Information Visualization In Practice

How the principles of information visualization can be used in research and commercial systems

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Putting Information Visualization Into Practice

A Common Problem
- There is too much information to represent all at once
- Providing all the details all at once is not useful (results overload)
- Context is lost when the details of a only subset of the information is shown.

Too Much Information To Show All At Once

Another Example Of The "Large Data Set – Limited Display Space Problem" : Games

Dungeon Master (Java version) **http://www.cs.pitt.edu/~alandale/dmjava/**

Too Much Information To Show All At Once

Approaches to the problem:

1) **Scrolling**

2) **Magnification**

3) **The DragMag**

4) **Transparent overlays**

5) **Overview and detail**

6) **Focus and context**

7) **Zooming**

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1) Scrolling

From http://www.dansmc.com/microfiche.jpg

Image from "Information Visualization" by Robert Spence

2) __Magnification: Inline__
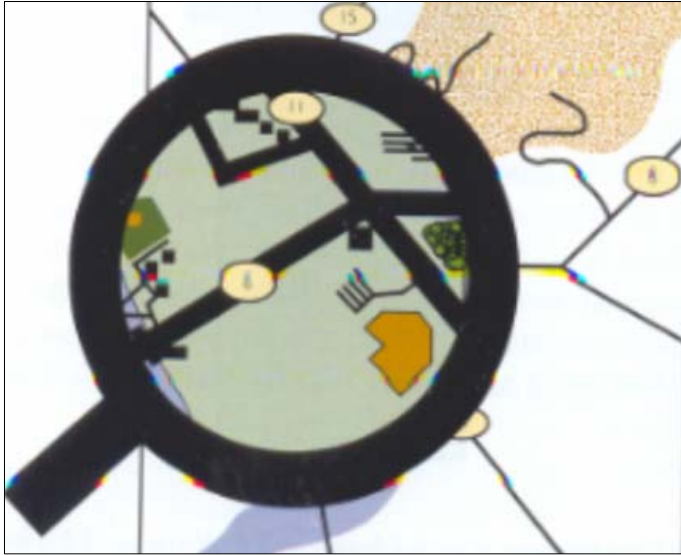
Image from "Information Visualization" by Robert Spence

James Tam

2) __Magnification: Mutually Exclusive__

Icewind Dale © Interplay productions

James Tam

2) Magnification: Mutually Exclusive
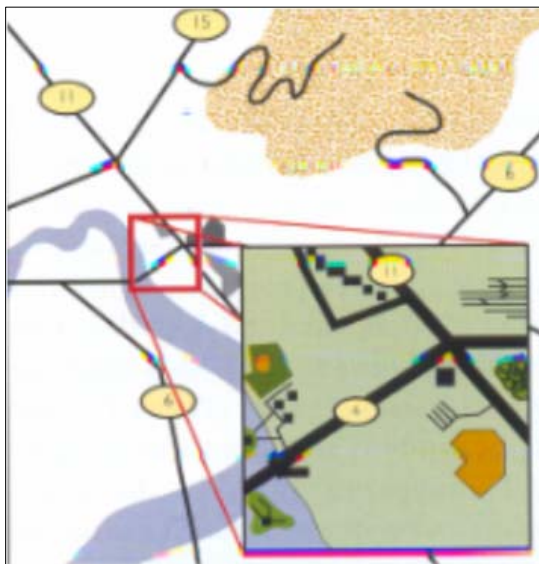

Icewind Dale © Interplay productions

3) The DragMag

Image from "Information Visualization" by Robert Spence

4) Transparent Overlays
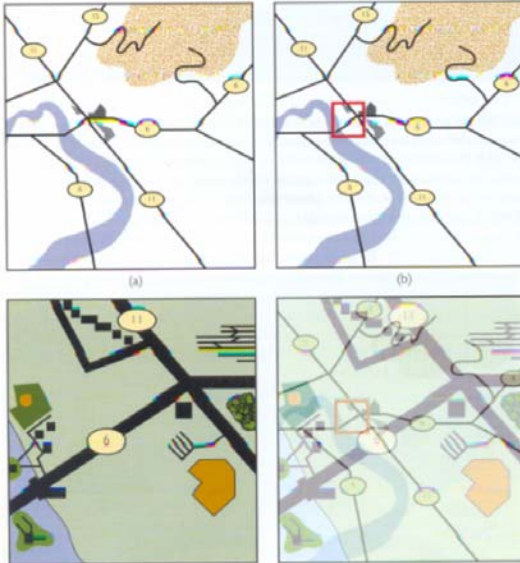

Image from "Information Visualization" by Robert Spence

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4) Transparent Overlays

Diablo © Blizzard

James Tam

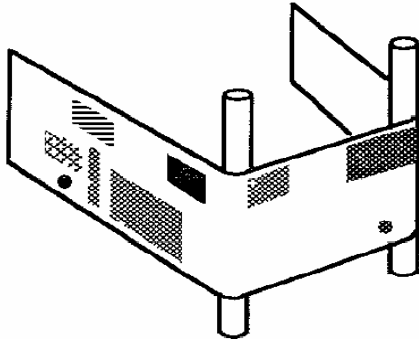# 5) <u>Overview And Detail: Separate</u>

5) <u>Overview And Detail</u>

Defender © Midway Home Entertainment Ltd.

6) Focus And Context

• Again the amount of the information is too large to display all at once.

• With this approach detailed view can still be viewed within its surrounding context.

Leung and Apperly TOCHI'94

Approaches To Applying A Focus And Context View

1. Employ selective omission

2. Employ a fisheye view

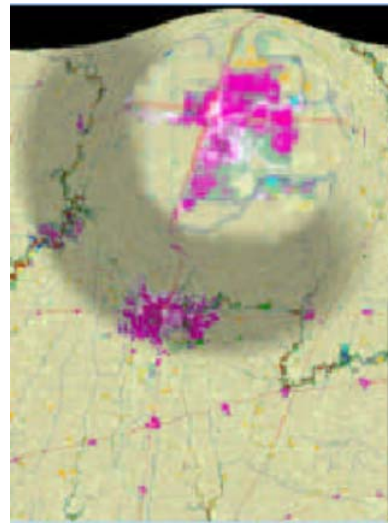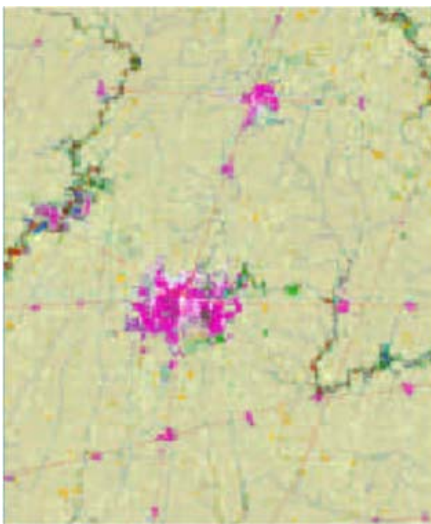# The Fisheye Lens: Photography
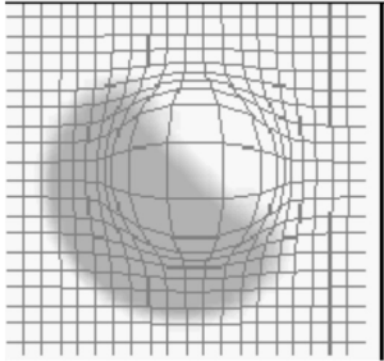
James Tam

Fisheye View

James Tam

Fisheye View: Visual Cues For The Distortion

Distortion is understandable through the use of a grid and shading

James Tam

Table Lens

Housing Market for Santa Clara County, CA – March 2000

James Tam

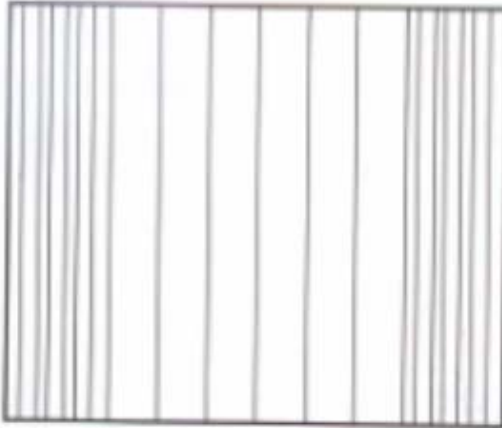# Focus And Context: Distortion In One Dimension

• **Distortion in the X-dimension**
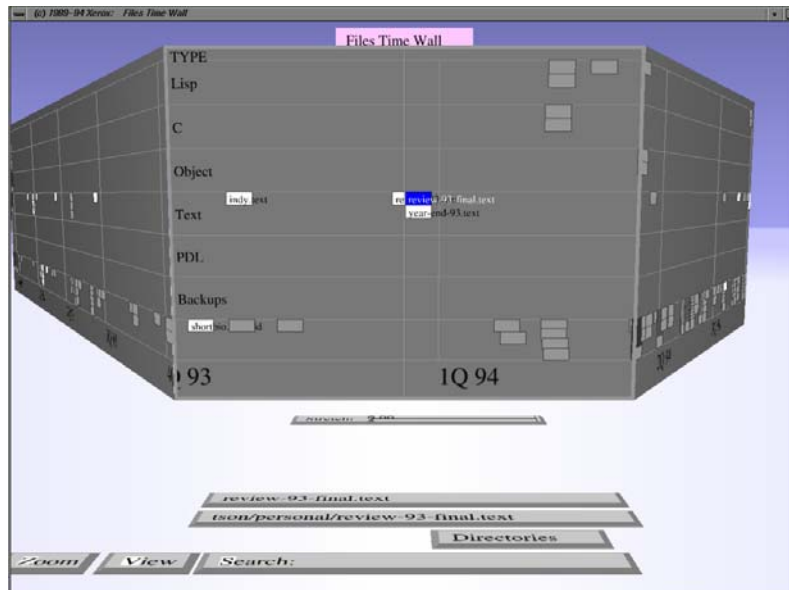

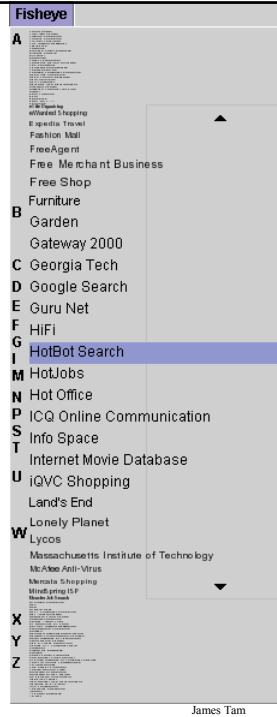Image from "Information Visualization" by Robert Spence

The Perspective Wall

Mackinlay / Robertson / Card: Proc ACM CHI'91

Fisheye Menus
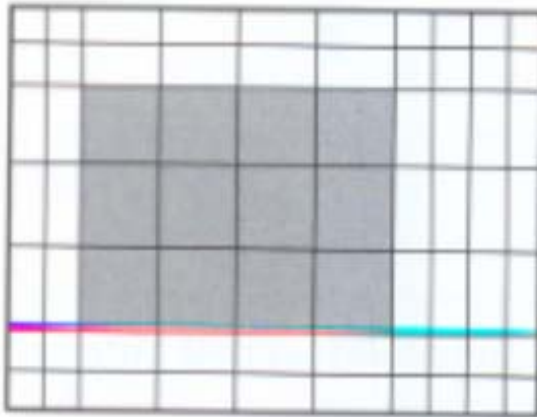
A
...
wWanted Shopping
Expedia Travel
Fashion Mall
FreeAgent
Free Merchant Business
Free Shop
Furniture
B Garden
Gateway 2000
C Georgia Tech
D Google Search
E Guru Net
F HiFi
G
I HotBot Search
M HotJobs
N Hot Office
P ICQ Online Communication
S Info Space
T Internet Movie Database
U iQVC Shopping
Land's End
Lonely Planet
W Lycos
Massachusetts Institute of Technology
McAfee Anti-Virus
Mercata Shopping
MindSpring ISP
Mavin Job Search

X
Y
Z

Bederson, B.B. (May 2000)
University of Maryland
www.cs.umd.edu/hcil/fisheyemenu/

James Tam

Focus And Context: Distortion In Two Dimensions
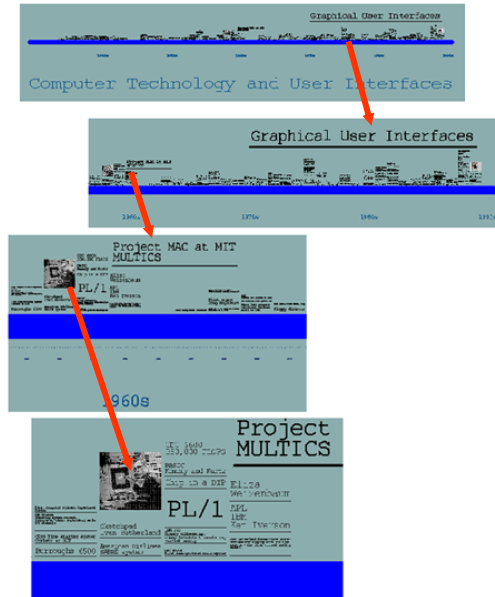
•**Distortion in both the X and Y dimensions**

Images from "Information Visualization" by Robert Spence

James Tam

Distortion In Two-Dimensions: A Calendar System

Mar April May June July Aug Sept Oct

11 Sun	Check slides, notes Family barbeque
12 Mon	Fly LA Kathy to airport Model Maker
13 Tue	
14 Wed	
15 Thur	
16 Fri	Flight to SFO Tutorial set-up Tutorial United flight Heathrow Pointer Color OHs Jane + Jonh Call Kathy
17 Sat	Fly LHR Kathy to collect Chapter 2/see Dave March

Image from "Information Visualization" by Robert Spence

DocumentLens

Robertson / Mackinlay ACM UIST 1993

7) Zooming

Browsing of digital images

http://java.sun.com/features/2001/08/photomesa.html
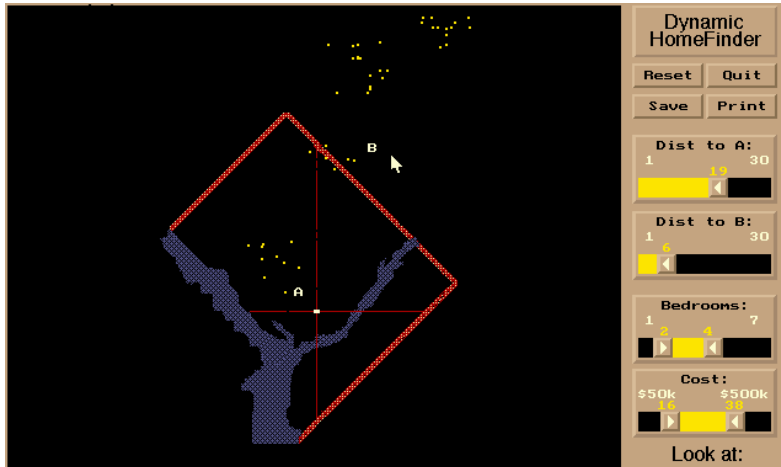
James Tam

Visual Information-Seeking Mantra

•**Overview first, zoom and filter, then details on demand**

•**Overview first, zoom and filter, then details on demand**

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•**Overview first, zoom and filter, then details on demand**

•**Overview first, zoom and filter, then details on demand**

•**Overview first, zoom and filter, then details on demand**

•**Overview first, zoom and filter, then details on demand**

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•**Overview first, zoom and filter, then details on demand**

Ben Shneiderman, Designing the User Interface 3rd Ed. 1997 p523

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Dynamic Queries: HomeFinder

James Tam

HomeFinder: The Details

Start with an overview of the data

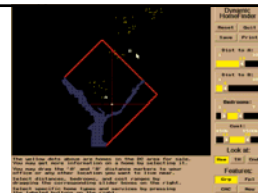**Dynamic queries (rapid, incremental, reversible actions)**
- All results are displayed instantly
- No "search button"
- Prevents errors

Direct manipulation of
- Queries
- Query results
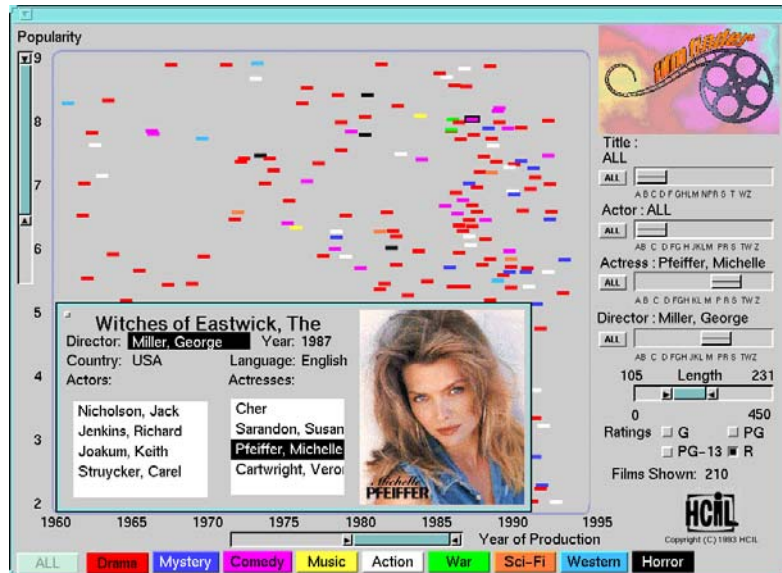- Can be interacted with like real-world objects

Details on Demand
- When the data set is small enough additional information can be provided

James Tam

Starfield Display: FilmFinder

FilmFinder: The Details

Filmfinder employs many of the principles employed in HomeFinder:

- Overview of the data
- Zoom and filter through
  - Dynamic queries
  - Direct manipulation
- Details on demand

But with FilmFinder system there are additional concepts:

- Starfield display
  - The entire data base can be viewed and manipulated on one screen
- Tight coupling of interface components (to the state of the system)

A Student Project: HomeBay

Dynamic Queries

Radar Overview

Progressive details on demand

481 Student Project (April, 2000) Rob Pearson, Kashama Willms and James Chisan

James Tam

Multiple Views Of A Large Data Set: PhotoFinder

University of Maryland Human Computer Interaction Laboratory http://www.cs.umd.edu/hcil/

James Tam

Representing Connectivity

•**The problem of having large data set – but limited display space must still be dealt with**

•**Also there is the additional problem of showing how things in a large data set relate e.g., How to show Internet connections between servers?**

•**Some issues:**
  •Occlusion of information
  •Edge crossing
  •Overwhelming quantity of edges
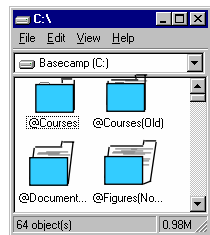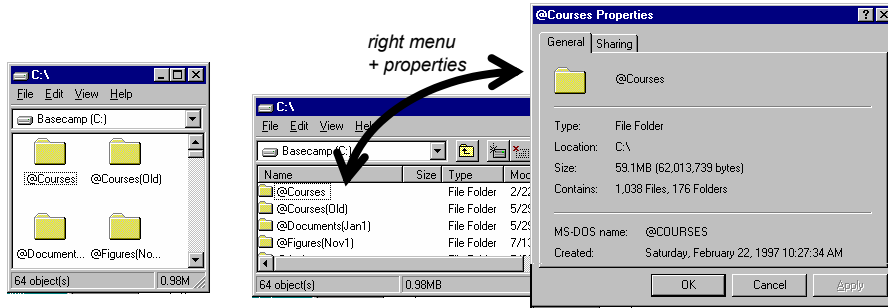
Representing Phone Network Connections
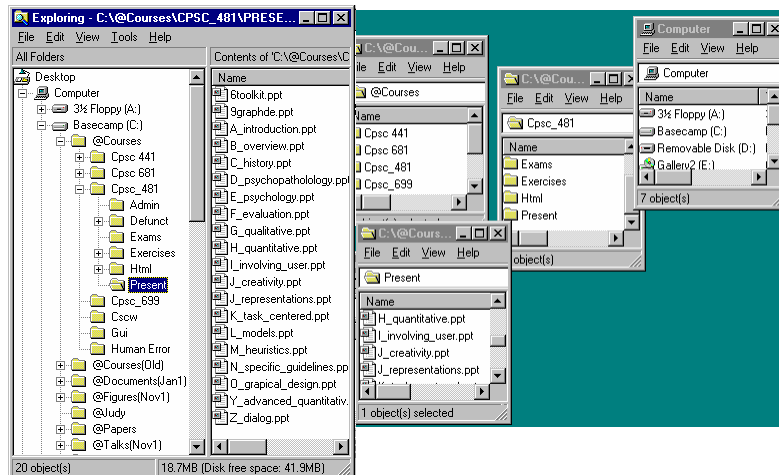

Images from "Information Visualization" by Robert Spence

Which Folder Has The Most Documents?
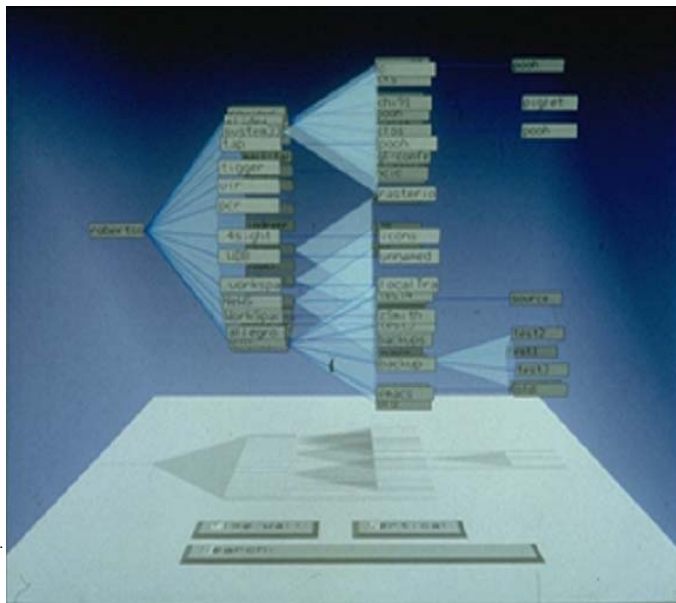
right menu
+ properties

James Tam

Where Am I? Where Was I Going?
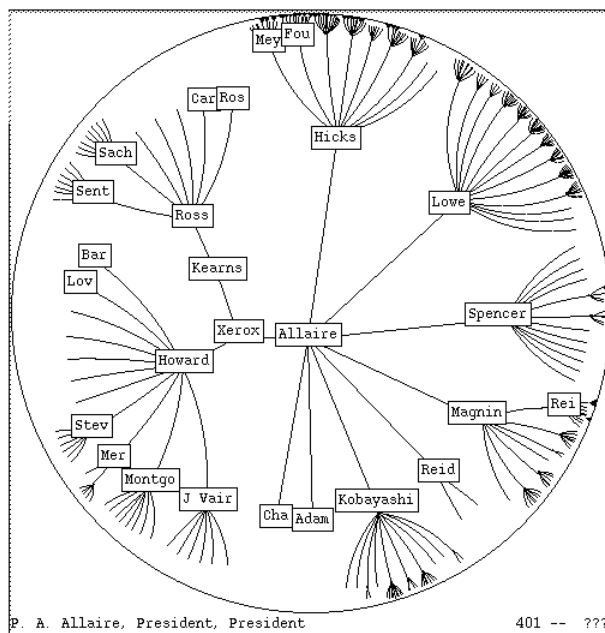
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Cone Trees

Robertson / Mackinlay / Card
Cone Trees: Animated 3D Visualizations of Hierarchical Information. Proc ACM CHI'91

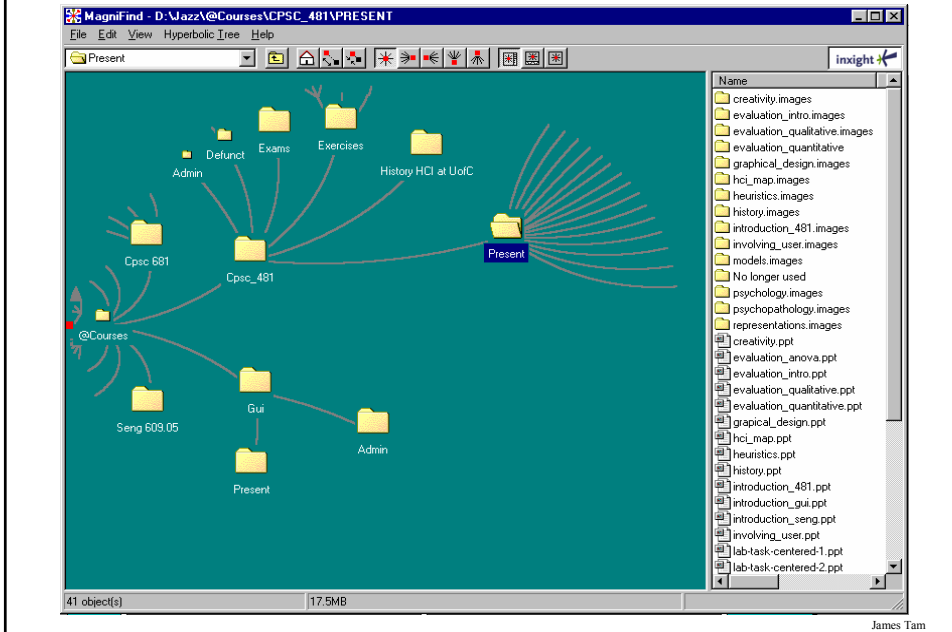P. A. Allaire, President, President   401 -- ???
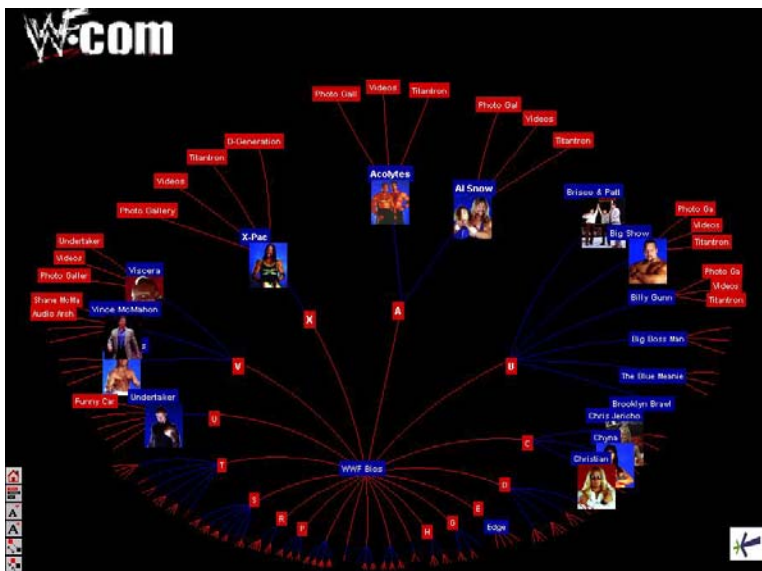
Xerox Parc/Inxight

Demo:http://startree.inxight.com/

Hyperbolic View Of A Disk Hierarchy

James Tam

Hyperbolic View Of The Web

Demo:http://startree.inxight.com/

James Tam

What You Now Know

Ways of dealing with the "large data set but limited display space" problem

1) Scrolling
2) Magnification
3) The DragMag
4) Transparent overlays
5) Overview and detail
6) Focus and context
7) Zooming

The information seeking mantra and how it has been applied in the HomeFinder and FilmFinder systems

Problems and some solutions when representing connectivity in large data sets

James Tam

Interface Design And Usability Engineering

This diagram is a variation of the one presented by Saul Greenberg

James Tam