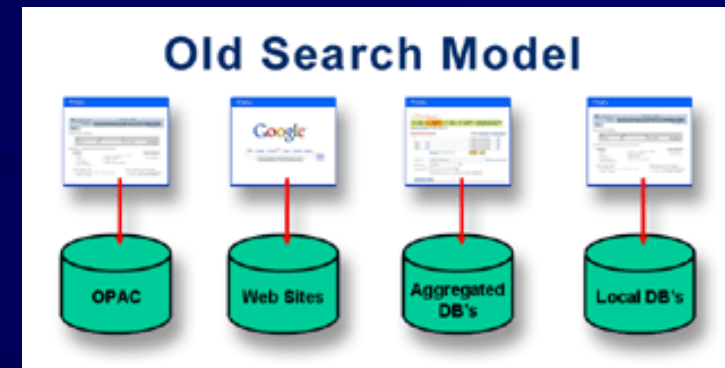
About lipoprotein
Use a Natural Cholesterol Remedy Safely Drop 30 Points, Guaranteed!
[Lower-Cholesterol.IsGuaranteed.com](#)

Lipid Profile Test

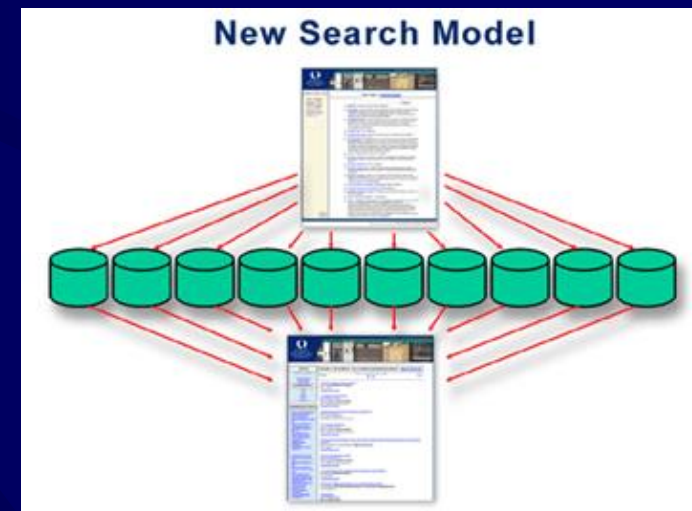
2006 ARL Best Practices Trend – Federated Search Engines

Academic Libraries now possess on average 400 academic databases, OPAC, (Metalib, Central Search, Webfeat, Cross Database Search Engines,)

- Problem Creates Even Longer Infinite Scrolling List Syndrome.



Circa 2002



How Do Entities Relate: Lipoprotein



Subjects, general:

- [Diet therapy -- Handbooks, manuals, etc.](#)
- [Diet in disease -- Handbooks, manuals, etc.](#)
- [Nutrition -- Handbooks, manuals, etc.](#)

Other author(s),etc

- [Nelson, Jennifer K.](#)

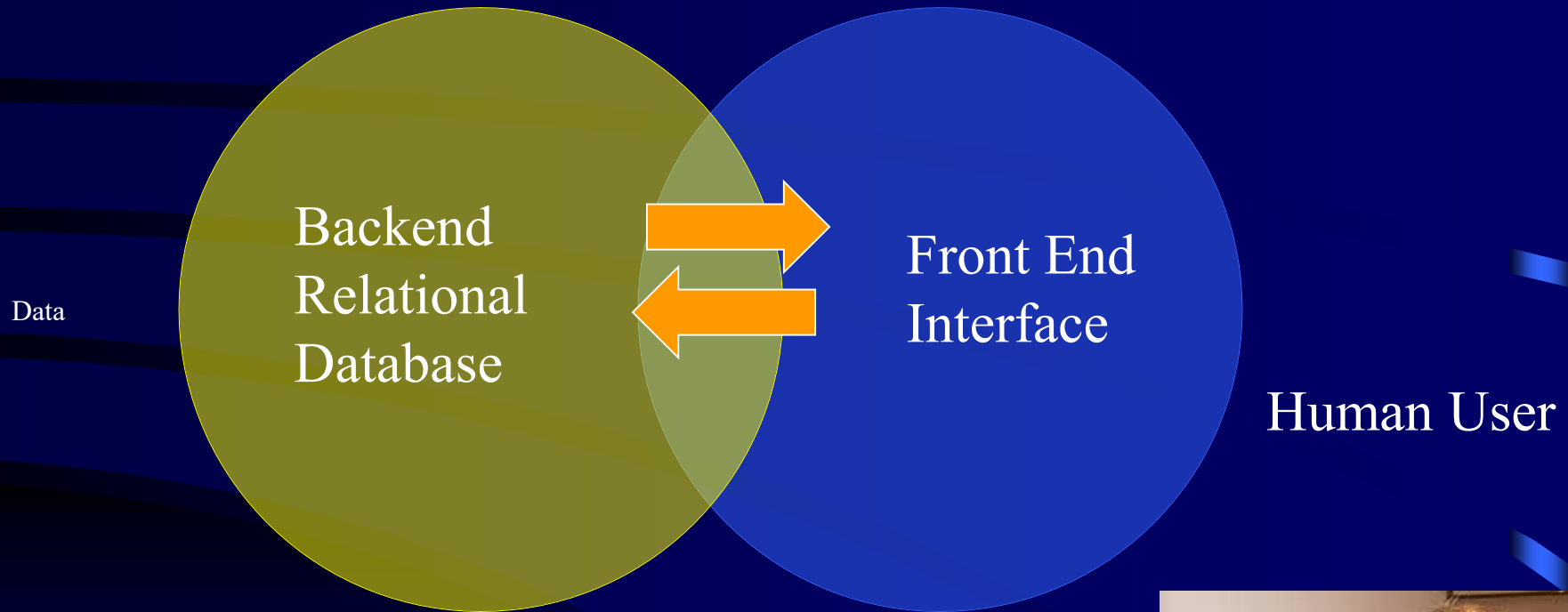
Other author(s),etc

- [Mayo Clinic.](#)

Other title(s):

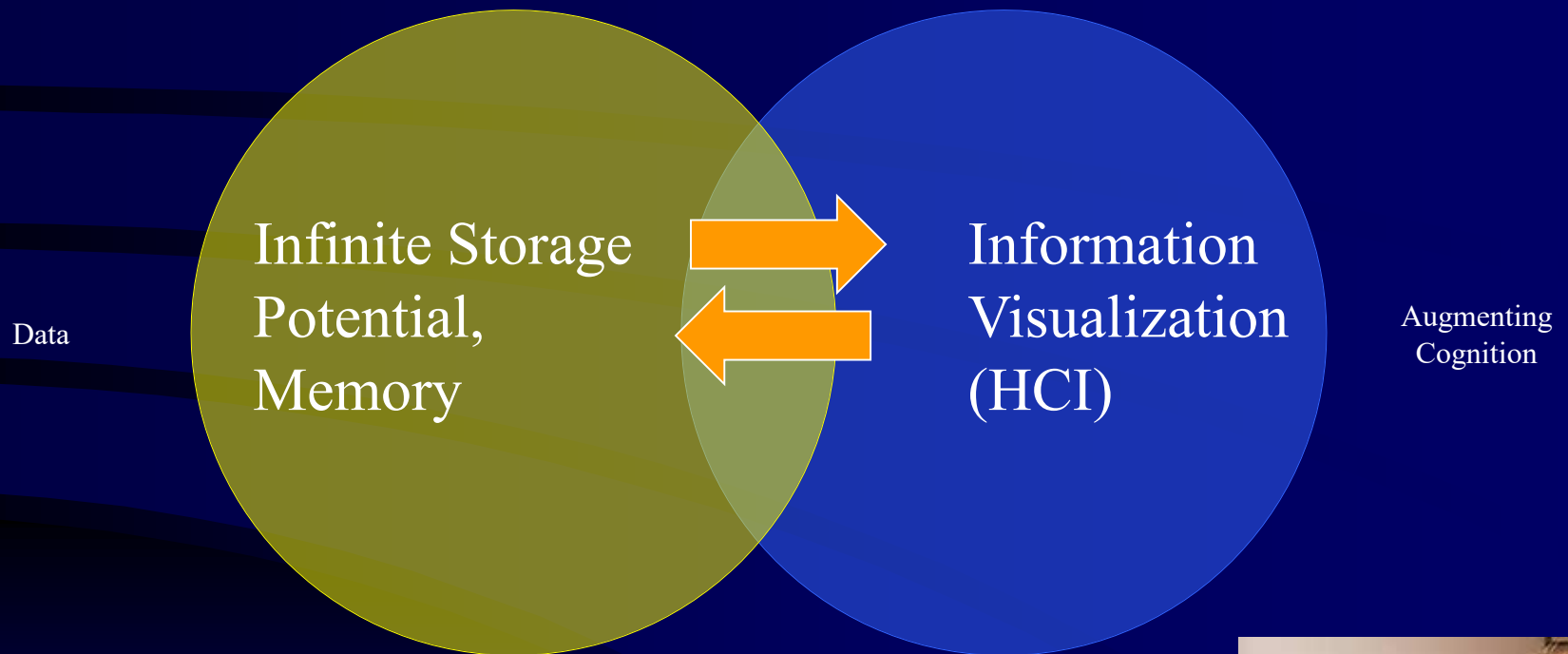
- [Diet manual.](#)

Global Networked Potential of Internet



Larger Purposes

Visually Augment Human Intelligence to Facilitate New
Knowledge Generation



Other Directions?

Information Visualization Offers Possibilities

```
Command Prompt
D:\Program Files\DataScope 5.1 Demo\MX>"D:\Program Files\DataScope 5.1 Demo\MX\N
MConsole.exe" C:\Temp\ChurnPred.pml C:\Temp\ChurnPred.xml
DataScope 5.1 Model Executor Console
Copyright: Cygiron Ltd. 2001
Loading project file
Evaluating model
Number of evaluated records: 10000

Evaluation finished on 10000 records in 3.52 seconds.

Field statistics:
There were 0 records with missing 'Avg monthly transactions'!
There were 0 records with missing 'Sex'!
There were 0 records with missing 'Occupation Type'!
There were 0 records with missing 'Home Location'!
There were 0 records with missing 'Number'!
There were 0 records with missing 'Account Type'!
There were 0 records with missing 'Age'!
There were 0 records with missing 'Education'!
There were 0 records with missing 'Avg monthly balance'!

Predicted field 'Predicted reason of churn'
Contents:
Category '1' with 200 elements
Category '2' with 4873 elements
Category '3' with 200 elements
Category '4' with 1458 elements
Category '5' with 400 elements
Category '6' with 250 elements
Category '7' with 2257 elements
Category '8' with 1150 elements
Number of missing values: 0

Processing messages:
none.
D:\Program Files\DataScope 5.1 Demo\MX>
```



Command Line Interface
Infinite Scrolling List
Literal

Semantic Relationships

GUI : Working on the level of
Iconic abstraction: metaphor,
narrative, icons used as
cognitive tools or pointers

Visually Semiotic Relationships

Possibilities of Screenspace 1st Phase

- Icon harnessed
Cognitive Tool
Visual Metaphor.

Computer/Information Science getting handle on
this, 1984- Present



Folder



Folder

Possibilities of Screenspace 2nd Phase

Framing or Environmental Metaphors
(Desktop or Interface Level Metaphor – not as
well established discourse or thought out
implementations)

Iconoclastic
Anxiety

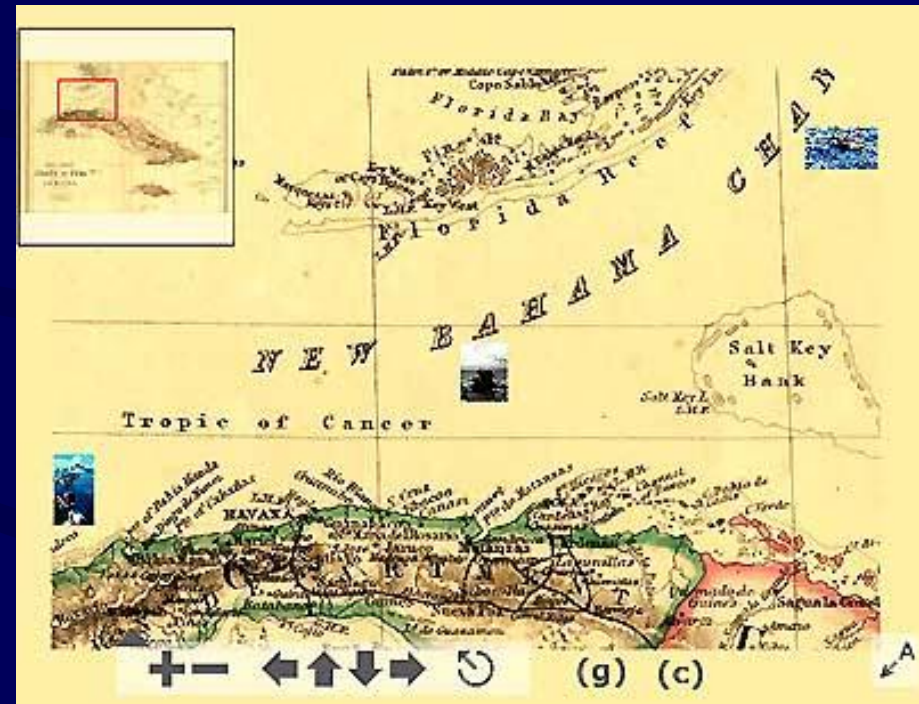
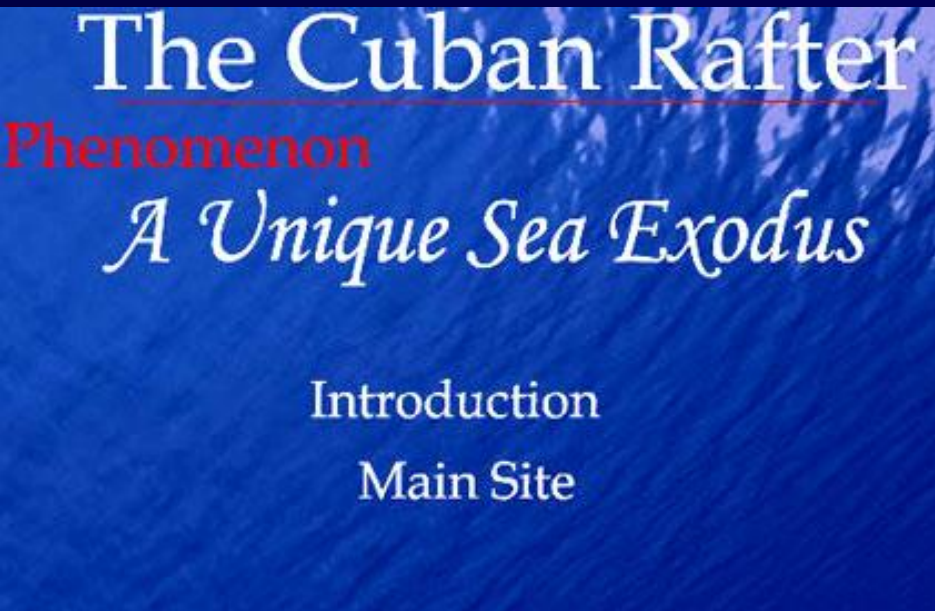
Xerox Parc's Web
Forager, 3D Office,
Information
Workspace
(circa. 1995)



Visualization and Multimedia

Physical/Cognitive Cartographies

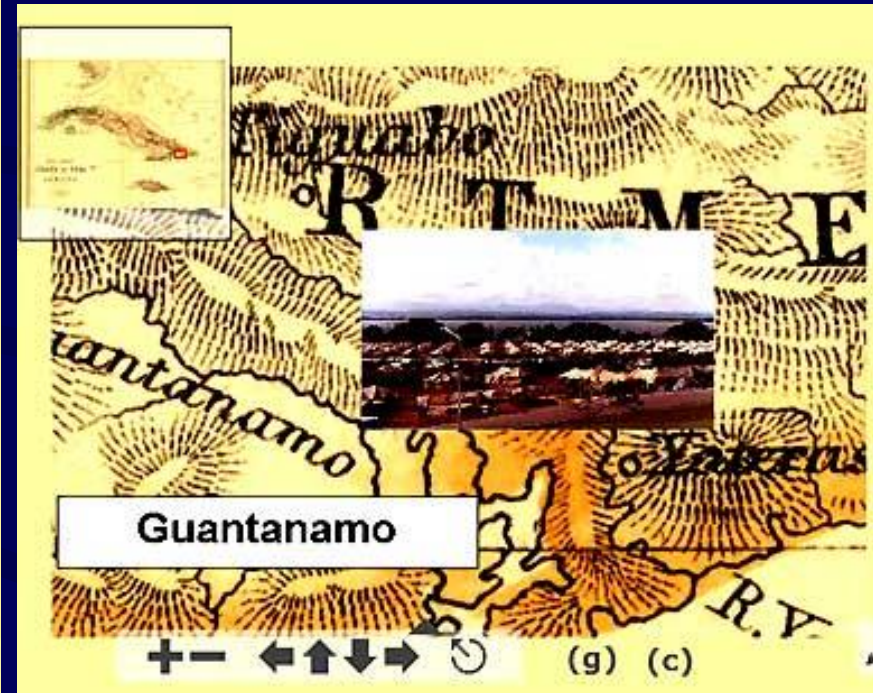
<http://balseros.miami.edu>



Multimedia Digital Library - Zoomable Interface (1800 Mg Map) –
Front End

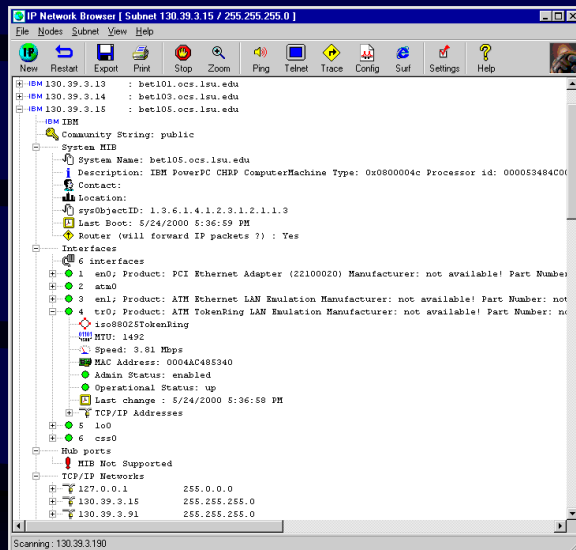
Digital Video, Document and Image Library - Database Back end.

Zoomable Fly-Through Intuitive Navigation



Link to Image and Video Library Databases

Framing Metaphors



Navigating
“Information
Universe” by
scrolling

Navigating Information
Universe by
Fly – Through

Wider Context and Rationale Towards Information Visualization



21th C. Culture
Visual Culture



Television

Cinema

Principal Cultural Codes

Visuals Grammars and Codes

- Codes that we learn to understand from early age

Transparent, Ubiquitous, Global

Predicated on movement, narrative, metaphor,
humanly understandable, well developed sets of
visuals grammars



Information Landscapes

Navigating bodies of knowledge to augment intelligence, see larger relationships and create new knowledge.

Catalogs



200 B.C



1940



2006



2026

The Next Cognitive Challenges or Philosophical Toolsets for Information Science

Information Visualization
Motion,
Narratology,
Interactivity

How can we harness these concepts to work better with large bodies of Information (catalogs and data?)

How can the catalog be reconfigured with regards to current digital paradigms?

Next Page				
Extended Display				
New Search				
Another Search				
Limit/Sort Search				
Search as Words				
(Search History)				

TITLE				
cell biology				
Search				

Num	Mark	TITLES (1-12 of 48)	Year	Entries 140 Found
1	☐	Cell Biology		87
2	☐	Cell Biology A Comprehensive Treatise V 1 : Taylor	1977	1
3	☐	Cell Biology A Comprehensive Treatise V 2 : Taylor	1979	1
4	☐	Cell Biology A Comprehensive Treatise V 3 : Taylor	1980	1
5	☐	Cell Biology A Comprehensive Treatise V 4 : Taylor	1980	1
6	☐	Cell Biology A Laboratory Handbook : Taylor	1994	1
7	☐	Cell Biology A Laboratory Text : RDL	1965	1
8	☐	Cell Biology A Molecular Approach		4
9	☐	Cell Biology And Genetics : Taylor	1998	1
10	☐	Cell Biology And Histology		3
11	☐	Cell Biology And Immunology Of Leukocyte Function Proceedings : Taylor	1979	1
12	☐	Cell Biology And Toxicology : Internet		1

Save Marked Records	JUMP TO AN ENTRY	48
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Online Digital Resources

New Media and Substance

100
interactivity



High Online Expressiveness

(Rich Media Possibilities, Video, Audio, Interactivity)



Ideal Digital Resource Goals

Robust Academic Structure
High Degree of
Media Expressivity

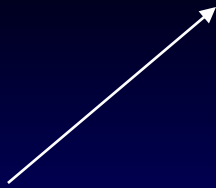
Increasing
Online
Media
Richness

video

audio

images

Text



Traditional Online Academic Digital Libraries and Catalog

Text Heavy/ Database Search



0

Increasing Academic Depth Structure/Substance

Where has Innovation Been Historically Accomplished?

Left Brain School of Info. Visualization

Math/computer/information
science Ph.D's
Military Technology Innovators
Medical Researchers (Gene
Sequencing)
GIS/Spatial Engineers

$$\begin{aligned}x &= x_0 + v_0 \Delta t + \frac{1}{2} a \Delta t^2 & v &= v_0 + a \Delta t \\ \Delta x &= v_0 \Delta t + \frac{1}{2} a \Delta t^2 & \Leftarrow & \Delta t = \frac{v - v_0}{a} \\ \Delta x &= v_0 \left(\frac{v - v_0}{a} \right) + \frac{1}{2} a \left(\frac{v - v_0}{a} \right)^2 \\ \Delta x &= \frac{v v_0 - v_0^2}{a} + \frac{v^2 - 2v v_0 + v_0^2}{2a} \\ 2a \Delta x &= (2v v_0 - 2v_0^2) + (v^2 - 2v v_0 + v_0^2) \\ 2a \Delta x &= v^2 - v_0^2 \\ v^2 &= v_0^2 + 2a \Delta x\end{aligned}$$



Right Brain School of Information Visualization

(The Low End or Historically Recent
Barbarians at the Gates)

Web Designers

Flash Group, Online Vector
Animation tied with Robust
Programming Backend)

Online Game Designers
Graphic Designers
Advertising Catalogs/Database
Synthesis)

Innovative Usual Suspects
Parc
Maryland
MIT Media Lab)



Lens, Telescope, Microscope, Screen

Left Brain School

- ‘Serious’ Purposes:
Information Mapping,
Organizing Large bodies of
information visually,
relationally, dynamically.
Historically high cost of
entry (Computer Power,
Warnock & Sutherland in
Utah)

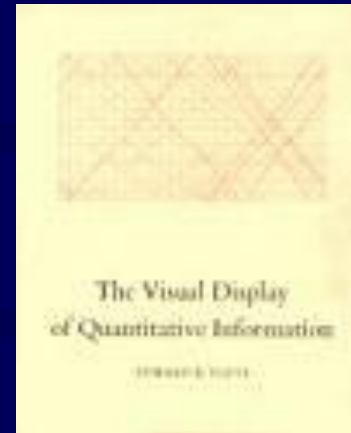


1st Phase Study of Visual Grammars, Visual Narrative Codes

Art History (Panofsky,
Gombrich et al.)
Bertin (Geography,
Graphics, Semiology of
Graphics)
Tufte (Mathematical
Statistics)

Can these formalist structural
‘texts’ be remapped with
regards to current ‘digital’
possibilities?

•



2nd Phase Study of Visual Semiotics

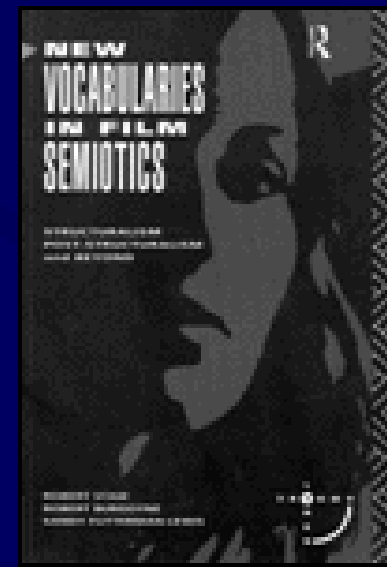
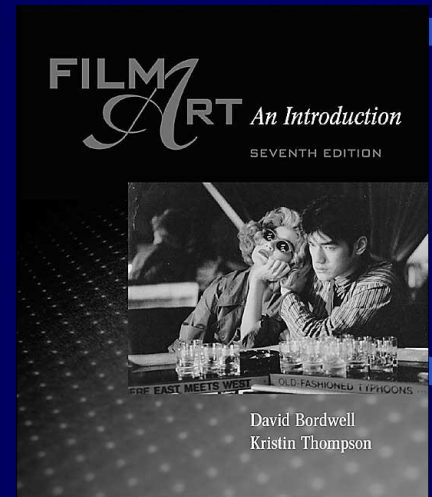
Overlooked disciplines of
prescriptive theoretical literature

Cinema Studies

Structural/Formalist studies of
Codes of Movement in Time.

Visual Semiotics,
(Eisenstein, Bazin, Christian
Metz – Structural Visual
Grammar)

•



Emergent Possibilities

- 3D Online networked Game Engine paradigm mapped to robust information seeking (academic/e-commerce) possibilities (Information Foraging, hunter/gatherer metaphor for seeking information in large systems)

Possibilities are rich.
Visual grammars and codes
largely unexplored



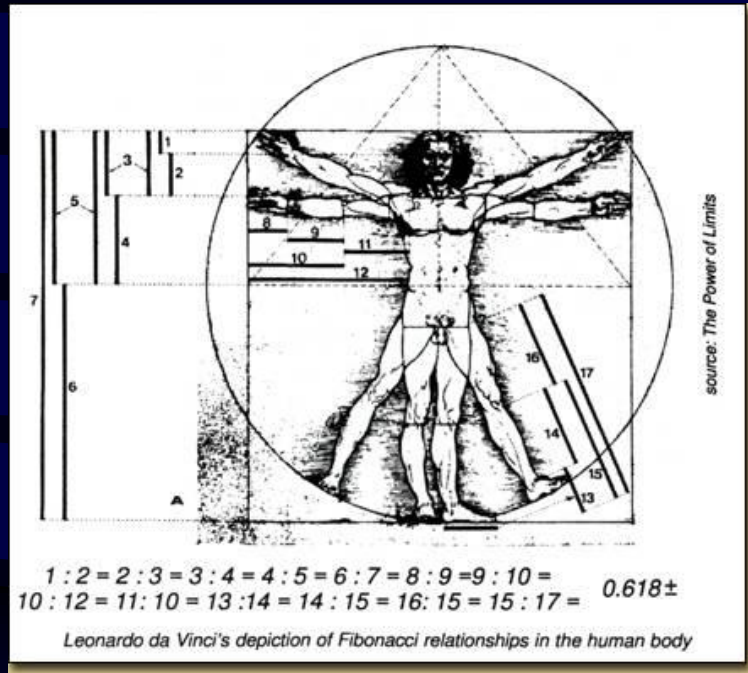
Next Generation System Design Questions

There are a a spectrum of great questions needing to be answered and tested regarding information visualization and information systems

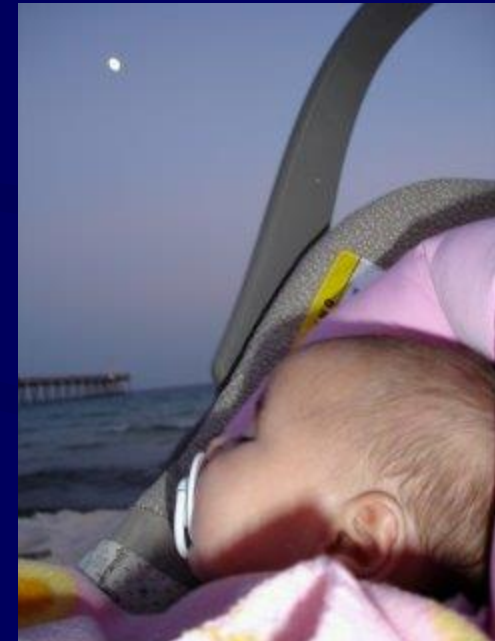


The opening motif in this talk has been the biological and the potential of the human developmental biological cycle
To illuminate our own online information systems

Digital Renaissance



Need for Synthetic Renaissance
Ideology



Horizons
Largely Unexplored

Information Visualization

The term "visualization" should eventually be extended to take advantage of our intuitive human perceptual systems, including auditory, spatio-temporal, and tactile senses, as well as motor output. The goal here is to create better humanly usable information systems.

(Donald Norman, SIGVIS Weblog)





Thank You for Coming

Questions?

<http://library.uwf.edu/presentation.ppt>

Contact Information: Ray Uzwysyn
ruzwysyn@uwf.edu

Brief Information Visualization Bibliography - Books

Chen, Chaomei. Information Visualization and Virtual Environments. New York: Springer, 1999. (also, other texts)

Shneiderman, Ben. Card, Stuart K., Mackinlay, Jock D. Readings in Information Visualization. San Francisco: Moran Kaufmann, 1999. (also, other texts)

Spence, Robert. Information Visualization. ACM Press, 2000.

Websites – Links to Working Applications and Current R&D

- Human Computer Interaction Laboratory
(Shneiderman et al., College Park Maryland)
<http://www.cs.umd.edu/hcil/> (click Visualization)

Flashforward <http://www.flashforward2003.com>
(Click on past winners for excellent examples)

MIT Media Lab, In particular John Maeda's Aesthetics and Computation/Visual Language Groups)
<http://acg.media.mit.edu/> and <http://plw.media.mit.edu>

Xerox Parc Research Group
<http://www.parc.xerox.com/research>

A Few R&D Developers

- Jared Tarbell <http://levitated.net>
Eric Natzke <http://www.natzke.com>
Yugo Nakamura <http://www.yugop.com>
Joshua Davis <http://www.joshuadavis.com>
- Finally, my more informal weblog: horizons of visualization/digital library explorations:
<http://libprod.library.miami.edu:41430/webservices>

