

# Casual InfoVis



CS 7450 - Information Visualization  
October 9, 2013  
John Stasko

TVCG (InfoVis) '07

# Casual InfoVis



- Let's start off with ideas and concepts from...

## Casual Information Visualization: Depictions of Data in Everyday Life

Zachary Pousman, John T. Stasko, *Member, IEEE*, and Michael Mateas

**Abstract**—Information visualization has often focused on providing deep insight for expert user populations and on techniques for amplifying cognition through complicated interactive visual models. This paper proposes a new subdomain for infovis research that complements the focus on analytic tasks and expert use. Instead of work-related and analytically driven infovis, we propose Casual Information Visualization (or Casual Infovis) as a complement to more traditional infovis domains. Traditional infovis systems, techniques, and methods do not easily lend themselves to the broad range of user populations, from expert to novices, or from work tasks to more everyday situations. We propose definitions, perspectives, and research directions for further investigations of this emerging subfield. These perspectives build from ambient information visualization [52], social visualization, and also from artistic work that visualizes information [41]. We seek to provide a perspective on infovis that integrates these research agendas under a coherent vocabulary and framework for design. We enumerate the following contributions. First, we demonstrate how blurry the boundary of infovis is by examining systems that exhibit many of the putative properties of infovis systems, but perhaps would not be considered so. Second, we explore the notion of insight and how, instead of a monolithic definition of insight, there may be multiple types, each with particular characteristics. Third, we discuss design challenges for systems intended for casual audiences. Finally we conclude with challenges for system evaluation in this emerging subfield.

**Index Terms**—Casual information visualization, ambient infovis, social infovis, editorial, design, evaluation.

### 1 INTRODUCTION

Much of the work in information visualization assumes a population of expert users who have knowledge and experience in analyzing problems in specific domains. Workers in widely varying domains from fi-

Are these types of tools really infovis systems? The question arises, where are the limits of infovis with respect to the everyday uses of computational artifacts.

Card, Mackinlay, and Shneiderman define information visualiza-

# Casual InfoVis



- Let's start off with ideas and concepts from the paper...
- A complement to the majority of 'central' infovis; which is a focus on analytic tasks and analysts as the idealized user.
- *Infovis for the everyday person*
- Spend some time looking at the 'edges' of the infovis domain

## Definition



- *Casual Infovis* is the use of computer mediated tools to depict personally meaningful information in visual ways that support everyday users in both everyday work and non-work situations.

# Good Examples



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# Changes to traditional notions

- The user population
  - Expand to include many more kinds of people and many more situations and scenarios.
  - People who are not explicit or implicit analysts
  - Non-professionals in general
  - Low(er) motivation

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## Changes to traditional notions

- Usage pattern
  - New patterns of use that depart from the more traditional deep-dive explorations and sensemaking
  - In a word, more *casual*
  - Fleeting awareness and monitoring tasks
  - Could also include more substantial reflections
  - Mobile and ubiquitous, not just desktop

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## Changes to traditional notions

- Data types also change
  - Often personally relevant (about 'me')
  - Tight coupling between user and the data
  - Tight coupling gets at what is *meaningful* about the data stream... not always what is *important*. Sometimes the most minute and boring detail is still very meaningful.

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## Changes to traditional notions



- Insight
  - Gets a one of the fundamental questions of infovis. We all agree that the purpose of infovis is insight... *Do you agree?*
  - But the examples on the edges show different kinds of insights.
  - Maybe insights are not perfectly quantifiable in a way that's rigorous  
(for an attempt see Saraiya & North 2005)

## Areas to explore for today



- Artistic InfoVis
- Ambient InfoVis
- Social InfoVis (an appetizer)

## A quick word...



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## A quick word... on birds



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## A quick word... on birds

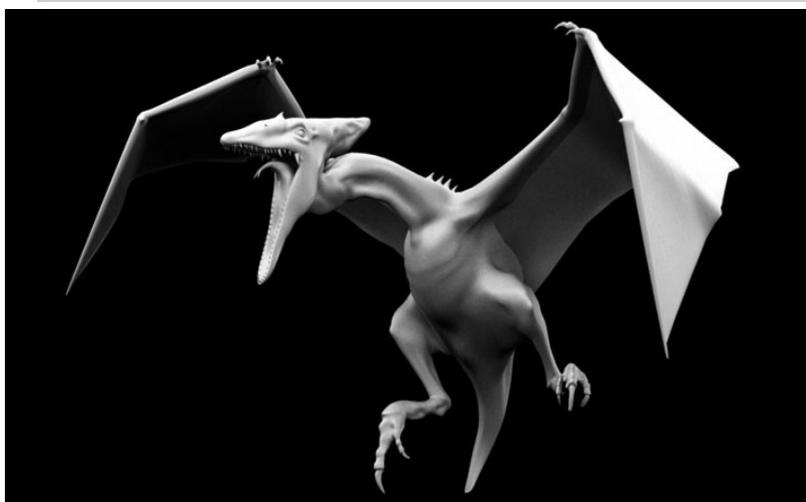


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## A quick word... on birds



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## Areas to explore for today

- Artistic InfoVis
- Ambient InfoVis
- Social InfoVis

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## Artistic InfoVis

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# Artistic InfoVis



- Artistic expression using visualizations of data
- They are not just generative art – they still read data, represent it, and some are interactive
- Systems often depart from the central notion of infovis that first and foremost, a visualization should be easy to read.
- Also can 'problemitize' the data...

# Many examples



# Jason Salavon



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# Jason Salavon



*Homes for Sale*



109 Homes for Sale,  
Seattle/Tacoma



117 Homes for Sale,  
Chicagoland



124 Homes for Sale,  
The 5 Boroughs



121 Homes for Sale,  
LA/Orange County



114 Homes for Sale,  
Dallas/Ft. Worth Metroplex



112 Homes for Sale,  
Miami-Dade County

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# Jason Salavon



The Top Grossing Film of All Time, 1 x 1 2000

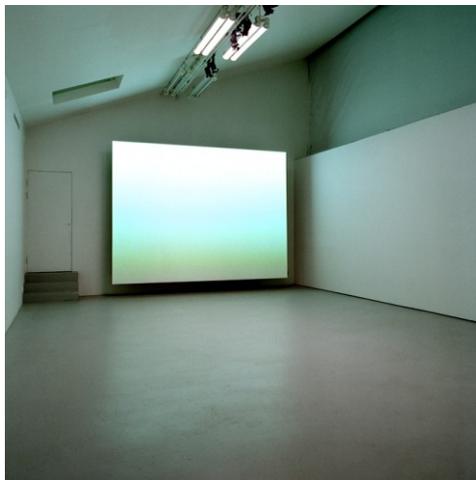
The worldwide top grossing film of all time (until 2010), Titanic, was digitized from video in its entirety and broken up into its constituent frames. Each of these was then averaged to a single color best representative of that frame and reformatted as a photograph mirroring the narrative sequence of the film. Reading from left-to-right and top-to-bottom, the narrative's visual rhythm is laid out in pure color.

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# Wignell



*Sorting (real time)*

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# Arthur Buxton



28 van Gogh paintings visualised as pie charts showing the five most common colours in each as a percentage. Can you tell which one's which?

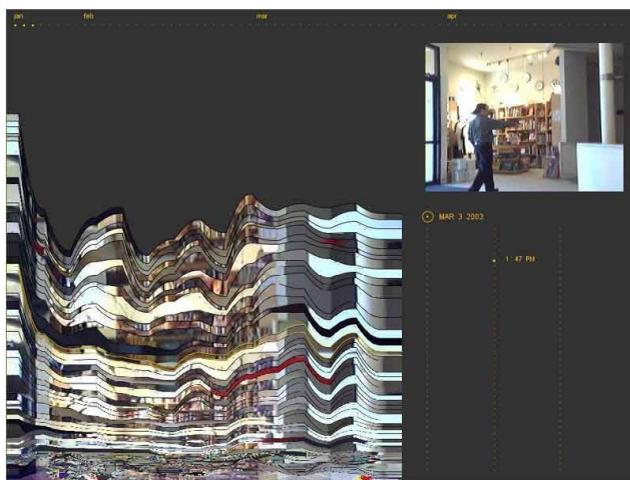
<http://www.arthurbuxton.com/2010/11/van-gogh-visualisation.html>

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# Viegas, et al.



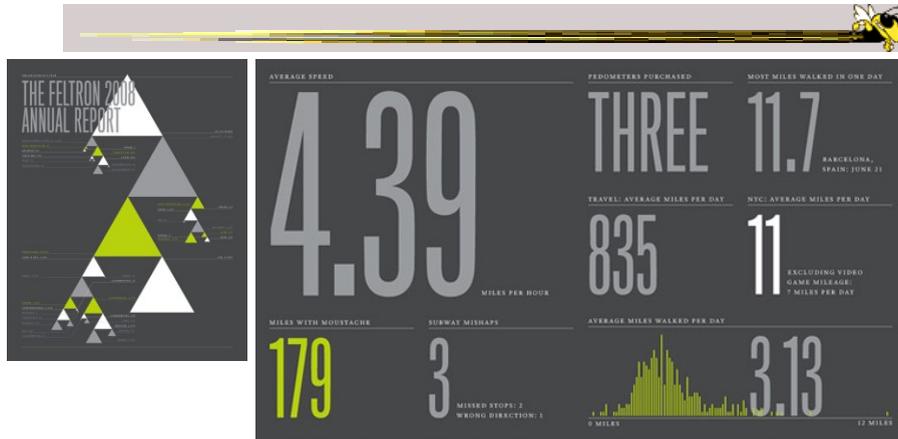
*Artifacts of the Presence Era*

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# Feltron



*Annual Report (2008)*

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# Flags as infographics



*Foote, Cone & Belding*

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# Flags as infographics



*Footo, Cone & Belding*

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# Flags as infographics



*Footo, Cone & Belding*

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# New Communities

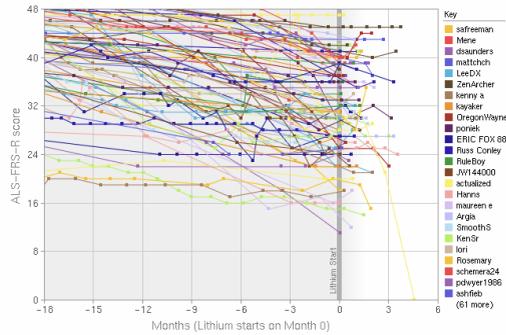


patientslikeme

generated: Mar 31, 2008 03:18PM  
by: Visitor

## ALSFRS-R Progression of Patients on Lithium

This graph shows the ALSFRS-R scores of ALS patients in the PatientsLikeMe system before and after they started taking lithium. It is an evolving prototype that we are developing to help understand if lithium, and ultimately other treatments, can slow ALS progression. **Source:** [http://www.patientslikeme.com/als\\_lithium](http://www.patientslikeme.com/als_lithium)



Filters: All patients taking lithium

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# New Communities



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# Ambient InfoVis



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## Objectives



- Systems so far
  - What is their purpose or objective?  
High-level purpose or task
  - Analysis, Exploration, Learning
- Are there other high-level tasks that infovis can assist with?
  - Awareness, monitoring

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## Central idea

- People interpret images well
- As they say, *a picture's worth thousand words* ... so use visualization for information awareness

## Calm Technology

- Mark Weiser
  - “A calm technology will move easily from the periphery of our attention, to the center, and back.”



# Ambient Displays



- Conveys low- to medium-priority information to people, while residing in the periphery of their attention
- Other terms sometimes used
  - Peripheral display, notification system

# Ambient Displays



- Purpose:
  - Information awareness, perhaps monitoring
- Focus:
  - Aesthetics
    - Visually pleasing enhancement to surroundings

# Other dimensions in the space



Information capacity

How much info can they transmit?

Notification level

Are they subtle or more attention-grabbing?

Representational Fidelity

Flexibility with regard to data mappings

Aesthetics

Visually pleasing enhancement to surroundings

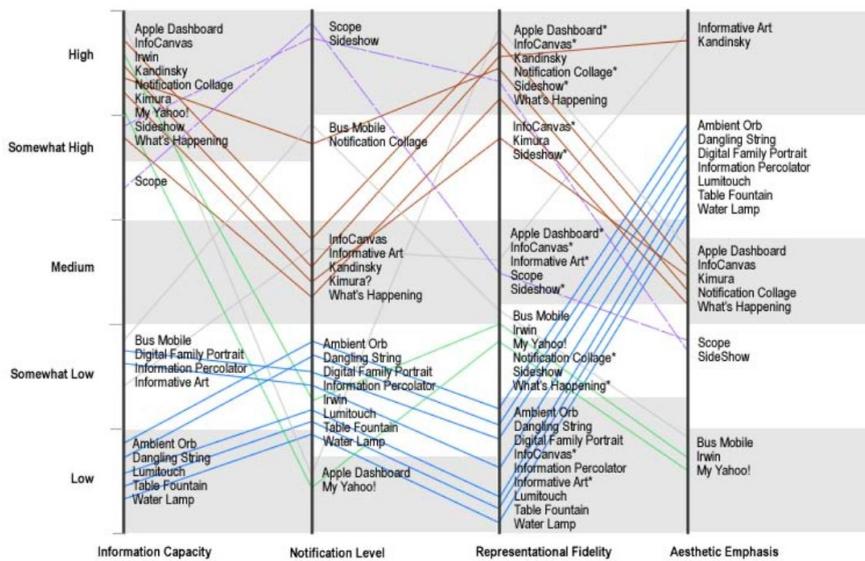
Pousman & Stasko  
AVI '06

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# Other dimensions in the space



# Ambient InfoVis



- InfoVis off the desktop
- Still visually encoding information, but not for analytic purposes
  - Presenting the information in places where you're not doing "desktop computing"

# Examples



- Let's look at some examples of ambient displays or ambient information visualizations

# Dangling String

- Plastic spaghetti wire hanging from ceiling
- Hangs from motor in ceiling
- Electrically connected to ethernet cable so bits going by cause it to jiggle
- Created by artist Natalie Jeremijenko



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# Ambient Room

- Use variety of physical objects in office to communicate the state of relevant information
- Hiroshi Ishii's group at MIT



Wisneski et al  
CoBuild '98

Video

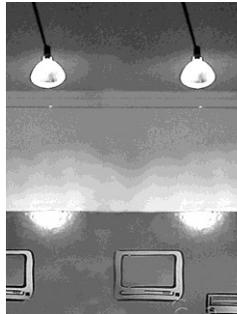


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# Karlsruhe Projects



Web awareness

Gellersen & Schmidt  
*Personal Technologies '99*

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# Lumitouch



- Touch one picture frame, the other lights up



Chang et al  
CHI '01 Extended Abstracts

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# Information Percolator



- Fish tank with bubble controller
- Various messages can be sent in bubbles



Heiner et al  
UIST '99

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# Busmobile, Weathermobile



Mankoff et al  
CHI '03

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# Ambient Orb

Monitor stock market data, weather, etc.



[www.ambientdevices.com](http://www.ambientdevices.com)

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# Information Visualizations?

- Well, they are visually presenting information
- But perhaps not an emphasis on the *information*
  - More about peripherality, calmness, aesthetics

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## Other Styles

- Another set of techniques/systems focus less on aesthetics and more on the quality of information conveyance

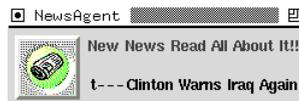
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## Ticker Displays

- Animated text strings (ticker, fade, roll, blast) typically in periphery of person's monitor



Fitzpatrick et al  
CHI '99 Extended Abstracts

McCrickard et al  
*IJHCS* '03

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# What's Happening/The Buzz



Screen-saver or projected display using collages of images



Zhao & Stasko  
AVI '02

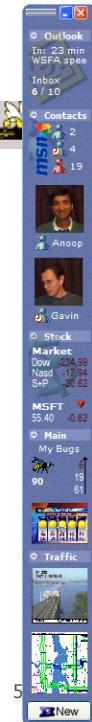
Eagan & Stasko  
CHI '08

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# Sideshow



- Sidebar on edge of monitor
- Provides info on weather, traffic, presence, project status, etc.
- Can author new items
- From Microsoft

Cadiz et al  
CSCW '02

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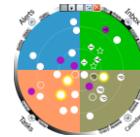
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# Scope

- Corner of the screen awareness widget to help with tasks, appts, etc.
- Glanceable awareness, more details on demand

van Dantzig et al  
AVI '02

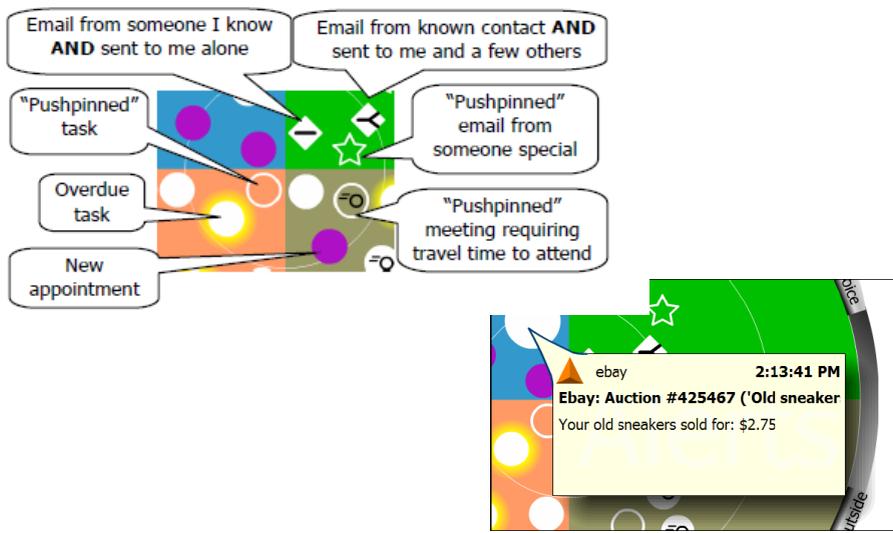


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# Encoding

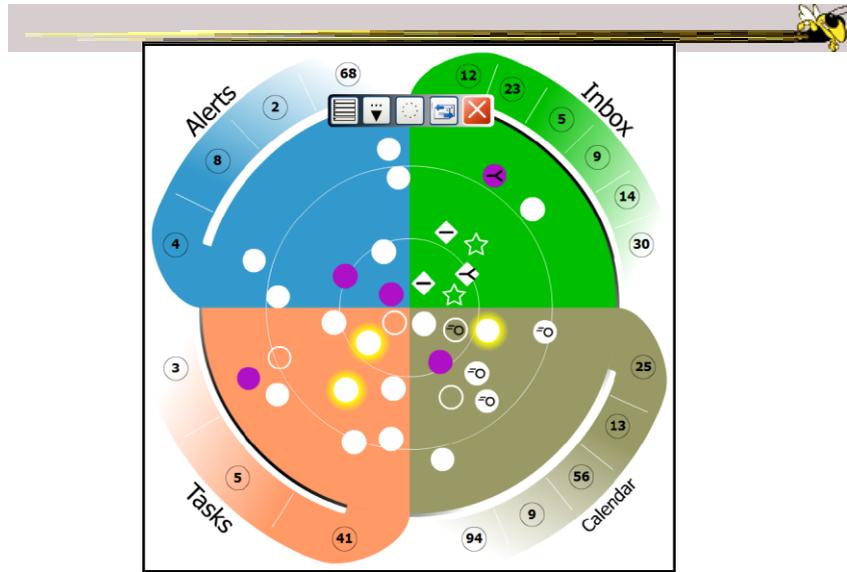


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# Final Interface



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# Trade-off



Aesthetics

Utility



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# Kandinsky

- Generates aesthetic information collages
- Information Collage:  
Ambient information display of an object
- Aesthetic Template:  
Express Aesthetic concepts in visual form

Fogarty, Forlizzi & Hudson  
UIST '02

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# System Architecture

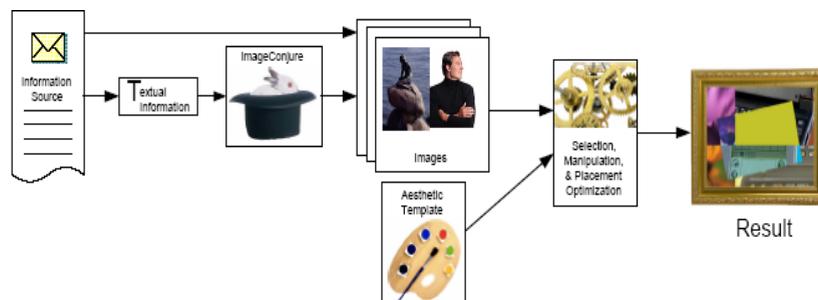


Figure 2. Architecture of the Kandinsky System

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# Representative Images



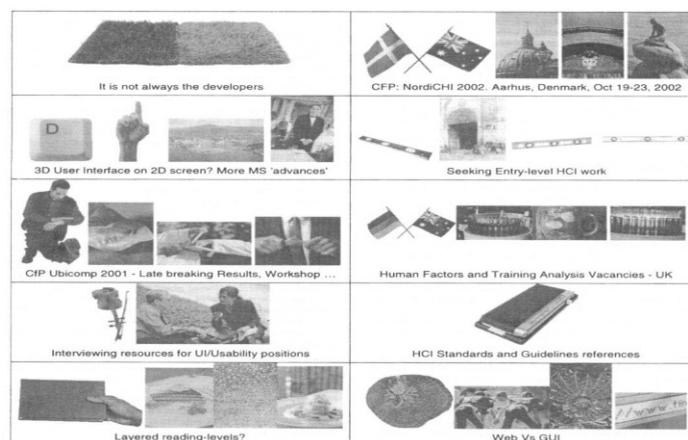
- ImageConjure subsystem
  - Converts text into representative images
  - Selects from large photo/clip art collections
  - Uses a textual summary; prepared by a person
  - Scores the images; returns the best matches

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# ImageConjure Results



From: PhotoDisc Inc. (24,000 images) and Hemera Inc. (50,000 images)

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# Optimization Process



- Configuration of components (selection of information images, placement within collage)
- Uses aesthetic templates and “temperature” parameter
- 4-Layered Regions
  - Fixed visual elements
  - Initial image selection and placement strategy
  - Evaluation criteria
  - Post-processing

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# Properties of Interest



## Low-Level

## High-Level

- |                   |                     |
|-------------------|---------------------|
| • Color           | • Relative Contrast |
| • Texture         | • Dimensionality    |
| • Edges and Lines | • Balance           |
| • Direction       | • Motion            |
| • Shape           | • Stress            |

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# Example Generation

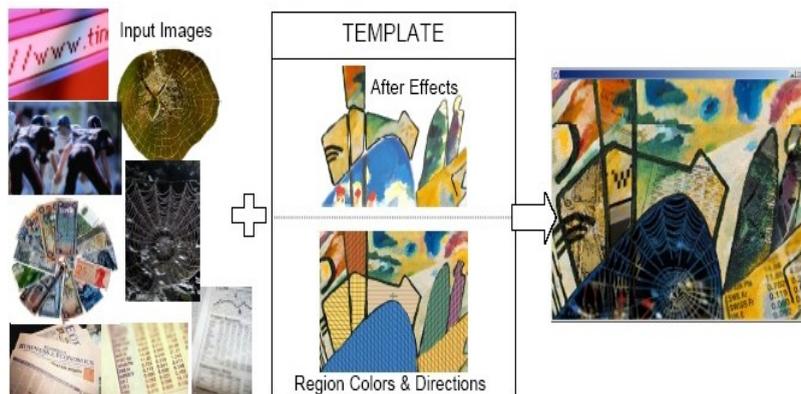


Figure 6. Example Images, Aesthetic Template, and Result

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# Summary

- Less information conveying, more aesthetic appeal



Figure 7. Example Results

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# Informative Art

- Electronic paintings–Flat panel LCDs hung on the wall
- Abstract art in which aspects of the picture change to signify underlying data values
- From Future Applications Lab, Viktoria Institute, Sweden

Redstrom et al  
DARE '00

Skog et al  
InfoVis '03



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# Design Criteria

- Communicate useful information
- Blend in with surroundings and be appealing to look at
- Minimize animation – Don't want to draw the eye too much

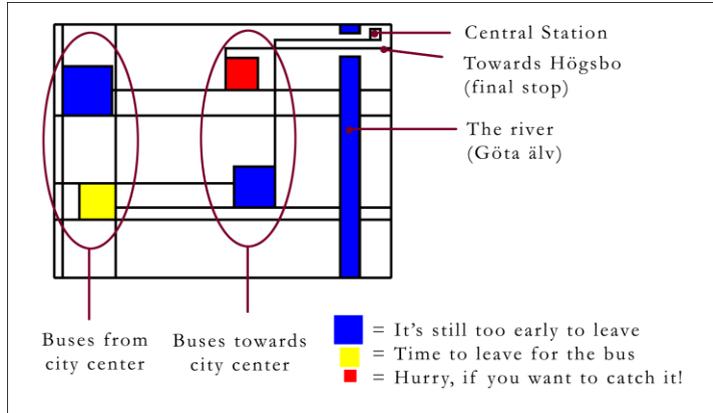
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# Example

## Mondrian



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# Example

## Andy Warhol



Cans gradually change from asparagus soup to tomato soup to signify upcoming event

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## Lessons Learned



- Find info relevant to place where display is located
- Rate of change of info should be enough to promote relevance and draw interest
- Base visualization on artistic display, may support readability and promote comprehension
- Let features of info source affect visual encoding to improve memory of mapping

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## InfoCanvas



- Information Art–Similar approach as in Viktoria project
- Electronic painting deployed on LCDs in the environment
- Focus: User-driven views
- II group at Georgia Tech

Stasko et al  
Ubicomp '04

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# Objectives

- Personalized
  - Display individual's personal information
- Flexible
  - Variety of info sources and representations
- Consolidated
  - Present multiple data items on one display
- Accurate
  - Be clear, and highlight uncertainty
- Appealing
  - Fun to use, aesthetically pleasing

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# Hardware

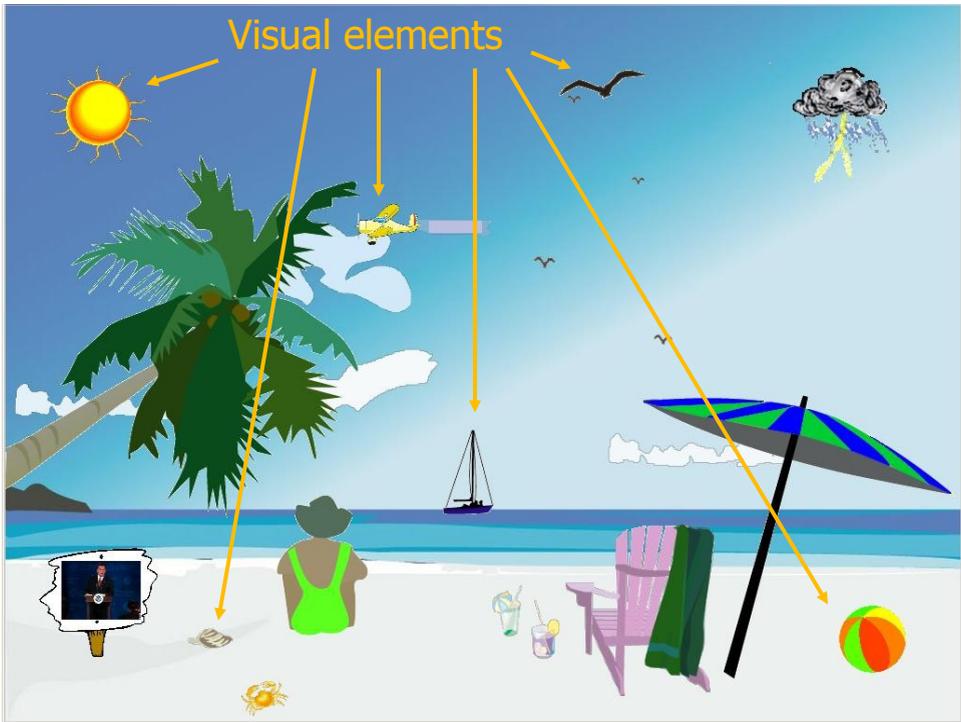


LCD – bezel + picture frame

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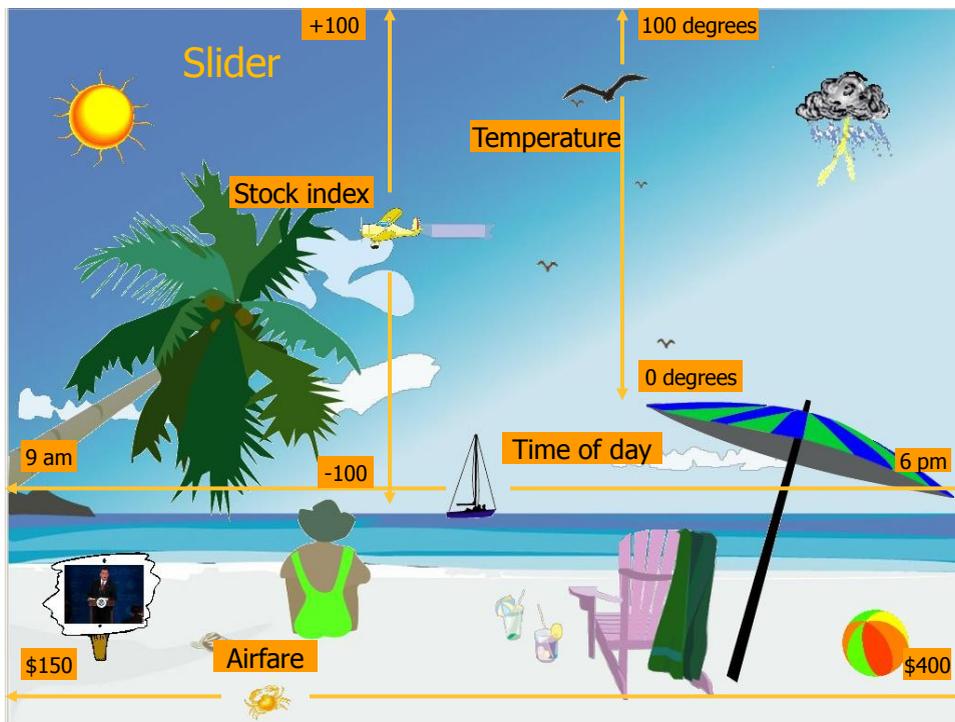
# Transformations

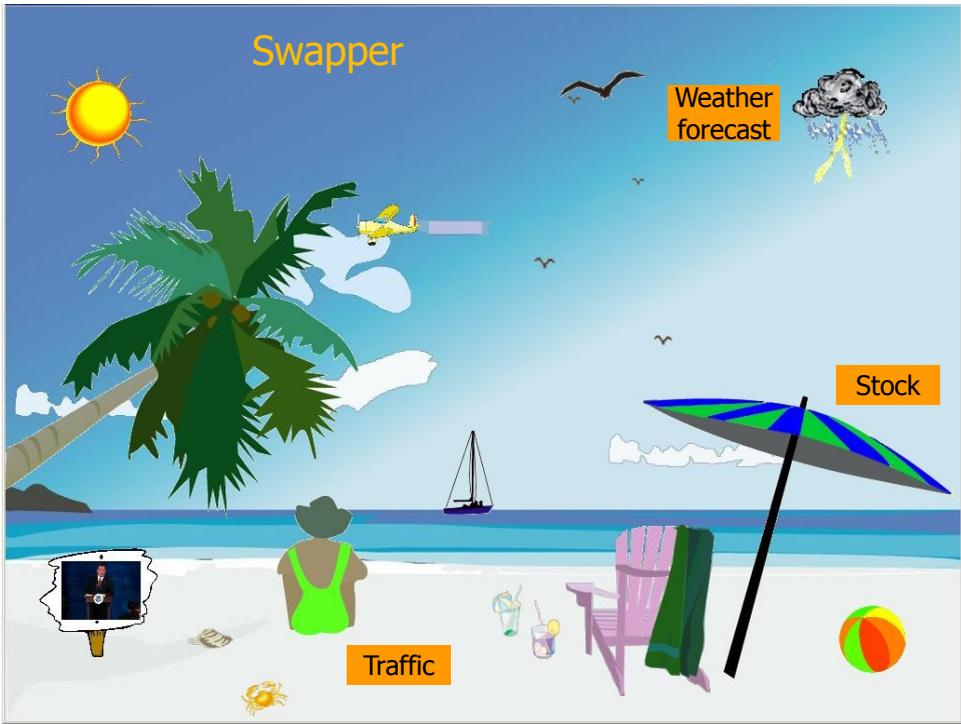
- Slider
- Image swapper
- Appearance
- Scaler
- Populater
- Projector

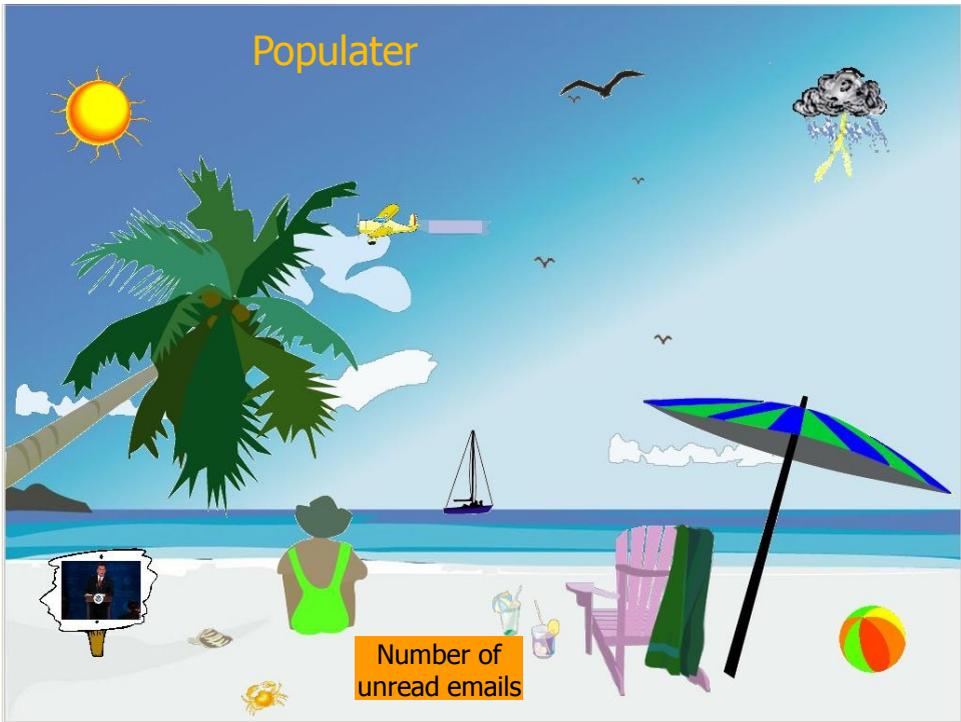
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## Other Example Themes



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# Implementation



- Java application
- Data harvester classes
- Painting specified through XML file
- System establishes data->visual mapping and polls data sources to maintain current representation

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## Lessons Learned



- Ubiquitous computing technologies can operate effectively in the field
- Consolidating information is valuable
- Abstractness/symbolism can be beneficial
- “Push” technology merits reconsideration
- Personalization is important
- Better customization tools are needed

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## Social InfoVis



- Another big (and growing) area... let's just scratch the surface today.

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# Definition



- Social Visualization
  - “Visualization *of* social information *for* social purposes”  
---Judith Donath, MIT
  - Visualizing data that concerns people or is somehow people-centered

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# Social Visualization



- “Unlike information visualization which has as its goal of helping users digest information more effectively or data visualization which has as its goal of helping users analyze and see trends in the data, **social visualization** has as its goal of creating **awareness and catalyzing social interactions among its users.**”  
(Alison Lee)

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## Example Domains



- Social visualization might depict
    - Conversations
    - Newsgroup activities
    - Email patterns
    - Chat room activities
    - Presence at specific locations
    - Social networks
    - Life histories
- Can you think of others?

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## On-line Communities



- PeopleGarden
  - Visualization technique for portraying on-line interaction environments (Virtual Communities)
  - Provides both individual and societal views
  - Utilizes garden and flower metaphors

Xiong & Donath  
UIST '99

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# Particulars

- Who – Anyone visiting online community
- Problem – Help someone gain a more rapid understanding of the community as a whole and the individual participants
- Data – Postings from past

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# Data Portrait: Petals

Fundamental view of an individual



His/Her postings are represented as petals of the flower, arranged by time in a clockwise

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## Data Portrait: Postings



- New posts are added to the right
- Slide everything back so it stays symmetric
- Each petal fades over time showing time since posting
- A marked difference in saturation of adjacent petals denotes a gap in posting

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## Data Portrait: Responses



Response to posting



- Small circle drawn on top of a posting to represent each follow-up response

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# Data Portrait: Color



Initial post vs. reply



Color can represent original/reply  
Here magenta is original post, blue is reply

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## Garden

Combine many portraits to make a garden

Message board with 1200 postings over 2 months

Each flower is a different user  
Height indicates length of time at the board



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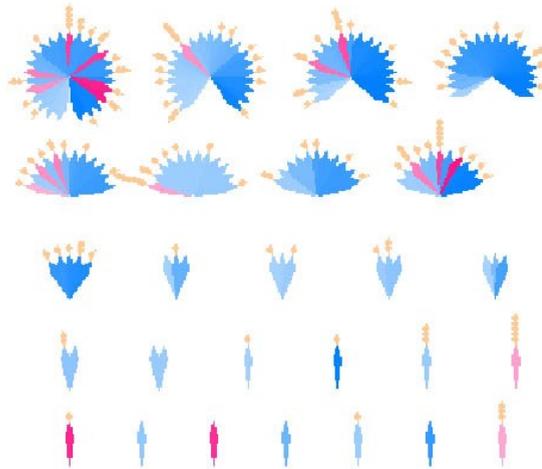
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# Alternate Garden View



Sorted by  
number of  
postings

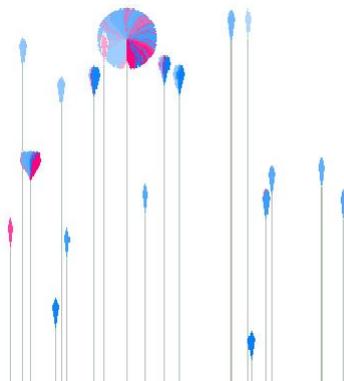


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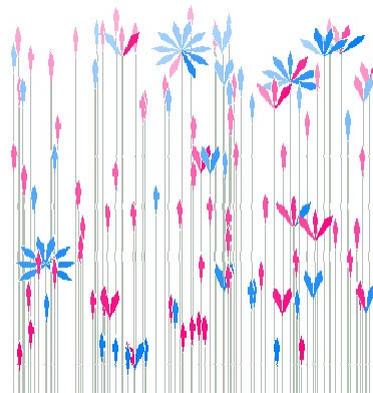
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# Interpreting Displays



Group with one dominating  
person



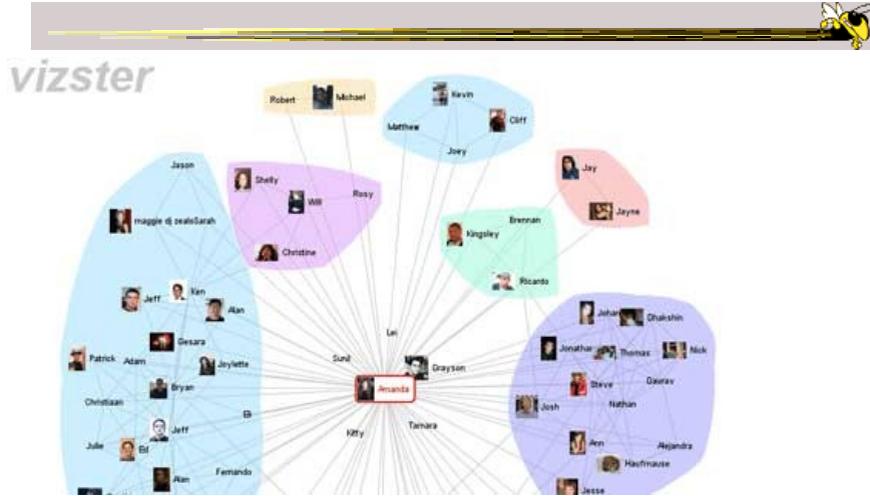
More democratic group

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# Vizster



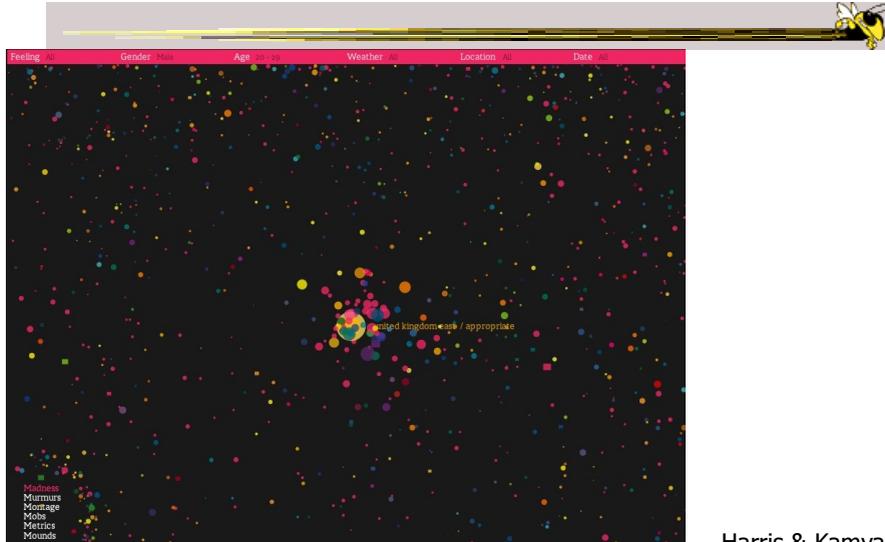
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Heer & boyd  
InfoVis '05  
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<http://www.wefeelfine.org/>

# We Feel Fine



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Harris & Kamvar

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## In Sum...

- Different kinds of 'insight'
  - Analytical insights (more traditional concept)
  - Reflective insights
  - Awareness insights
  - Social insight

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## In Sum...

- Info Vis is moving into lots of life, not just desk work and data analysis by experts
  - News, commerce, story-telling, sociality
  - Self-reflection
  - One way to help manage information overload
- Requires a change to evaluation techniques (what matters is changing)
- Opens new design spaces

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# Project



- Next milestone – Oct. 21
  - Design document (2 copies)
    - Describe users & objectives more
    - Show different design ideas
    - Describe which one(s) you plan to go with and implement

# HW 4



- What did you think of the systems?

## HW 5



- Draw a graph
- 10-vertex abstract graph provided
- You draw a node-link representation
- Follow the directions!
  
- Due Monday 21<sup>st</sup> (no late ones)
- Don't spend a lot of time

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## Upcoming



- No class next week – VIS Conference
  
- Graphs & Networks 1
  - Reading:  
Lee et al '06
- Graphs & Networks 2
  - Reading:  
Perer & Shneiderman '06

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# References

- Thanks to Zach Pousman for contributions to the lecture