

# CSCI 4973

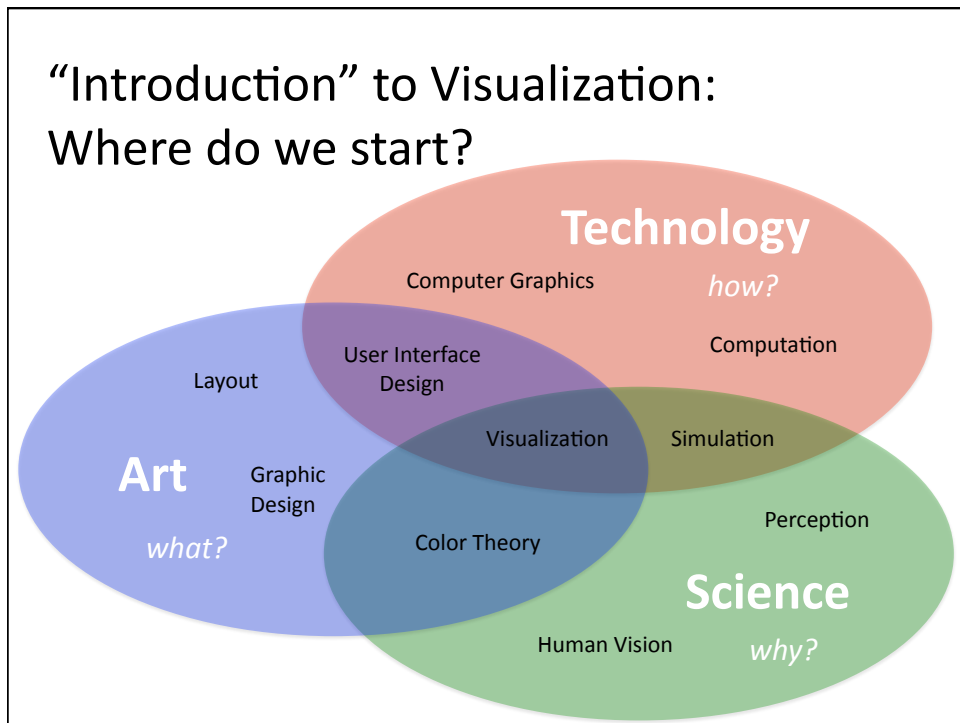
## Introduction to Visualization

### Spring 2012

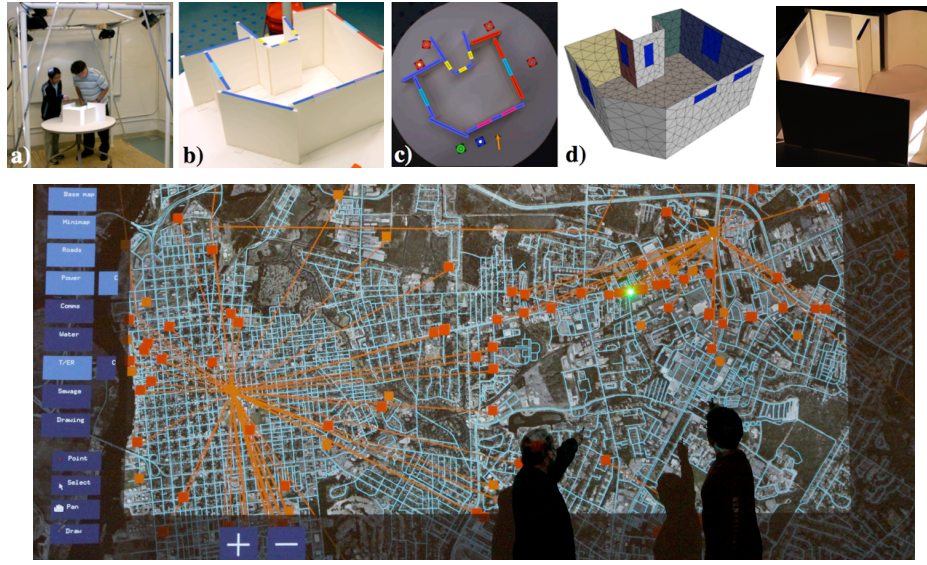
<http://www.cs.rpi.edu/~cutler/classes/visualization/S12/>

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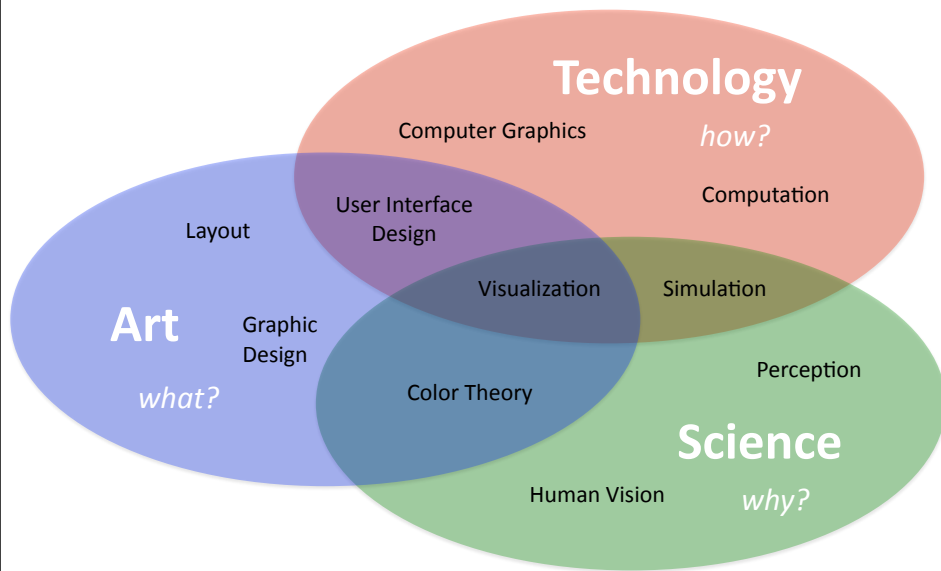
MRC 331A



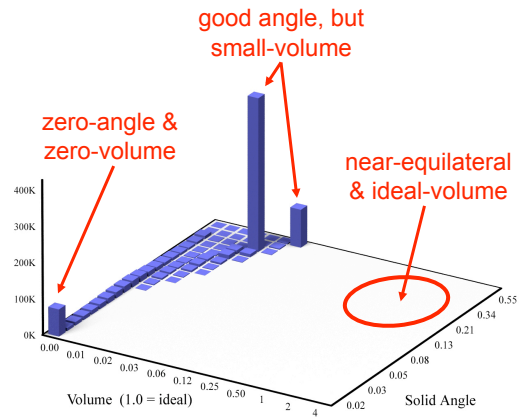
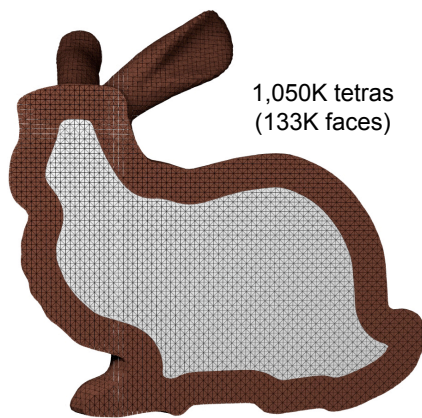
## Introductions... my research:



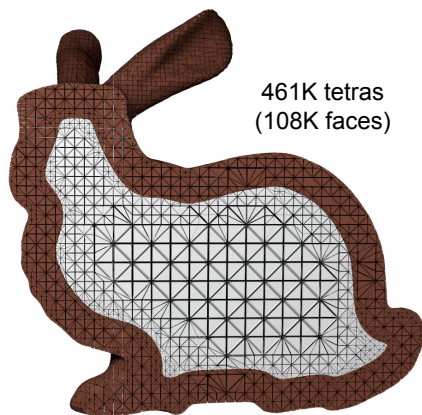
And you? Major/Research Area? Skills & Strengths?  
What do you hope to learn in this course?



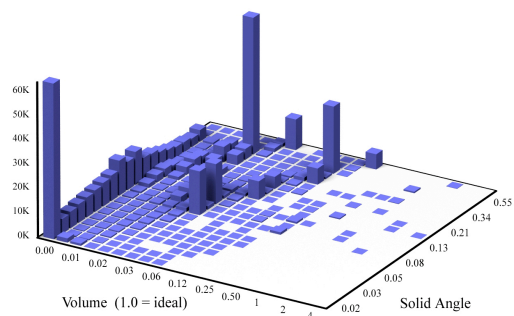
## Visualization of Tetrahedra Quality



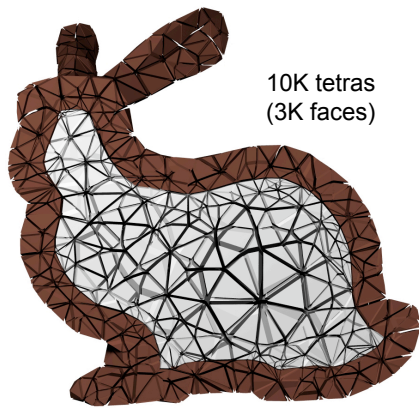
## Visualization of Tetrahedra Quality



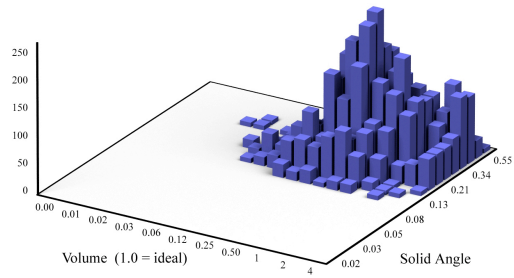
Octree or Adaptive Distance Field (ADF)



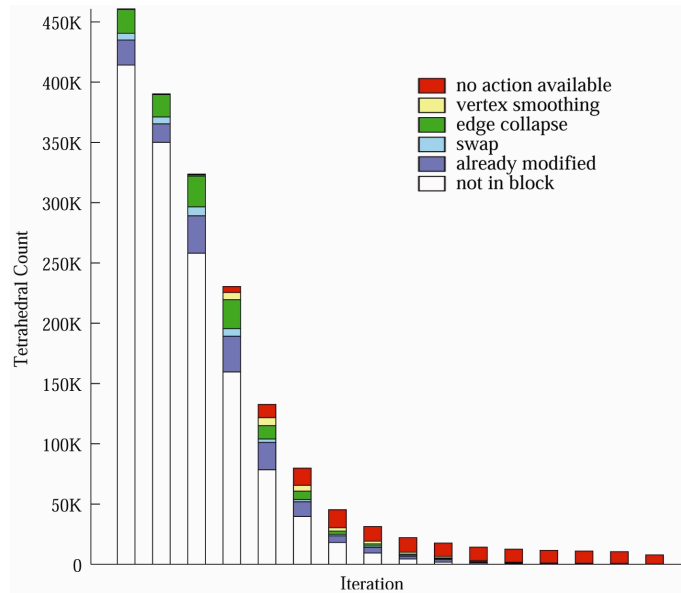
## Visualization of Tetrahedra Quality



After Simplification  
& Mesh Improvement



## Visualization of Simplification Algorithm

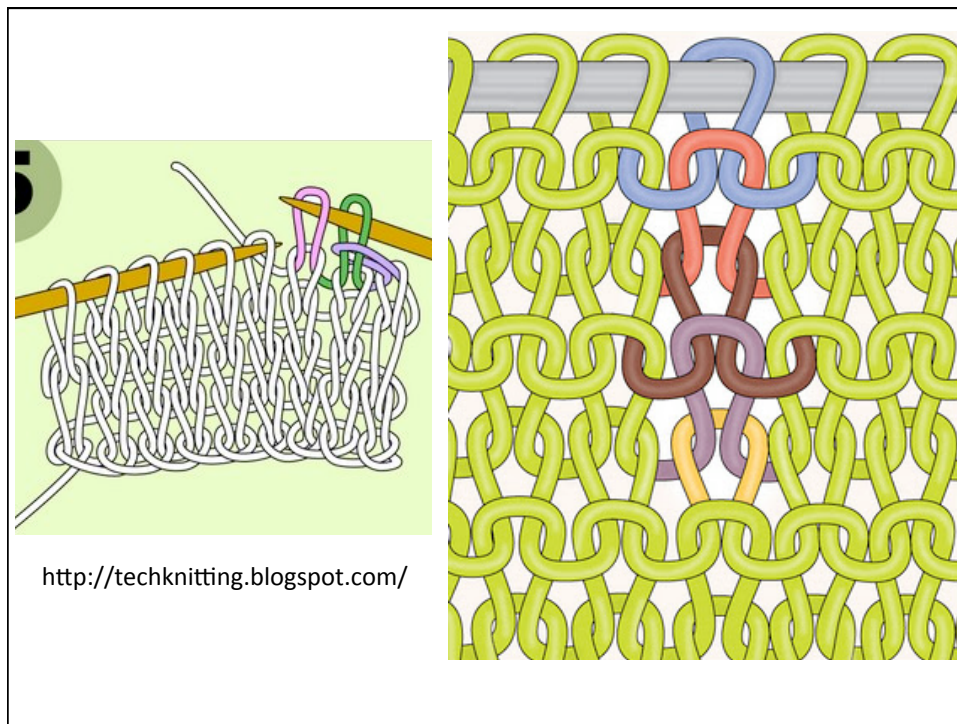


## The Visualization Process

- Motivation & Problem Definition
- Visualization Design
- Data Collection
- Visualization Execution
- Analysis & Validation
- Visualization Revision
- Presentation

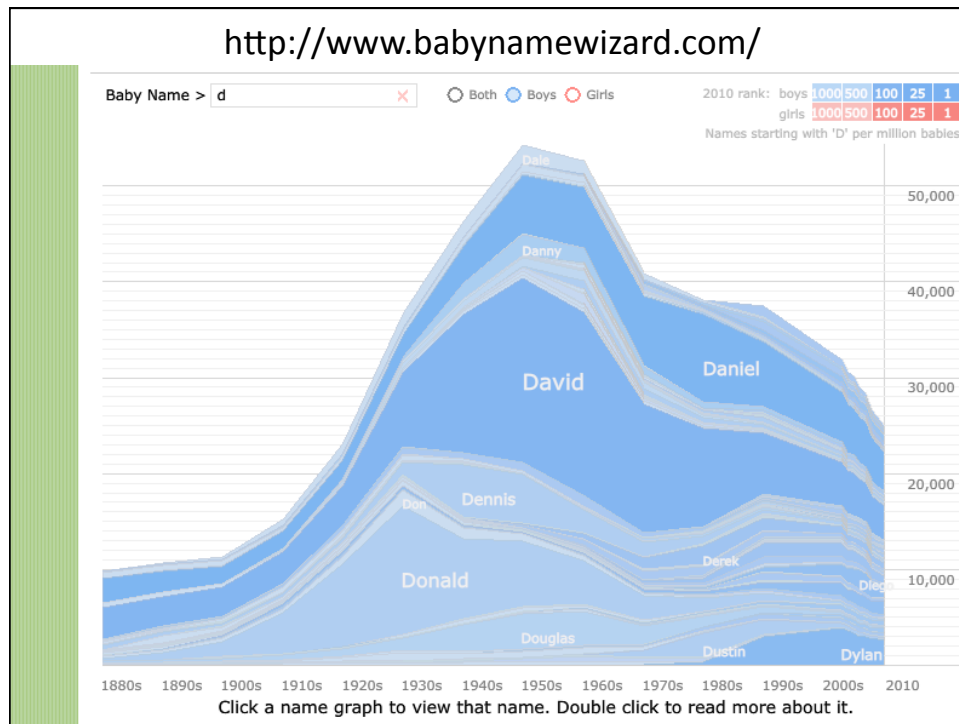
## The Visualization Process

- Motivation & Problem Definition
  - e.g., audience, purpose, goals, interdisciplinary collaboration
- Visualization Design
- Data Collection
- Visualization Execution
- Analysis & Validation
- Visualization Revision
- Presentation



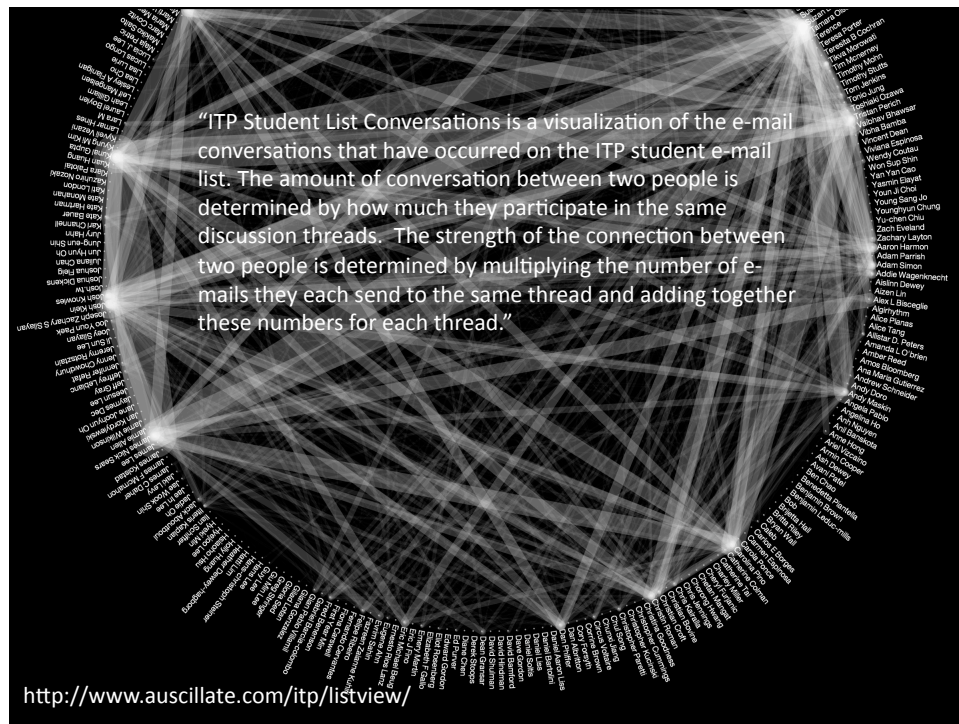
## The Visualization Process

- Motivation & Problem Definition
- Visualization Design
  - e.g., media, color, organization, layout, static vs. dynamic, creativity
- Data Collection
- Visualization Execution
- Analysis & Validation
- Visualization Revision
- Presentation



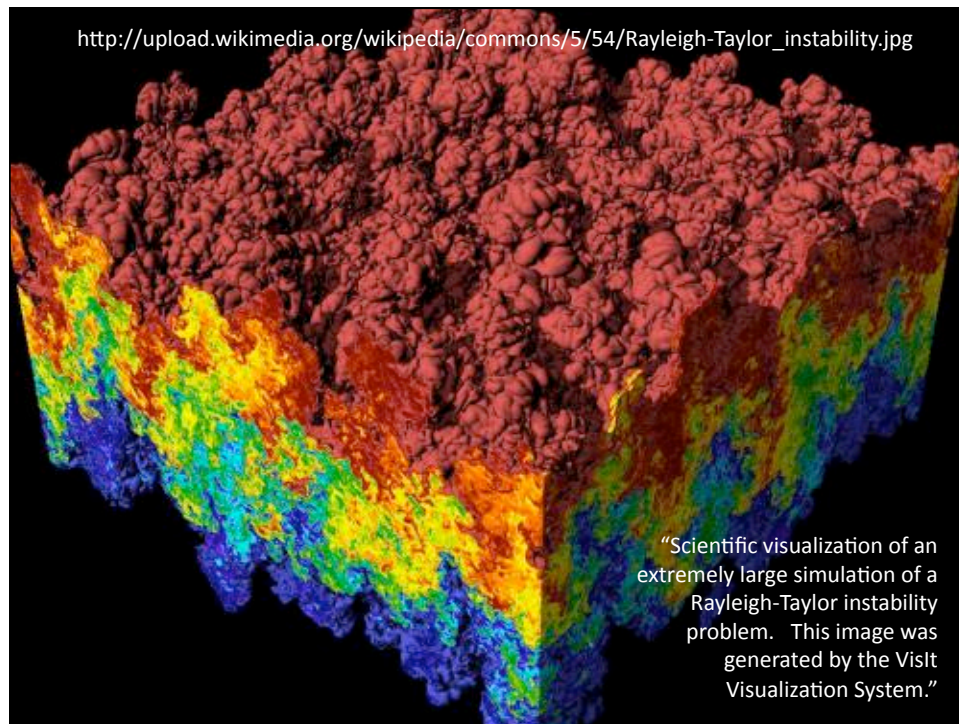
## The Visualization Process

- Motivation & Problem Definition
- Visualization Design
- **Data Collection**
  - e.g., data structures, file formats, parsing, performance & efficiency, databases, very large datasets, interdisciplinary collaboration
- Visualization Execution
- Analysis & Validation
- Visualization Revision
- Presentation



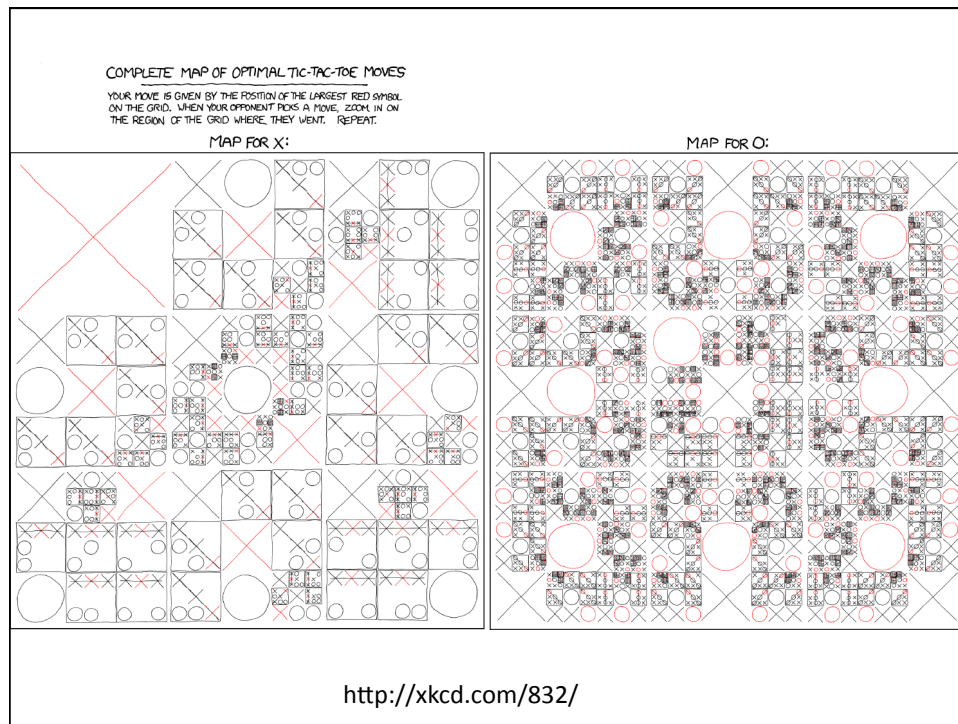
## The Visualization Process

- Motivation & Problem Definition
- Visualization Design
- Data Collection
- Visualization Execution
  - e.g., data structures, implementation details, visualization toolkits/environments (VTK, OpenGL, etc.), performance & efficiency
- Analysis & Validation
- Visualization Revision
- Presentation



## The Visualization Process

- Motivation & Problem Definition
- Visualization Design
- Data Collection
- Visualization Execution
- **Analysis & Validation**
  - e.g., debugging, drawing conclusions from data, accuracy, precision, interpretation, useability
- Visualization Revision
- Presentation



## The Visualization Process

- Motivation & Problem Definition
- Visualization Design
- Data Collection
- Visualization Execution
- Analysis & Validation
- Visualization Revision
  - e.g., prototype & revise, iterated design, comparing before & after, solicit user feedback, formal user studies
- Presentation



<http://www.heraldsun.com.au/> Getty



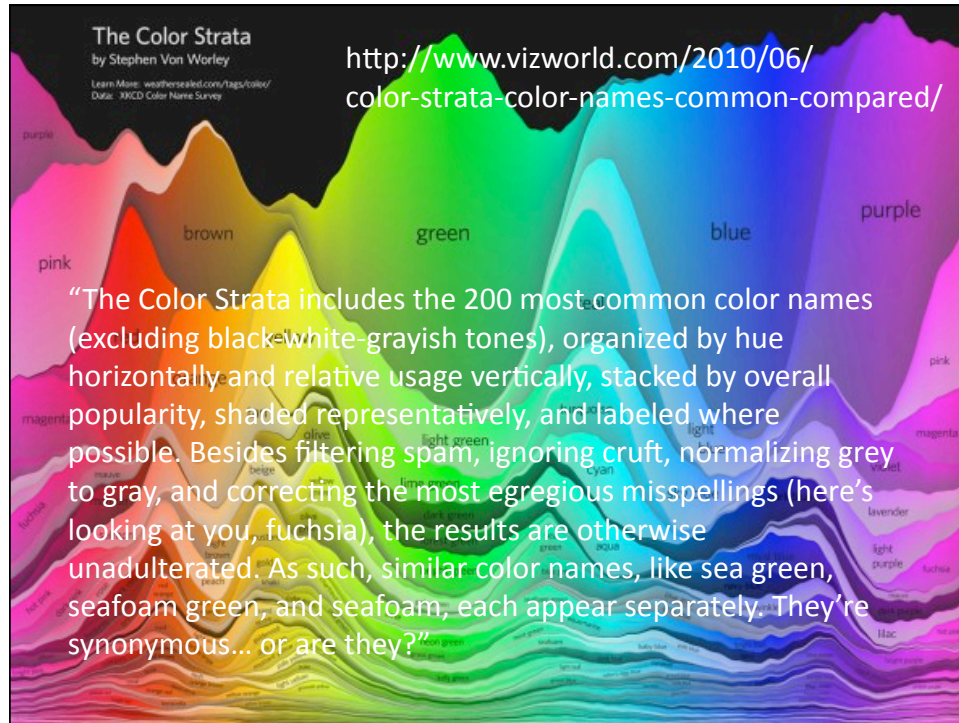
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From somewhere on Facebook....  
<http://www.facebook.com/babayoff>

## The Visualization Process

- Motivation & Problem Definition
- Visualization Design
- Data Collection
- Visualization Execution
- Analysis & Validation
- Visualization Revision
- **Presentation**
  - e.g., mixed media, descriptive titles/labels, concise and complete captions/companion text, elevator pitch, documentation



CSCI 4530/6530 Advanced Computer Graphics	CSCI 4973 Introduction to Visualization
<p>Established course traditional, technical lectures instructor provides most of the content lots of in class discussion read 2 research papers a week</p> <p>Structured individual homeworks lots of programming flexibility only in extra credit</p> <p>5 week final project teams of 2 encouraged topic of your choice lots of graphics-related programming</p> <p>4 units of credit (3 for grad version) Counts as a “CS option” for CS majors Huge time commitment</p> <p>Prior graphics experience recommended</p>	<p>New course will be different than Fall 2010 offering instructor provides some of the content students provide some of the content lots of in class discussion some in class work time read 1 research paper a week</p> <p>Design-your-own homeworks design/art/creativity/thinking/revision/ presentation is focus some programming for implementation some fiddling with visualization toolkits individual &amp; group work required</p> <p>2 units of credit Counts only as “Free Elective” for CS majors (Probably) an unreasonable time commitment expected for a 2 credit course</p> <p>Passion for visual perfection recommended</p>

Computer Science

Course Calendar

Note: Lecture topics and assignments are tentative and will be updated as the term progresses.

**CSCI 4973**

**Explorations in Visualization**

**Curating Visualization**

**Visualization Design & Implementation**

**Spring 2012**

<http://www.cs.rpi.edu/~cutler/classes/visualization/S12/>

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**MRC 331A**

Monday	Tuesday	Wednesday	Thursday	Friday
		Jan 25, Lecture 1: Introduction		
Jan 29, Readings: post-quiz, post-assignment 1 (due Feb 5)	Feb 5, Assignment 1: Introduction to Visualization	Feb 6, Lecture 2: Introduction		
Feb 11, Readings:	Feb 12, Assignment 2: Designing Visualization	Feb 13, Lecture 3: Designing Visualization		
Feb 20, No Classes	Feb 21, Assignment 3: Designing Visualization	Feb 22, Lecture 4: Spatial Data Structures		
	Feb 27, Assignment 4: Designing Visualization	Feb 28, Lecture 5: Interactive Visualization & Graph Layout		
	Mar 5, Assignment 5: Designing Visualization	Mar 6, Lecture 6: Interactive Visualization & Graph Layout		
	Mar 12-15, Spring Break, No Classes	Mar 19, Mid-Year Presentation		
Mar 19, Readings:	Mar 20, Assignment 6: Designing Visualization	Mar 21, Lecture 7: Visual Debugging		
Mar 26, Readings:	Mar 27, Assignment 7: Designing Visualization	Mar 28, Lecture 8: High-Dimensional Data		
Apr 2, Readings:	Apr 3, Assignment 8: Designing Visualization	Apr 4, Lecture 9: Interactive Visualization & Graph Layout		
Apr 9, Readings:	Apr 10, Assignment 9: Designing Visualization	Apr 11, Lecture 10:		
Apr 16, Readings:	Apr 17, Assignment 10: Designing Visualization	Apr 18, Lecture 11:		
	Apr 24, Final Project	Apr 25, Final Presentation		
	May 1, Final Project	May 2, Final Presentation		
	May 8, Last Day of Class			May 11, Final Exams
	May 16-17, Final Exams, No class for introduction to Visualization			

## “Rules” for the course

- Participation is 15% of your grade:
  - Class starts at 10am promptly, don't be late
  - Use of laptops for reference during paper discussion and general note-taking is allowed
  - If you are likely to be distracted by your laptop (email, web-surfing, games), please close the lid
- Sit in a different seat, next to different people, each week
  - To facilitate mixing for feedback and brainstorming during in-class exercises

## Readings for Next Week: (*pick one*)

- "Eenie, Meenie, Minie, Moe: Selecting the Right Graph for Your Message", Stephen Few, Intelligent Enterprise, 2004
  - "User Studies: Why, How, and When?" Christopher, Healy, Interrante, Laidlaw, and Ware, IEEE Computer Graphics and Applications, 2003
  - "Helping Engineers and Scientists Avoid PowerPoint Phluff", John Mignot, IEEE Aerospace Conference, 2005
- Everyone must post a *non-trivial* comment or question on their chosen reading to the LMS discussion **by Monday @ 11:59pm**

## Homework Assignment 1: **due Tuesday @ 11:59pm**

### Inspirational Visualization Images

- Find two example visualization images:
  - one great visualization
  - one example that needs revision to be effective
- For each example write a paragraph or two describing:
  - the author, context, audience, original media format and purpose of the visualization
  - your analysis of the positive and negative aspects of each example and how it could be improved, and
  - any generalizations you can make about what makes for a compelling, high-quality visualization

- For each weekly homework assignment, estimate the number of hours (~5 hours total / week) you spent on each stage of the Visualization Process:
  - Motivation & Problem Definition
  - Visualization Design
  - Data Collection
  - Visualization Execution
  - Analysis & Validation
  - Visualization Revision
  - Presentation
- Each week will probably only practice 1-3 stages. By the end of the semester you should have accumulated a “reasonable” amount of time in every stage.

“Been wondering for years where it is cats put their feet when they settle down into this pose”  
“whoa, so that’s how they do it!”



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