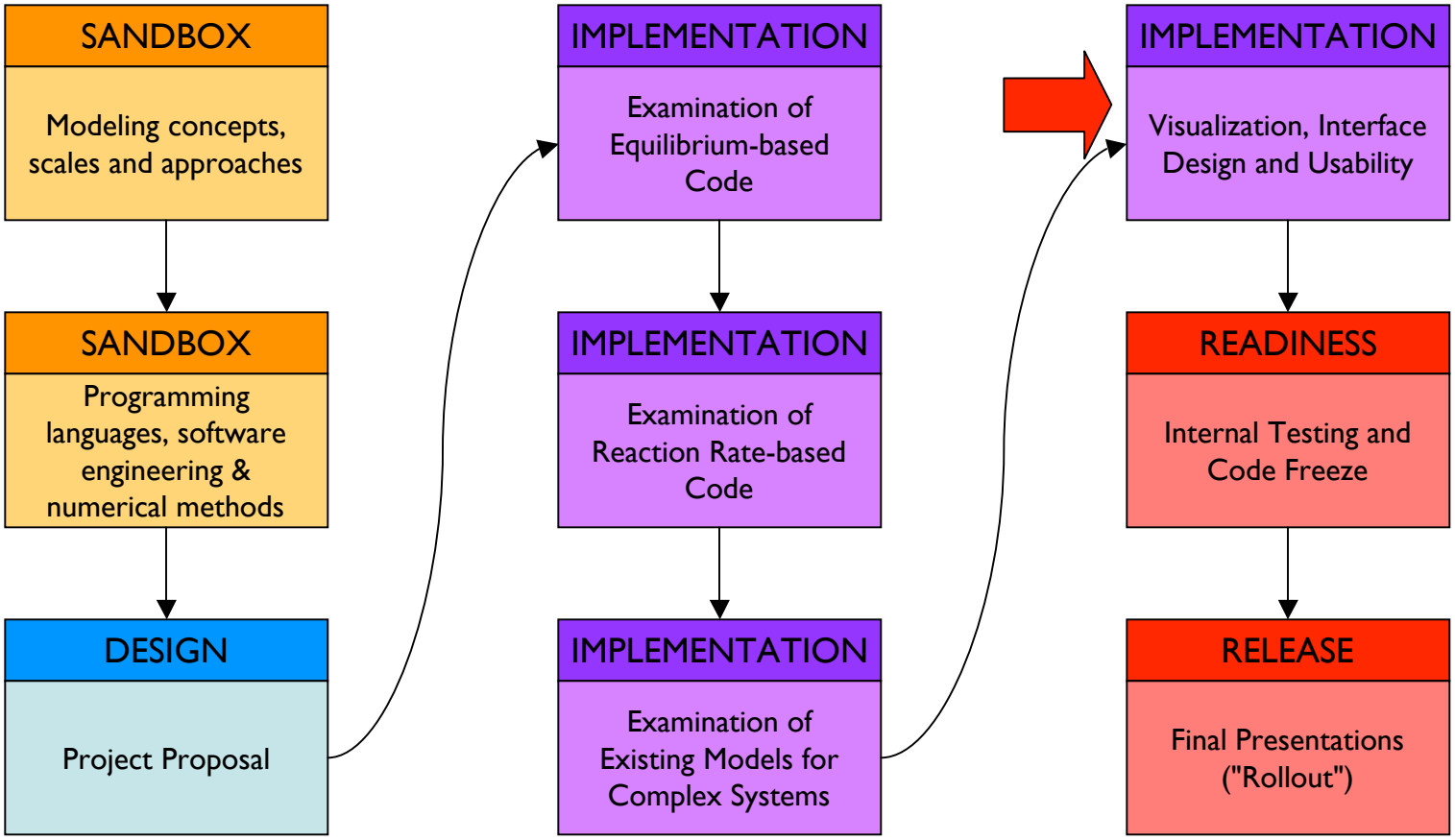
Explore CANDY LAND

Visualization, Interface Design & Usability

CEE 373

Roadmap


SANDBOX
Modeling concepts, scales and approaches
SANDBOX
Programming languages, software engineering & numerical methods
DESIGN
Project Proposal
IMPLEMENTATION
Examination of Equilibrium-based Code
IMPLEMENTATION
Examination of Reaction Rate-based Code
IMPLEMENTATION
Examination of Existing Models for Complex Systems
IMPLEMENTATION
Visualization, Interface Design and Usability
READINESS
Internal Testing and Code Freeze
RELEASE
Final Presentations ("Rollout")

VISUALIZATION, INTERFACE DESIGN & USABILITY

OBJECTIVES

1. To examine issues that may be encountered when visualization features are added.
2. To introduce common interface design principles.
3. To understand how to enhance software usability.

VISUALIZATION

Technology Basics

- Super VGA was first defined in 1989. In that first version, it called for a resolution of 800 x 600 4-bit pixels.
- Display resolutions and color bit-depth are determined by the video card, not monitor.
- Common color bit-depths: "bitmap", "grayscale", "256 colors" aka "8-bit", "Thousands" aka "16-bit", "Millions" aka "24-bit" aka "RGB".
- "Raster graphics" aka "bitmapped graphics" is rendered on a matrix of pixels, typically using x-y coordinates. Think "Photoshop."
- "Vector graphics" involve the positioning and sizing of objects such as lines, shapes and curves. Objects are easily scalable and moved, but keeping track of the objects is challenging. Think "Illustrator."

VISUALIZATION

Selected Issues

1. Clarity, precision and accuracy.
   - Does the full set of data get displayed or is there obscured information?
   - Do you need to overlay precision information? e.g., σ^2
   - Does the translation to the selected coordinate system have an impact on accuracy?
2. Data distortion.
   - Poor selection of axes scales can lead to distortion.
   - Coordinate rotation and tilting can also cause distortion.
   - Use of logarithmic scales.

VISUALIZATION

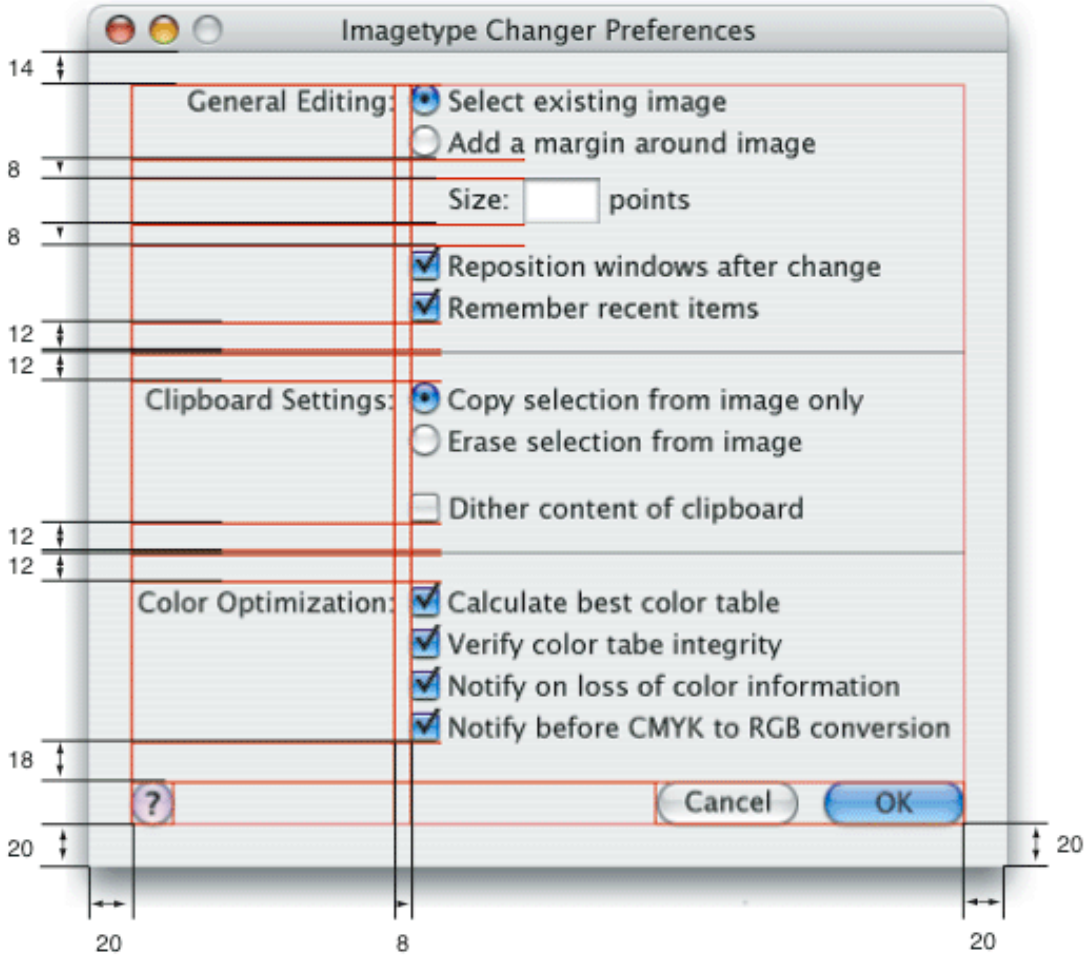
Advanced Topics

1. Visualization for data input.
   - What kind of graphics (icons, arrows, callouts) can help during data input?
2. Dynamic visualization during processing.
   - What kind of visual feedback (progress bar, spinning cursor) could a user get while data is being processed by the model?
3. Data mining.
   - Analysis of large volumes of relatively simple data to extract important trends and new, higher level information.
   - Is all the model output data typically generated during a modeling exercise amenable to data mining? Would it be a worthwhile activity?

INTERFACE DESIGN

1. UI Guidelines.
2. Passive vs Dynamic Interface
3. Collaborative Environments.

UI Guidelines



Passive vs Dynamic Interfaces: "Dialogs"

- **Modeless.** Enables users to change settings in a dialog while still interacting with document windows; the Find window in many word processors is an example of a modeless dialog. Modeless dialogs have title bar controls (close, minimize, and zoom buttons).

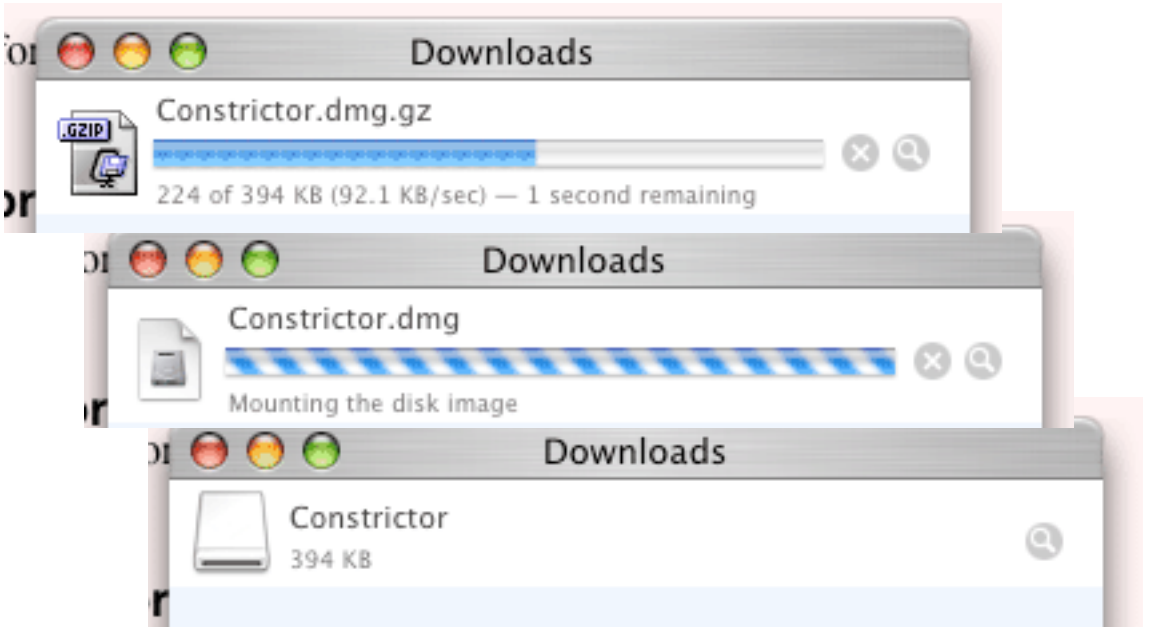
- **Document modal.** Prevents the user from doing anything else within a particular document. The user can switch to other documents in the application and to other applications.

- **Application modal.** Prevents the user from doing anything else within the owner application; the user can switch to another application. Most application-modal dialogs do not have the standard title bar controls (close, minimize, zoom); the user dismisses these dialogs by clicking a push button, such as OK or Cancel.

Passive vs Dynamic Interfaces: Cursors and more…

Cursors: Fast, reaction-type feedback. Little space needed.

Progress bars: For slower (>10 s) feedback. Provides estimated wait time. Compare with the spinning wait cursor.



Language: Use persuasive language.

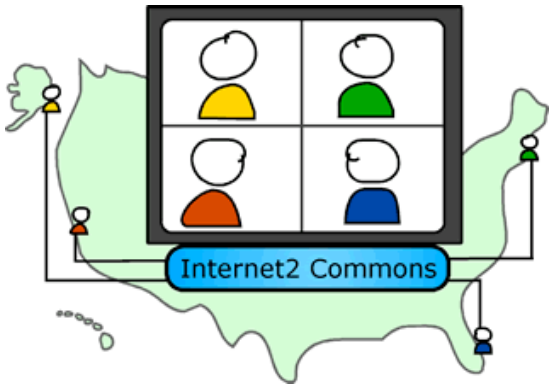
Collaborative Environments

Change history An overview of who has done what to where.

Version control How do you implement version control for multiple-concurrent efforts?

Shared document control Making sure there is just one "good" version being used.

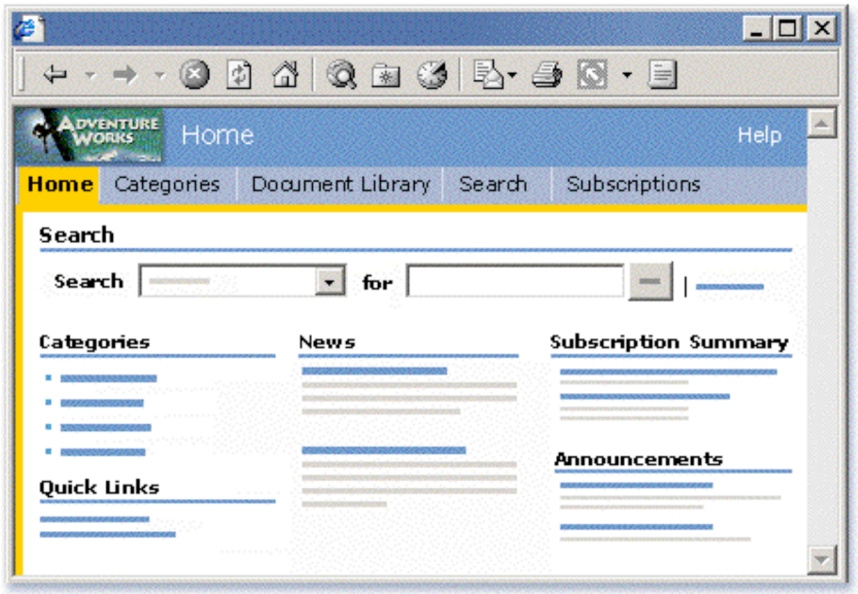
Concurrent editing Enabling work in overlapping time spans, and merging to form final products.



Collaborative Environments

Support and training issues Need to identify support and training leaders, and build appropriate resources.

Integrated communications Need unified interface for users, developers, support, and trainers to interact.

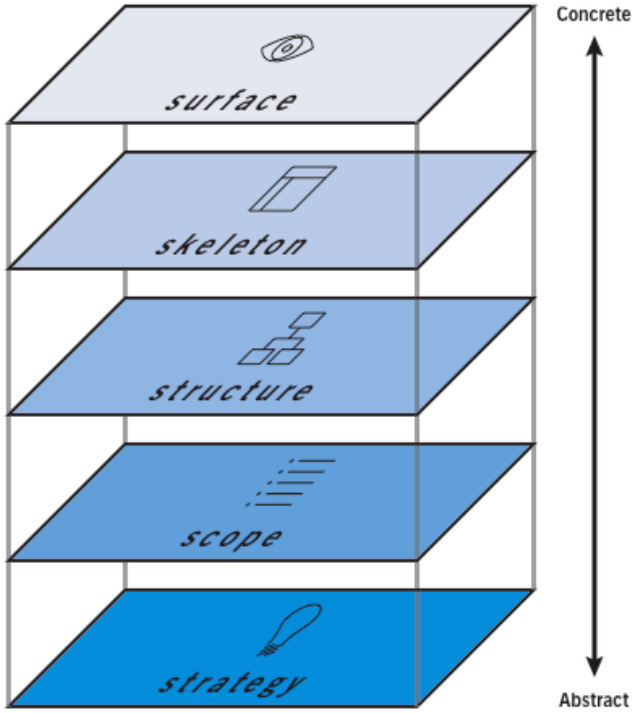


Collaborative Environments

Centralized vs Distributed Computing

Centralized computing facilitates easier management of resources. Distributed computing is scalable and has redundancy built in (a good thing!).

USABILITY



1. Information Architecture and Design.
2. Interaction Design - Error Handling.
3. Surface Design - the Follow the Eye principle.
4. Embedded and External E-Support

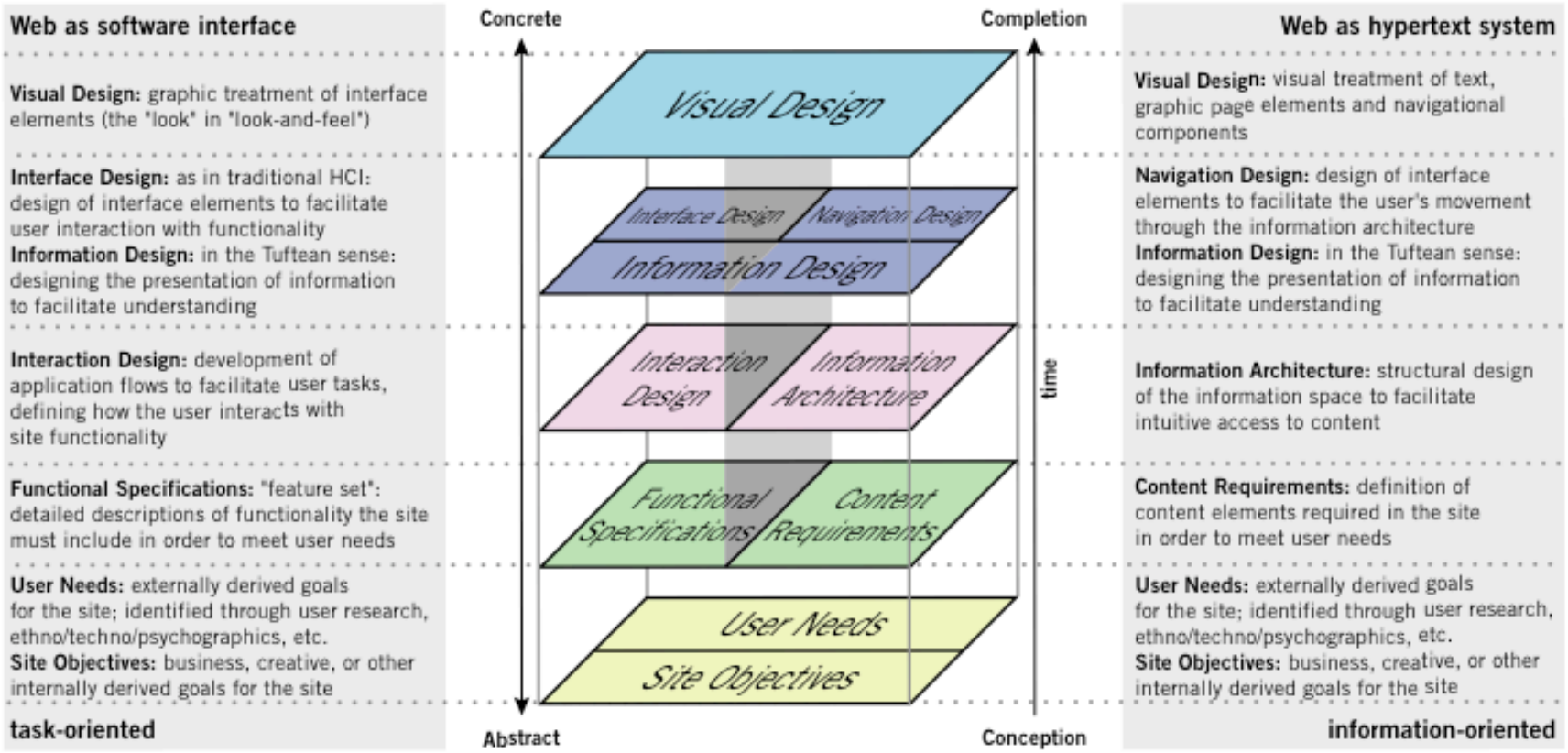
Jesse James Garrett
THE ELEMENTS OF USER EXPERIENCE
IN BOOKSTORES EVERYWHERE
OCTOBER 2002

The Elements of User Experience

Jesse James Garrett
jjg@jjg.net

30 March 2000

A basic duality: The Web was originally conceived as a hypertextual information space; but the development of increasingly sophisticated front- and back-end technologies has fostered its use as a remote software interface. This dual nature has led to much confusion, as user experience practitioners have attempted to adapt their terminology to cases beyond the scope of its original application. The goal of this document is to define some of these terms within their appropriate contexts, and to clarify the underlying relationships among these various elements.



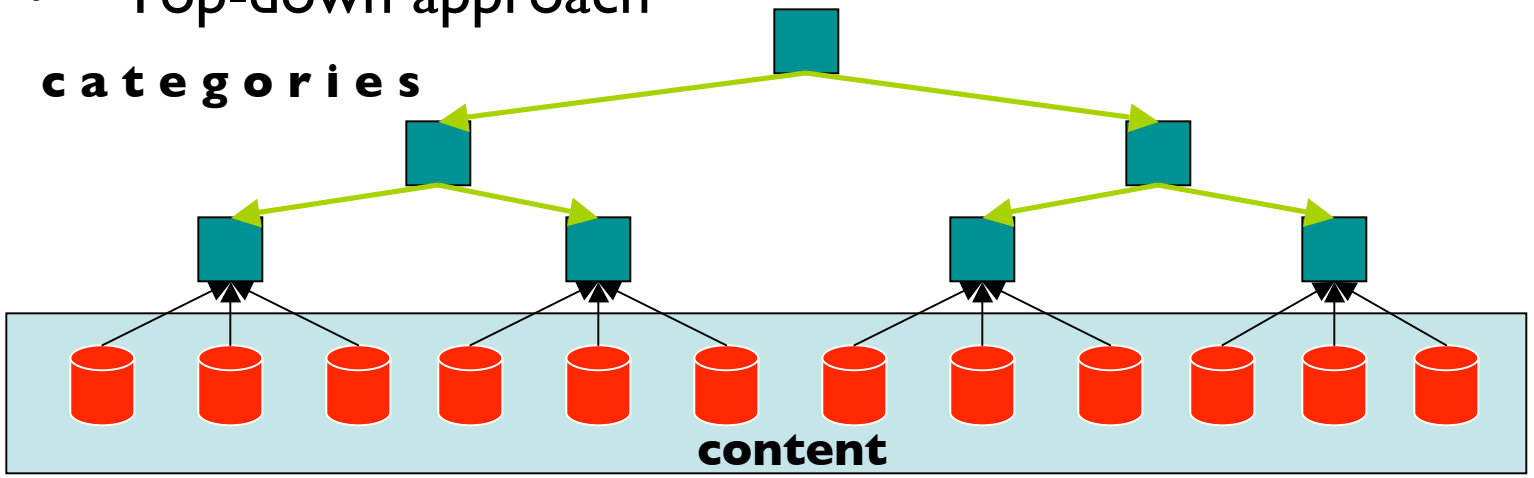
This picture is incomplete: The model outlined here does not account for secondary considerations (such as those arising during technical or content development) that may influence decisions during user experience development. Also, this model does not describe a development process, nor does it define roles within a user experience development team. Rather, it seeks to define the key considerations that go into the development of user experience on the Web today.

Information Architecture and Design.

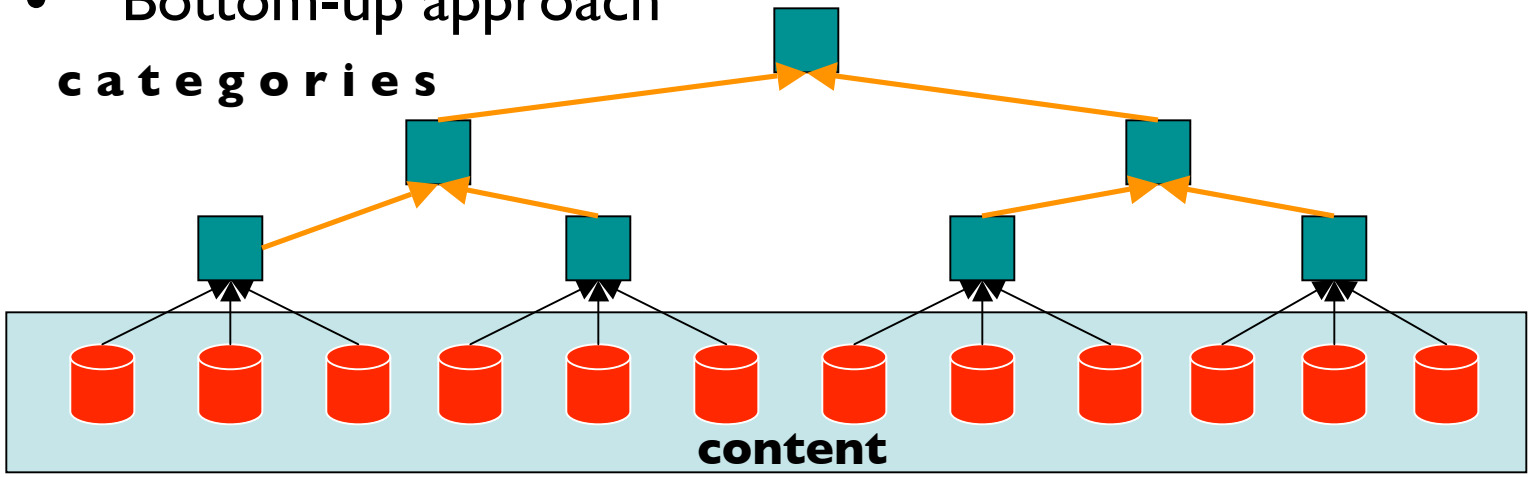
- IA: The organization of information, in terms of navigation, layout and search functionality. The goal is to enable users to find the information they are seeking in a clear manner.
- ID: Information design is the design of information graphics, and more generally the design of visual displays of data. Its most important component is structuring information so it will be as learnable or useful as possible.
- Long-held and essential concepts of library science, now applied to web and other interactive usage models.

Information Architecture and Design.

- Top-down approach



- Bottom-up approach



USABILITY

Information Architecture and Design.

Layouts

- Sequential

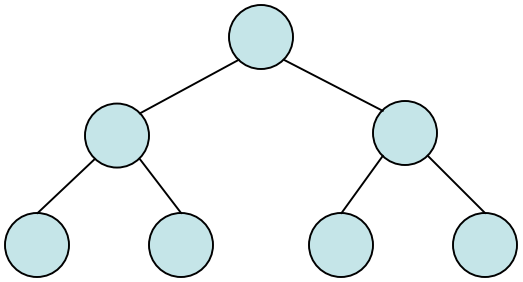
THERMO.DAT

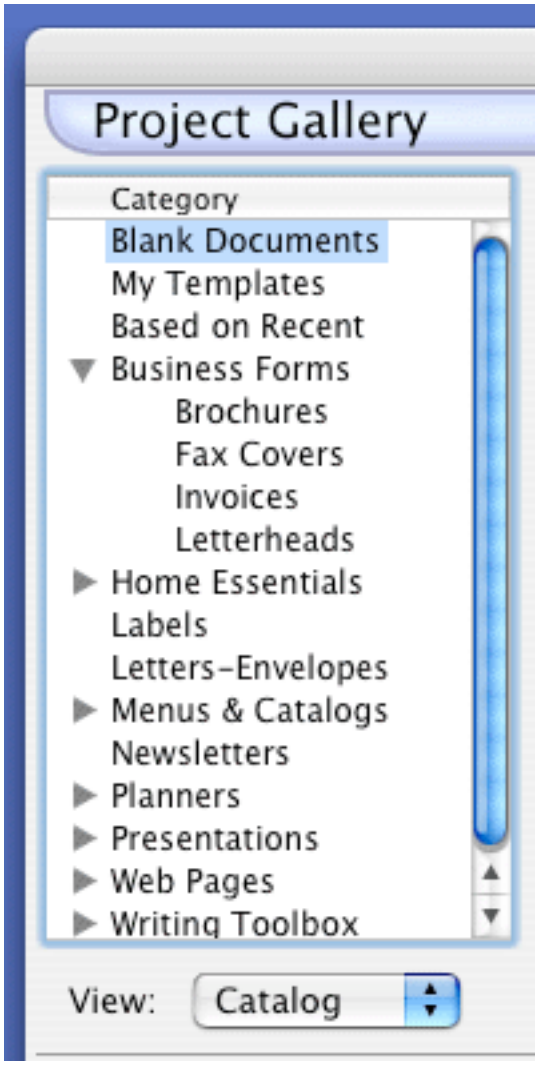
```
 359
1000     3.22     1    1 101    1    0    0    0    0       3.5460
1010    11.43     1    1  50    1  101    1    0    0      -0.8710
1020     2.31     1    1 102    1    0    0    0    0       1.4700
1030     0.94     1    1 104    1    0    0    0    0       3.7980
1060    20.96     1    1  50    2  109    1    0    0      -1.1200
1070     6.46     1    1 109    1    0    0    0    0       3.1000
1080    15.08     1    1  50    1  109    1    0    0      -0.2300
1350   -12.85     1    1  50   -1    0    0    0    0      15.8380
1360     2.98     2    1 101    1    0    0    0    0       2.0200
1370    11.40     2    1  50    1  101    1    0    0      -2.4270
1380     2.25     2    1 102    1    0    0    0    0       1.4000
1385    -1.00     2    1 103    1    0    0    0    0       0.0000
1390     1.82     2    1 104    1    0    0    0    0       4.6740
1420     6.59     2    1 109    1    0    0    0    0       3.1000
1430    21.07     2    1 109    1   50    2    0    0      -1.1200
1440    15.22     2    1  50    1  109    1    0    0      -0.2300
1740   -11.44     2    1  50   -1    0    0    0    0      15.4190
1750    14.10     3    1  50    1  109    1    0    0       0.0000
1760     6.00     3    1 109    1    0    0    0    0       0.0000
```

Information Architecture and Design.

Layouts

- Hierarchical

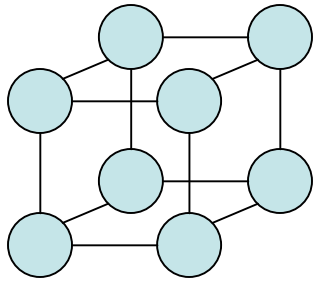




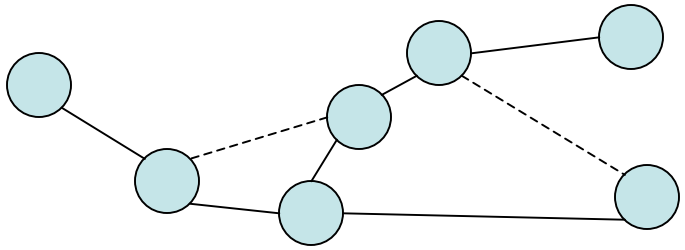
Information Architecture and Design.

Layouts

- Matrix



- Organic



Interaction Design

- Interaction design is concerned with describing possible user behavior and defining how the system will accommodate and respond to that behavior.

Interaction Design - Error Handling

DEALING WITH USER ERROR

PREVENTION

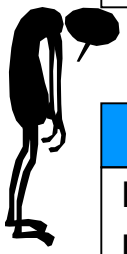
Design system so that errors are impossible.
Not always possible.
Not easy to accomplish.

CORRECTION

Design system so that errors are difficult to make.

Help the user identify the problem and fix it.

If possible, fix problem on user's behalf (can be time-wasting and annoying!)



RECOVERY

Helpful error messages after the error happens.

Provide way for user to recover from error, such as "undo."

Otherwise, guess that an error has occurred and ask user to confirm action.

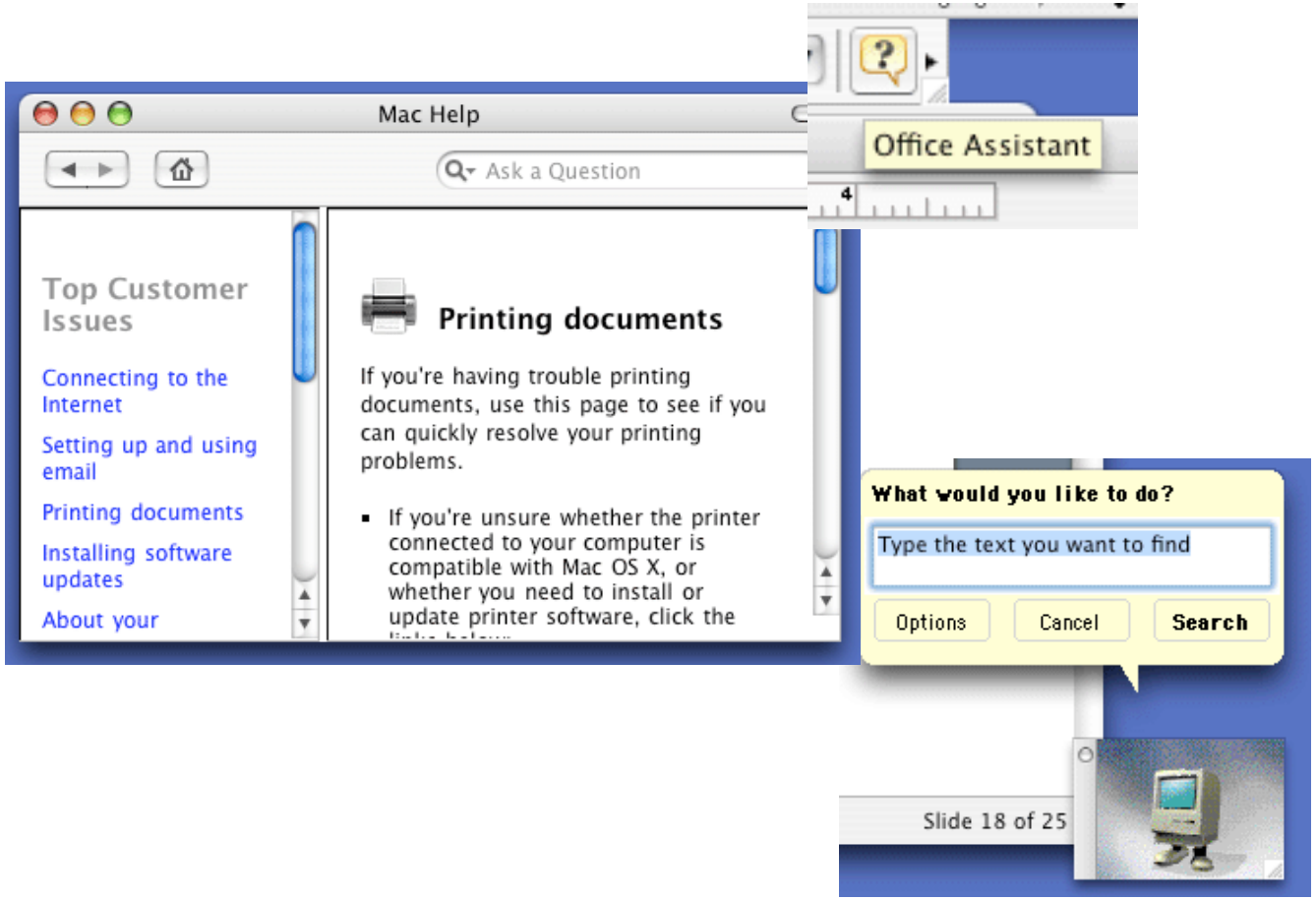
Surface Design - the "Follow the Eye" principle

- Where does the eye go first? What element of the design initially draws the user's attention?
- Does the eye-catching element reveal the primary objective of the interface?
- Smooth flow. Avoid having eyes bounce around various elements, and giving cluttered impression.
- Guided tour. The initial eye scan should "map" all the possibilities and show how to fulfill goals.
- Use contrast to draw attention.
- Use uniformity to avoid confusion.
- Use a grid-based layout, if effective, for element placement.
- Ease eye movement by making related interfaces consistent in design. For example, don't use different sizes for the OK button.

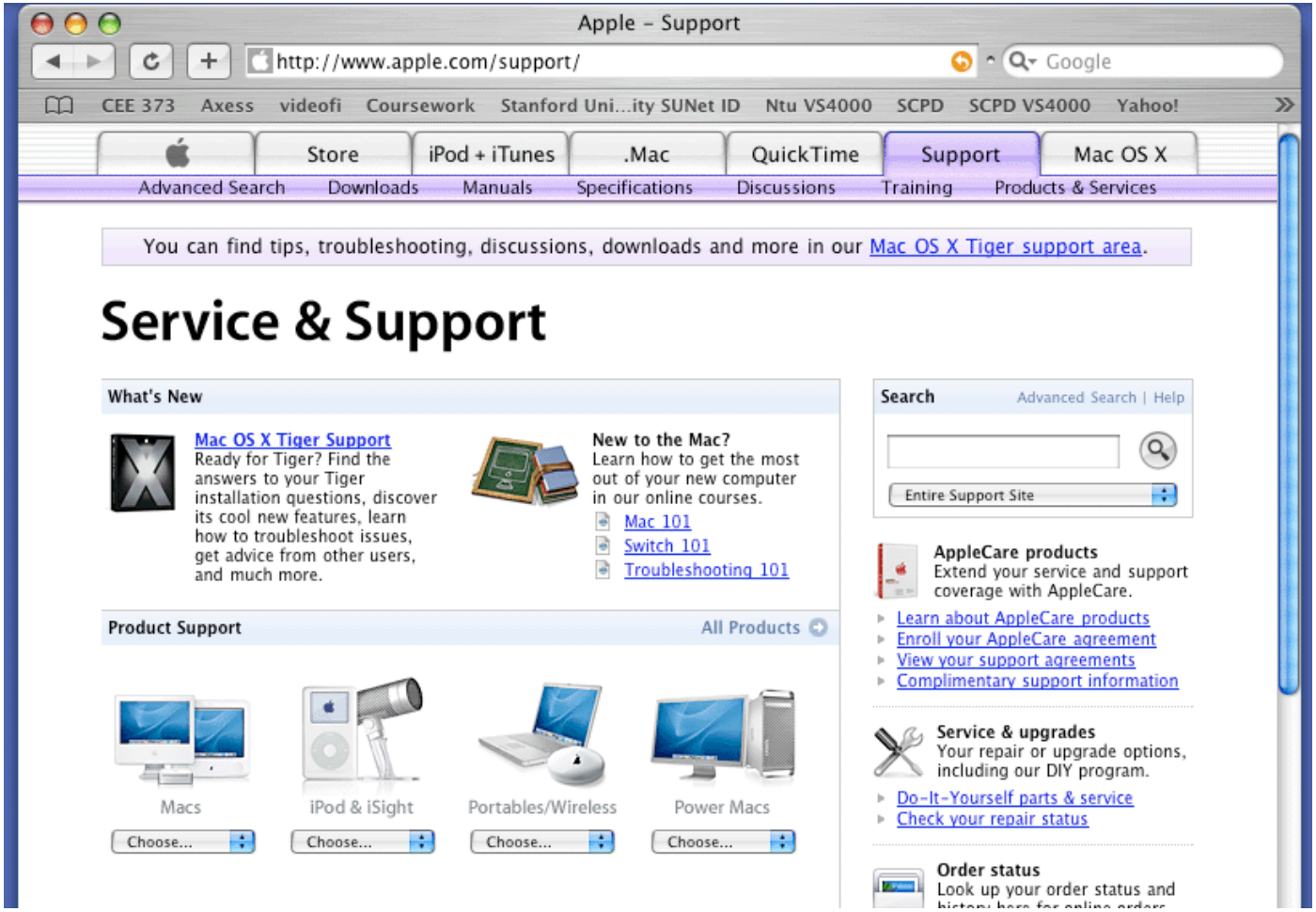
Embedded and External eSupport.

- eSupport employs technology to provide on-demand access to help information.
- The quality of eSupport principally relies on:
  - the ability of the support engineer to anticipate the questions that most users will have,
  - the ability to write understandable help articles,
  - making the information accessible.
- eSupport can be pre-emptive as well as responsive.

USABILITY


Mac Help
Ask a Question
Top Customer Issues
Connecting to the Internet
Setting up and using email
Printing documents
Installing software updates
About your
Printing documents
If you're having trouble printing documents, use this page to see if you can quickly resolve your printing problems.
If you're unsure whether the printer connected to your computer is compatible with Mac OS X, or whether you need to install or update printer software, click the
Office Assistant
What would you like to do?
Type the text you want to find
Options
Cancel
Search
Slide 18 of 25

USABILITY


Apple – Support
http://www.apple.com/support/
Google
CEE 373 Axess videofi Coursework Stanford Uni...ity SUNet ID Ntu VS4000 SCPD SCPD VS4000 Yahoo!
Store iPod + iTunes .Mac QuickTime Support Mac OS X
Advanced Search Downloads Manuals Specifications Discussions Training Products & Services
You can find tips, troubleshooting, discussions, downloads and more in our Mac OS X Tiger support area.
Service & Support
What's New
Mac OS X Tiger Support
Ready for Tiger? Find the answers to your Tiger installation questions, discover its cool new features, learn how to troubleshoot issues, get advice from other users, and much more.
New to the Mac?
Learn how to get the most out of your new computer in our online courses.
Mac 101
Switch 101
Troubleshooting 101
Product Support
All Products
Macs
iPod & iSight
Portables/Wireless
Power Macs
Choose...
Search
Advanced Search | Help
Entire Support Site
AppleCare products
Extend your service and support coverage with AppleCare.
Learn about AppleCare products
Enroll your AppleCare agreement
View your support agreements
Complimentary support information
Service & upgrades
Your repair or upgrade options, including our DIY program.
Do-It-Yourself parts & service
Check your repair status
Order status
Look up your order status and

VISUALIZATION, INTERFACE DESIGN & USABILITY

Summary

- Visualization
- Interface Design
- Usability

Interesting stories behind...

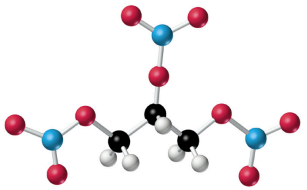
INVENTIONS & DISCOVERIES

VIAGRA® (sildenafil citrate) tablets

Teflon®

T-FAL

weber



INVENTIONS & DISCOVERIES

Interesting stories behind...

VIAGRA®
(sildenafil citrate) tablets

In 1991, inventors Andrew Bell, Dr David Brown and Dr Nicholas Terrett (also Pfizer employees at Kent) discovered that chemical compounds belonging to the pyrazolopyrimidinone class were useful in treating heart problems such as angina. Terrett was named in the 1991 British patent for Sildenafil (tradenamed Viagra) as a heart medicine, and some experts consider him as the father of Viagra….By 1994, Nicholas Terrett and colleague Peter Ellis discovered during the trial studies of Sildenafil as a heart medicine that it also increased blood flow to the…

INVENTIONS & DISCOVERIES

Interesting stories behind...

Plunkett and his technician assistant, Jack Rebok, were testing the chemical reactions of the refrigerant gas tetrafluoroethylene (TFE). One pressurized cylinder of the gas, which they themselves had filled earlier, failed to discharge when its valve was opened. They set the cylinder aside, but Rebok later noticed it was too heavy to be empty, and suggested they cut it open to see what had gone wrong. Plunkett agreed, despite the risk of an explosion; and they discovered that the gas inside the cylinder had inexplicably solidified into a white powder. Intrigued, Plunkett put his scheduled work aside and began to test the properties of this substance. It was much more lubricant than other slippery solids, like graphite; and in addition, it proved inert to virtually all other chemicals and had an extremely high melting point.

INVENTIONS & DISCOVERIES

Interesting stories behind...

T-FAL

Grégoire, an avid fisherman, decided to coat his fishing gear with Teflon to prevent tangles. His wife, Colette, had another idea: Why not coat her cooking pans? Grégoire agreed to try it, and he was successful enough to be granted a patent in 1954. The Grégoires were so happy with the results that they set up a business in their home. Starting around 1955, Marc coated pans in their kitchen and Colette peddled them on the street. French cooks, despite their customary reverence for tradition, snapped them up. Encouraged by this reception, the Grégoires formed the Tefal Corporation in May 1956 and opened a factory.

INVENTIONS & DISCOVERIES

Interesting stories behind...

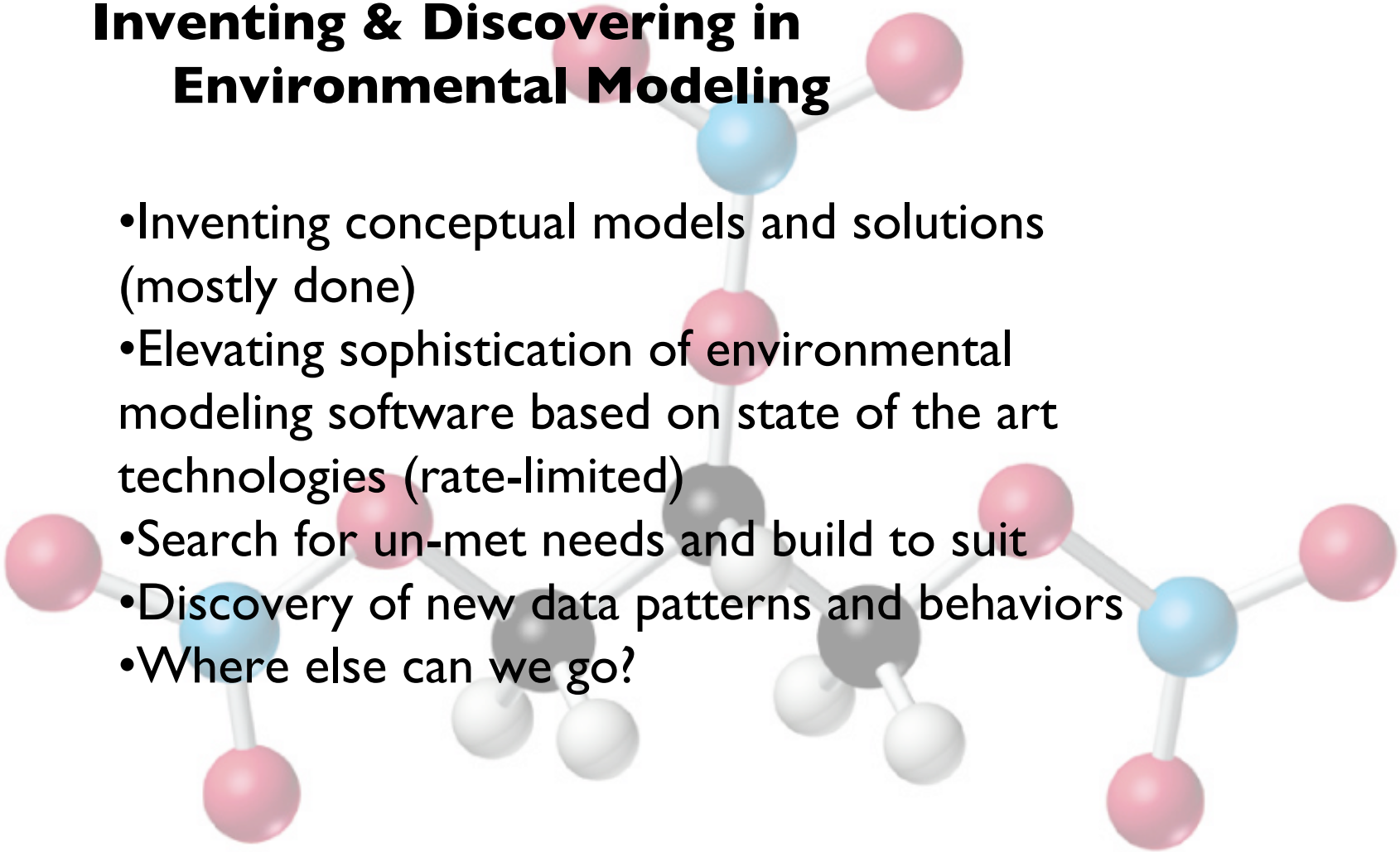
George worked at Weber Brothers Metal Works outside Chicago, welding large metal spheres together to make buoys. It was in these very spheres that his idea took shape. He knew a rounded cooking bowl with a lid was the key to success. He added three legs to the bottom, a handle to the top, and took the oddity home.

INVENTIONS & DISCOVERIES

Interesting stories behind...

- The secret of **nitroglycerin** emerged at last in the 1970s, when researchers realized that it works by reacting in the body to form a messenger molecule called **nitric oxide**, or NO.
- nitric oxide was regarded as an environmental pollutant and little else: at best a chemically reactive nuisance, at worst a poison. In the exhaust fumes of cars it reacted readily with oxygen to produce smog, increasing the risk of asthma. When discharged into the atmosphere from power station chimneys it contributed to the ecological damage from acid rain…The notion that such a noxious little molecule should also hold a key to a healthy body and mind was counter-intuitive, and is still disconcerting to some people.
- The molecule governs blood pressure, through a recently recognised process that contradicts textbook wisdom. It causes penile erections by dilating blood vessels, and controls the action of almost every orifice from swallowing to defecation. The immune system uses nitric oxide in fighting viral, bacterial and parasitic infections, and tumours. Nitric oxide transmits messages between nerve cells and is associated with the processes of learning, memory, sleeping, feeling pain, and, probably, depression. It is a mediator in inflammation and rheumatism.
- However, in the very first experiment designed for this new study in May 1978, an accidental finding as a result of a technician's error completely changed the course of research in my laboratory. The accidental finding was that on the preparation of rabbit aorta being used in the experiment, the muscarinic agents acetylcholine and carbachol induced relaxation rather than the expected contraction. Why this accidental finding was so exciting, how it led to our discovery of the endothelium-derived relaxing factor (EDRF), and how that factor was eventually identified as nitric oxide…

Inventing & Discovering in Environmental Modeling



- Inventing conceptual models and solutions (mostly done)
- Elevating sophistication of environmental modeling software based on state of the art technologies (rate-limited)
- Search for un-met needs and build to suit
- Discovery of new data patterns and behaviors
- Where else can we go?