User-centered design

DESIGN FOR USER EXPERIENCE
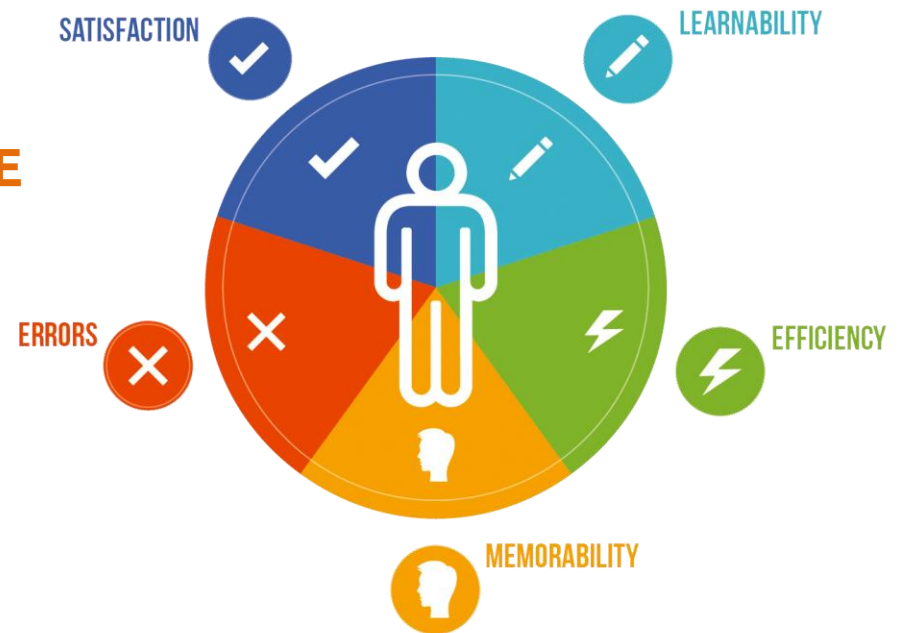
User-centered design

- Definition
- Human Computer Interaction
- User experience
- Usability and accessibility
- The design process
- Information architecture
- Evaluation

What the customer really needed

How the Program-mer wrote it

User-centered design

- A philosophy of product development
- The product is not an end in itself: it is a means toward the end of providing a good experience for the user
  - Suite of methods emphasizing understanding people rather than technology
- Common mistakes
  - Design by default: "We should do whatever is easiest to implement."
  - Design by mimicry: "If it's good enough for Amazon, it's good enough for us."
 - Design by fiat: "Because I said so."

User experience

We have a double-edged relationship with the products and services we use. They empower us and frustrate us; they simplify and complicate our lives; they separate us and bring us closer together.

But even though we interact with countless products and services every day, we easily forget that they are made by people, and that someone, somewhere should get the credit when they work well for us—or get the blame when they don't.
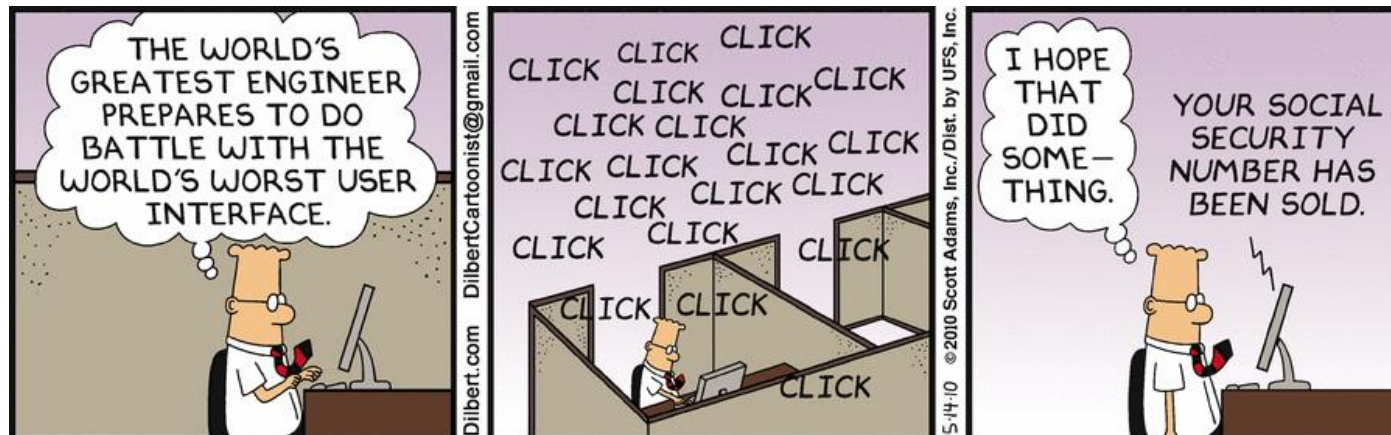
J. J. Garrett

User experience
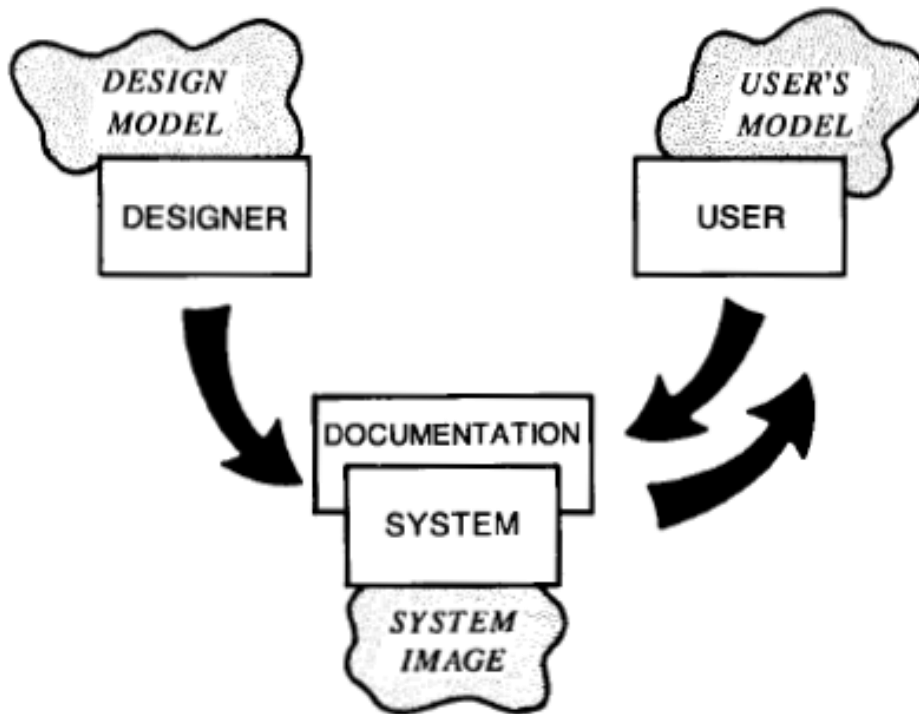
- Design model
  - conceptual model on which the design of the system is based
- System image
  - all aspects of the system that the user experiences
- User's model
  - model that the user develops on the basis of experience with the system

User experience

- User experience is about how a product or a service works on the outside, where a person comes into contact with it

- When most people think about product design they think of:
  - Aesthetic appeal: a well-designed product is one that looks good to the eye and feels good to the touch
  - Functionalities: a well-designed product is one that does what it promises to do (and a badly designed product is one that somehow doesn't, e.g. a printer that constantly jams)
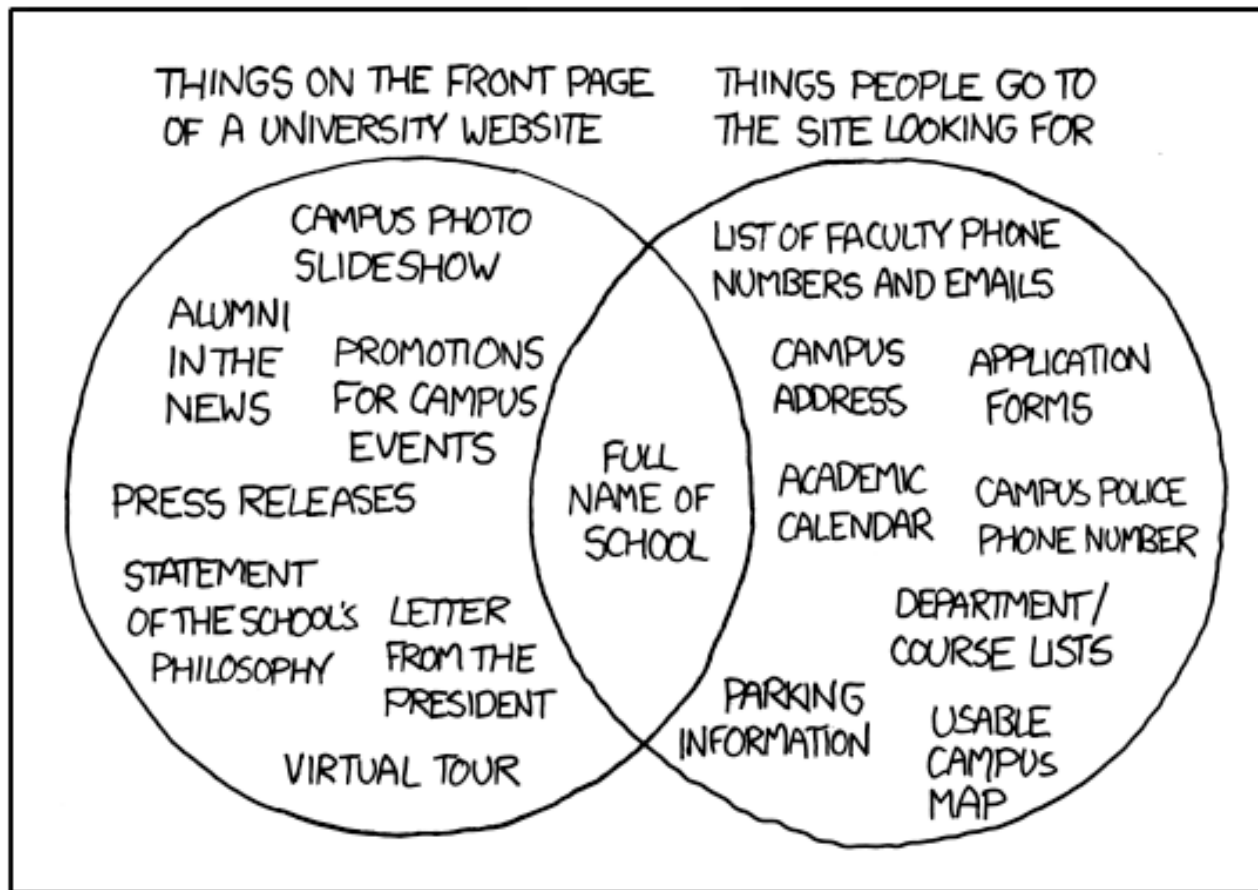
User experience

- User experience design deals also with questions of context
  - Aesthetic design makes sure the button on the coffeemaker is an appealing shape and texture
  - Functional design makes sure it triggers the appropriate action on the device
  - User experience design makes sure the aesthetic and functional aspects of the button work in the context of the rest of the product, asking questions like, "Is the button too small for such an important function?"
  - User experience design also makes sure the button works in the context of what the user is trying to accomplish, asking questions like, "Is the button in the right place relative to the other controls the user would be using at the same time?"
- The more complex a product is, the more difficult it becomes to identify exactly how to deliver a successful experience to the user

User experience and the Web

- Web sites are complicated, and something funny happens when people have trouble using complicated pieces of technology: they blame themselves

- Regardless of the type of site, in virtually every case, a Web site is a self-service product
  - There is no instruction manual to read beforehand, no training seminar to attend, no customer service representative to help guide the user through the site
  - There is only the user, facing the site alone with only her wits and personal experience to guide her

- Besides, to gain market share against these first-movers, competitors often add more and more content and functionality in hopes of drawing in new customers

User experience and the Web: an example

THINGS ON THE FRONT PAGE OF A UNIVERSITY WEBSITE

THINGS PEOPLE GO TO THE SITE LOOKING FOR

CAMPUS PHOTO SLIDESHOW

ALUMNI IN THE NEWS

PROMOTIONS FOR CAMPUS EVENTS

PRESS RELEASES

STATEMENT OF THE SCHOOL'S PHILOSOPHY

LETTER FROM THE PRESIDENT

VIRTUAL TOUR

FULL NAME OF SCHOOL

LIST OF FACULTY PHONE NUMBERS AND EMAILS

CAMPUS ADDRESS

APPLICATION FORMS

ACADEMIC CALENDAR

CAMPUS POLICE PHONE NUMBER

DEPARTMENT/ COURSE LISTS

PARKING INFORMATION

USABLE CAMPUS MAP

http://xkcd.com/773/

User experience design

- The user experience design process is all about ensuring that no aspect of the user's experience with your product happens without your conscious, explicit intent
  - This means taking into account every possibility of every action the user is likely to take and understanding the user's expectations at every step of the way through that process
- Everything the user experiences should be the result of a conscious decision on your part
  - Realistically, you might have to make a compromise here and there because of the time or expense involved in creating a better solution …
- … But a user-centered design process ensures that those compromises don't happen by accident
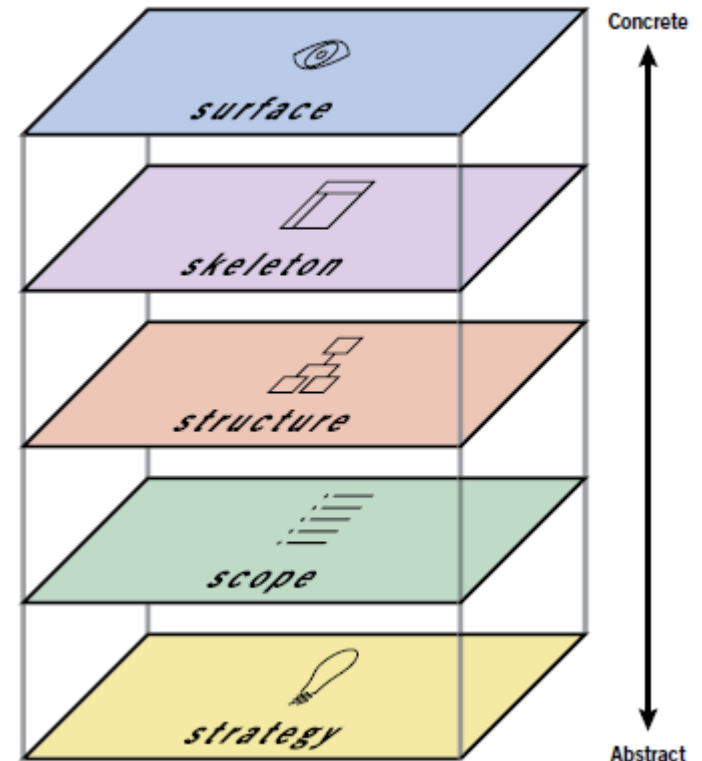
User experience

- User experience over time
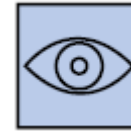

http://experiencedesign.m-iti.org/
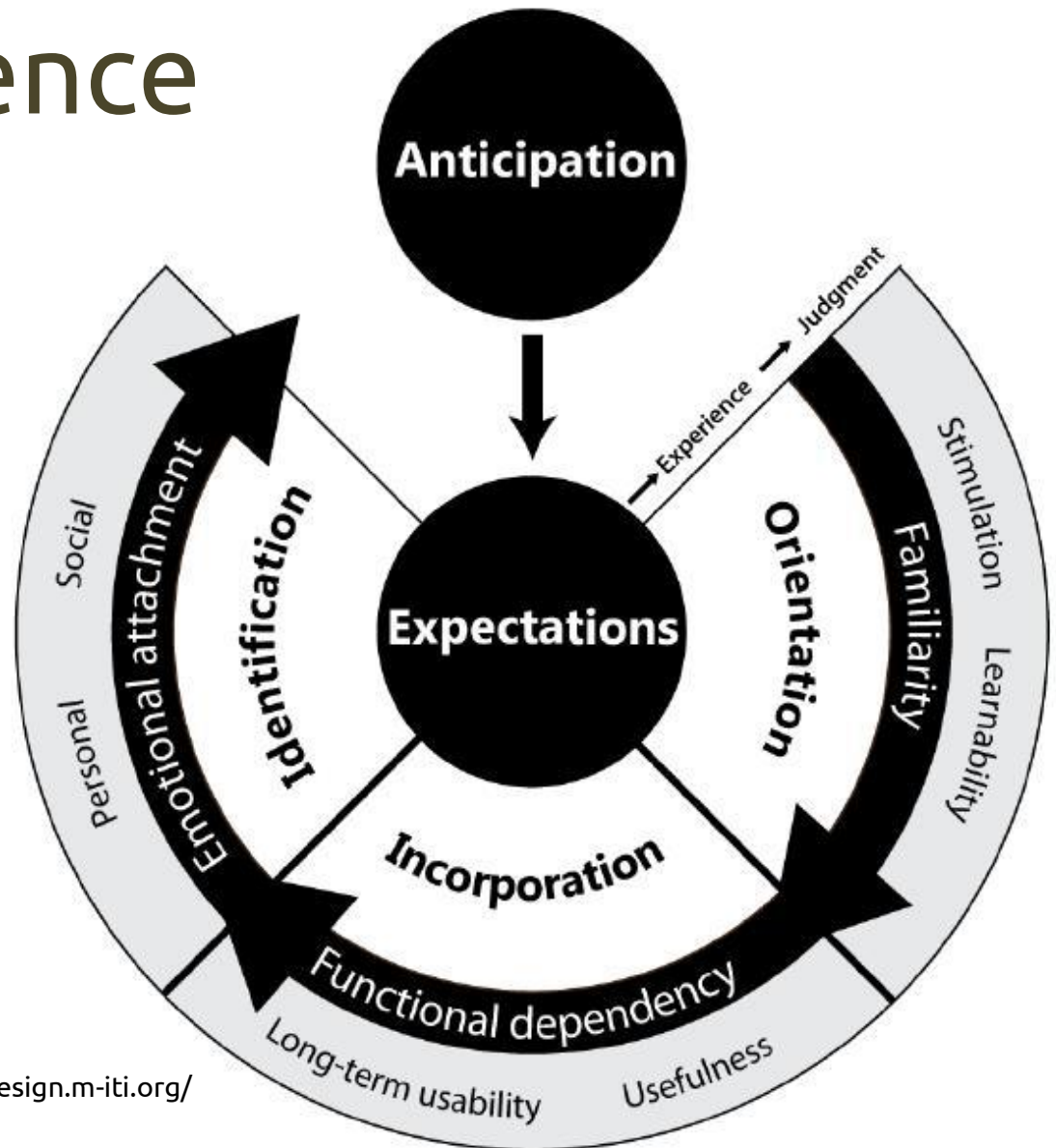
The five plans of web sites user experience

- Conceptual framework user experience problems and tools to solve them
- Each plane is dependent on the planes below

J. J. Garett

The surface plane

- What will the finished product look like?
  - On the surface you see a series of web pages, made up of images and text
  - Some of these images are things you can click on, performing some sort of function (e.g. taking you to a shopping cart)
  - Some of these images are just illustrations (e.g. a photograph of a product for sale or the logo of the site itself)
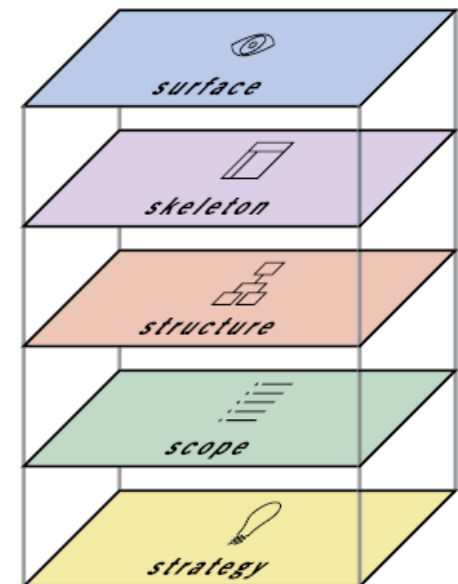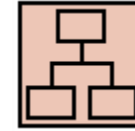
The skeleton plane
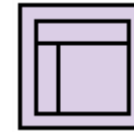
- What components will enable people to use the site?
  - Beneath the surface is the skeleton of the site: the placement of buttons, controls, photos, and blocks of text
  - The skeleton is designed to optimize the arrangement of these elements for maximum effect and efficiency…
  - E.g. … so that you remember the logo and can find that shopping cart button when you need it
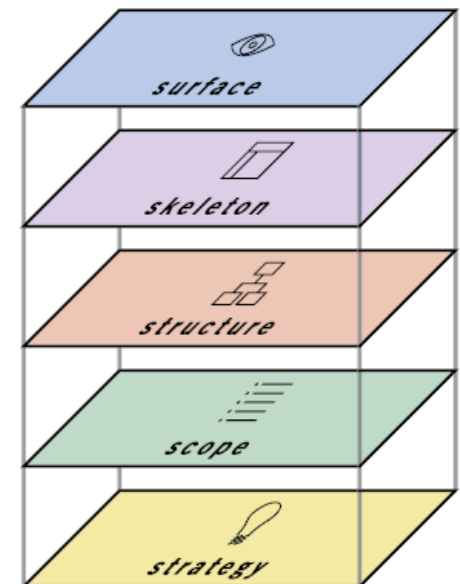
The structure plane

- How will the pieces of the sites fit together and behave?
    - The skeleton is a concrete expression of the more abstract structure of the site
    - The skeleton might define the placement of the interface elements on our checkout page, the structure would define how users got to that page and where they could go when they were finished there
    - The skeleton might define the arrangement of navigational elements allowing the users to browse categories of products, the structure would define what those categories are
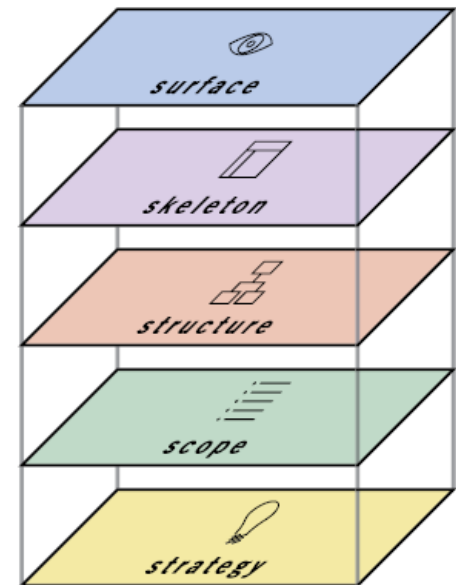
The scope plane

- What feature will the site need to include?
  - The structure defines the way in which the various features and functions of the site fit together
  - What those features and functions are constitutes the scope of the site
  - For example, some commerce sites offer a feature that enables users to save previously used shipping addresses so they can be used again: whether that feature—or any feature—is included on a site is a question of scope
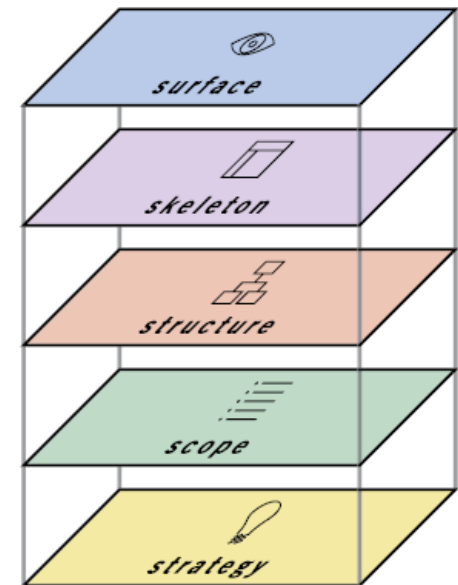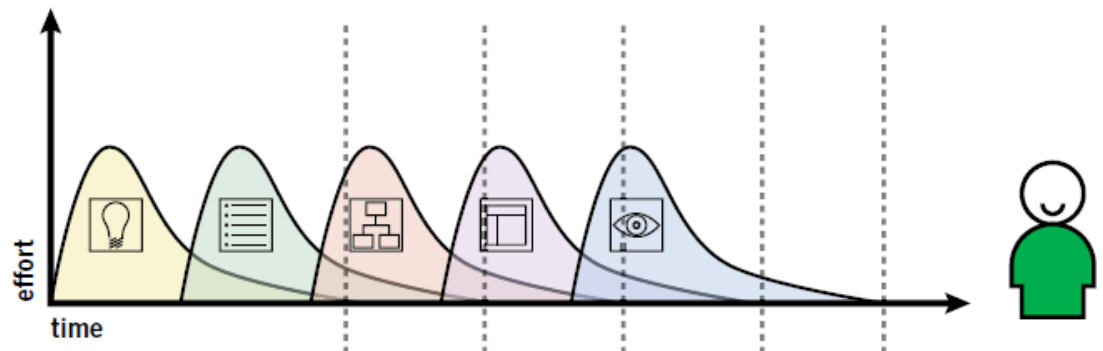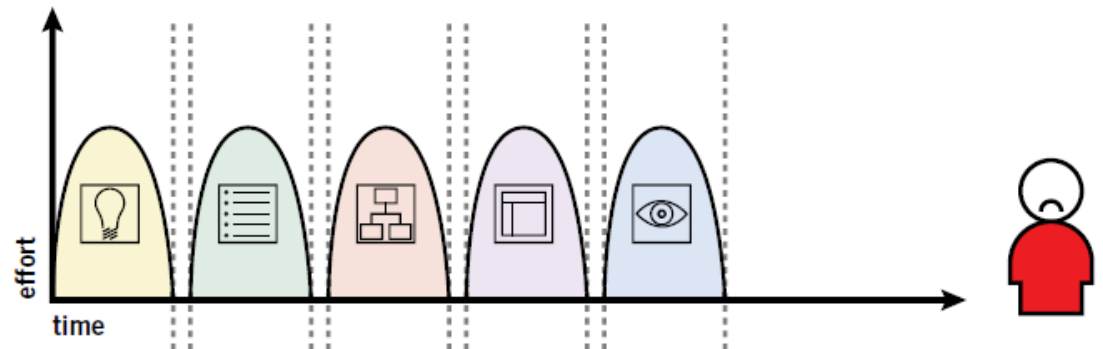
The strategy plane

- What do we want to get out of the site?
- What do our users want?
  - The scope is fundamentally determined by the strategy of the site
  - This strategy incorporates not only what the people running the site want to get out of it but what the users want to get out of the site as well
  - E.g., users want to buy products, and we want to sell them
  - Other objective (such as the role that advertising or content produced by the users plays in the business model, for example) might not be so easy to articulate
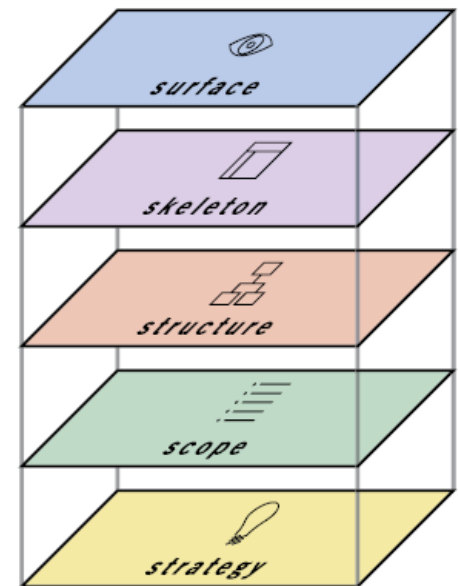
Building from botton to top
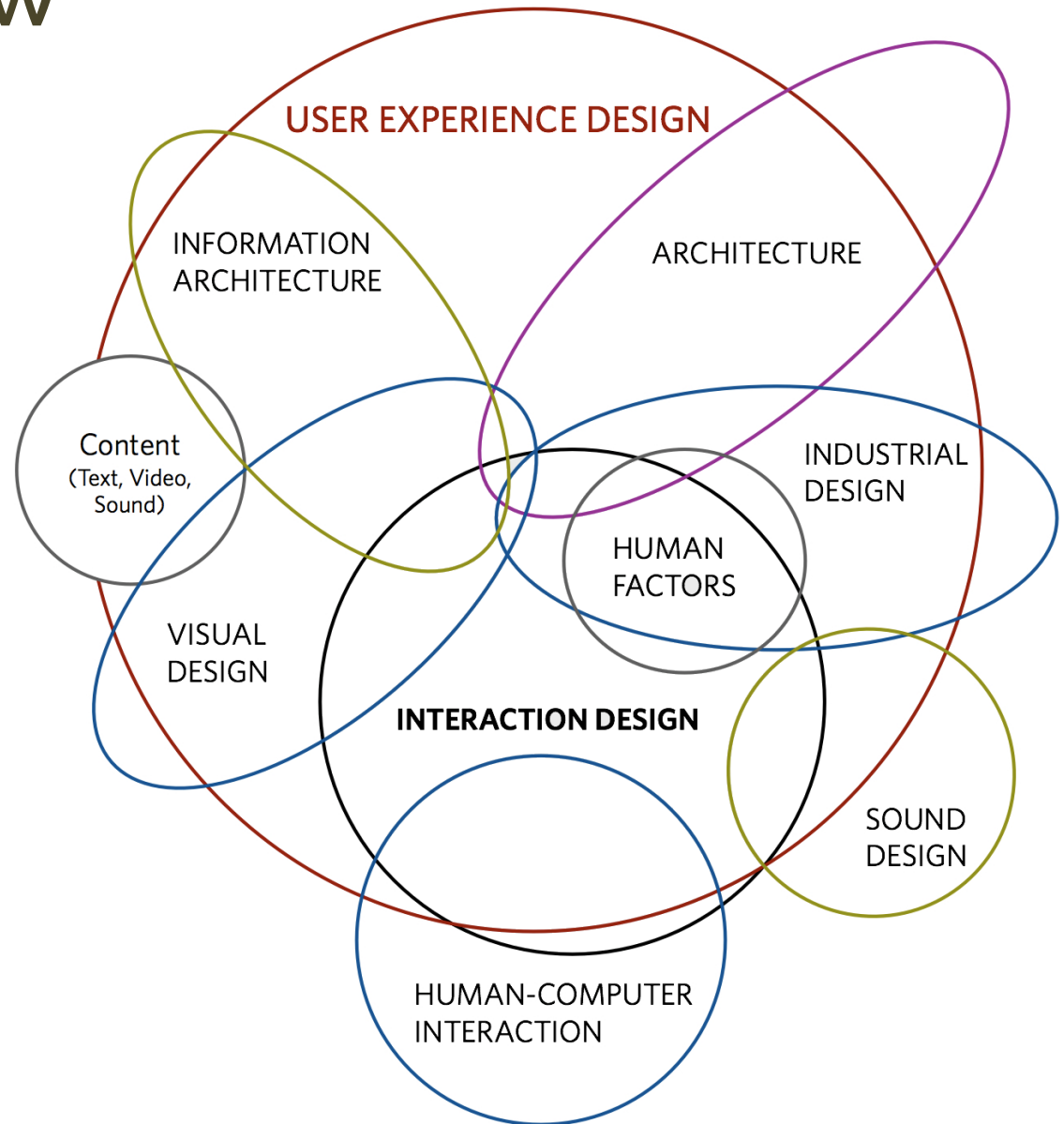
- Dependencies among the planes

User-centered design

THE DESIGN PROCESS OF A WEB SITE

POLITECNICO DI TORINO

e-Lite

An overview of design

USER EXPERIENCE DESIGN

INFORMATION ARCHITECTURE

ARCHITECTURE

Content (Text, Video, Sound)

INDUSTRIAL DESIGN

HUMAN FACTORS

VISUAL DESIGN

INTERACTION DESIGN

SOUND DESIGN

HUMAN-COMPUTER INTERACTION

The web duality

- When the web started, it was all about information
  - People could create documents, and they could link them to other documents
- Then technology advanced and new features were added to Web browsers and Web servers
  - Technology enabled Web sites not only to distribute information but to collect and manipulate it as well
- The Web became more interactive, responding to the input of users in ways that resembled and sometimes moved beyond traditional desktop applications
  - Advent of commercial interests on the Web: wide range of uses, such as electronic commerce, social media, financial services, …

The web duality

- When the Web user experience community started to form, its members spoke two different languages
  - One group saw every problem as an application design problem, and applied problem-solving approaches from the traditional desktop and mainframe software worlds
  - The other group saw the Web in terms of information distribution and retrieval, and applied problem-solving approaches from the traditional worlds of publishing, media, and information science
- Questions:
  - «where» is a Social Network Site?
  - «where» is YOUR Social Network Site?

The elements of user experience

- A framework for design
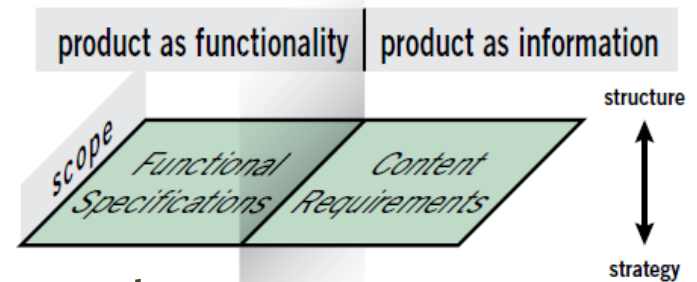- Implications for the design process
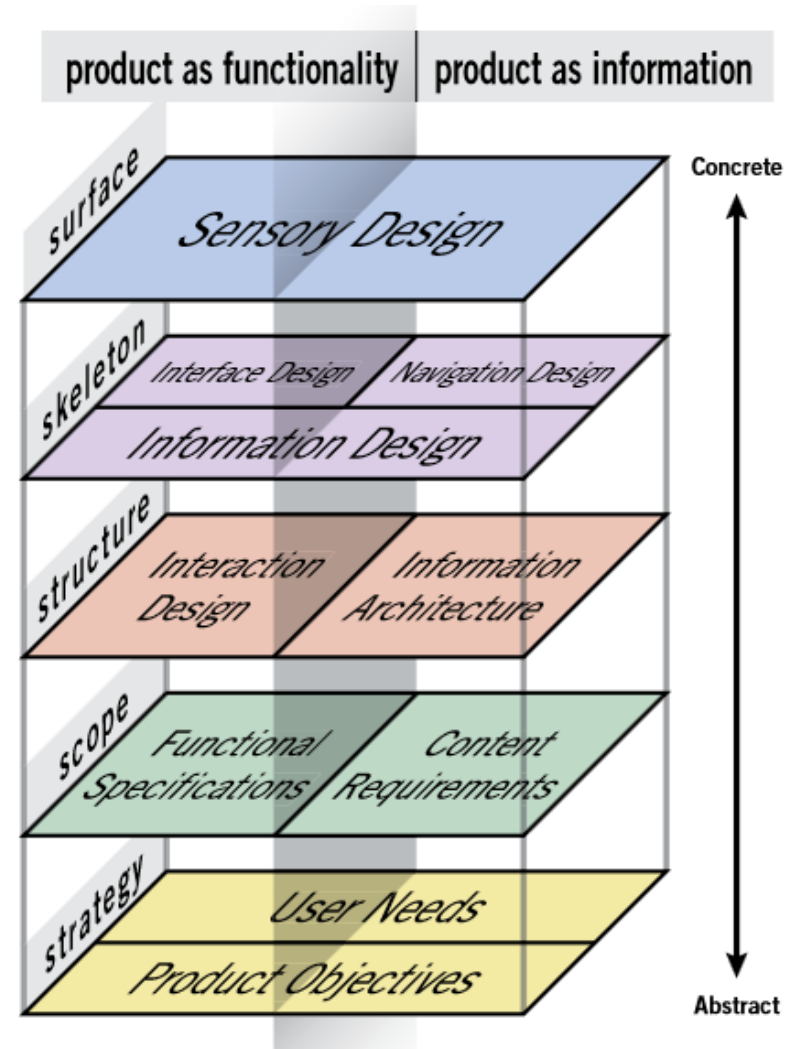
The strategy plane
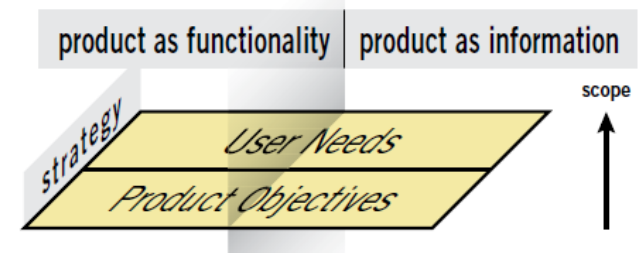
- The most common reason for the failure of a Web site is not technology, and it is not user experience
- Web sites most often fail because nobody bothered to answer two very basic questions:
  – What do we want to get out of this product?
  – What do our users want to get out of it?
- Answer should be explicit, grounded and well documented
- Product (site) objectives
  – Come from inside the organization (e.g., business, creative, …)
  – Business goals, fidelization, creative goals, success metrics, …
- User needs
  – Objectives imposed on the product from outside
  – Identified through user research
  – Personas

The scope plane

product as functionality | product as information
scope — Functional Specifications | Content Requirements
structure ↕ strategy

- Main question: what are we going to make?
- Importance of clearly identified and concrete requirements
  - Lots of features sound like good ideas, but they don't necessarily align with the strategic objectives
- Functional specifications (or requirements)
  - What will be the «feature set» of the software product, with detailed description
- Content requirements
  - What information needs to be included in the site under development
- Content requirements often have functional implications
  - Often, the functionalities needed in the site depend on the nature of the content to be managed
- Functional requirements have content implications
  - Will there be instructions on the preferences configuration screen? How about error messages? Someone has to write them…

The scope plane
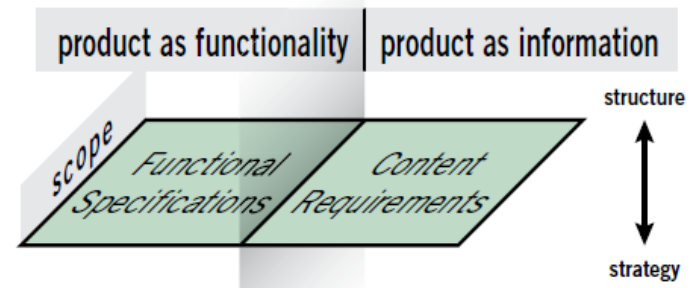
- Some requirements apply to the product as a whole
  - E.g., some technical requirements such as supported browsers and operating systems
- Other requirements apply only to a specific feature
  - Short description of a single feature
- The level of detail depends on the specific scope of the project
- The most productive source for functional and content requirements are users and stakeholders themselves, but need to be processed and reiterated
- Requirements that come out of the process fall into three general categories
  - Things people say they want
  - Things people say they want that are not the things they actually want
  - Things people don't know they want

Functional specifications

- Can change during implementation
- Very important: clarity and accuracy
- Positive
  - "The system will not allow the user to purchase a kite without kite string." vs "The system will direct the user to the kite string page if the user tries to buy a kite without string."
- Specific
  - "The most popular videos will be highlighted." vs "Videos with the most views in the last week will appear at the top of the list."
- No subjective language
  - "The site will have a hip, flashy style." vs "The look of the site will conform to the company branding guidelines document."

Content requirements

- Identifying all the content types associated with a feature (text, images, videos, …)
- Focus on content and not on format
  - E.g., FAQ comes from user interaction, not from the content provider
- The expected size of each of your content has a huge influence on the future user experience decisions
  - Word count for text features, pixel dimensions for images or video (e.g., use thumbnail images?), file sizes for downloadable documents, …
- Identify the responsible for each content element as soon as possible
- Content requires constant maintenance
  - Approaching content as if you can post it and forget it leads to a site that, over time, does an increasingly poor job of meeting user needs
- For every content element, identify how frequently it will be updated
- If your site has to serve multiple audiences with divergent needs, knowing which audience a piece of content is intended for can help you make better decisions about how to present that content

Prioritizing requirements

- Collecting ideas for possible requirements is not hard
- The tricky part is sorting out what features should be included in the scope of the project
- Evaluation based on
    - Whether requirements fulfill the strategic goals (both product objectives and user needs)
    - How feasible will it be to actually implement them (technical feasibility, organizational constraints, availability of resources, time constraints)
- Any feature suggestion not in line with the project strategy is, by definition, out of scope …
- … but if a suggested feature that falls outside the scope doesn't fit any of the types of constraints and still sounds like a good idea, you may want to reexamine some of the strategic objectives

The structure plane
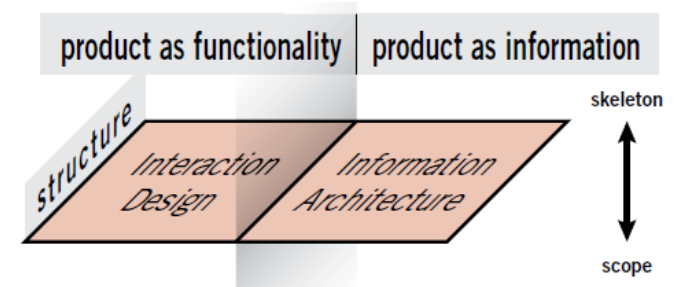
- Objective: starting from the prioritized requirements, to develop the conceptual structure of the site
- Interaction design
  - Development of application flows to facilitate user tasks
- Information architecture
  - Structural design of the information space to facilitate intuitive access to content
- Emphasis on defining patterns and sequences in which options will be presented to users
  - Interaction design: options involved in performing and completing tasks
  - Information architecture: options involved in delivering information to a user

Interaction design

- Objective: to describing possible user behavior and to define how the system will accommodate and respond to that behavior
- Traditionally, software programmers try to build a system in the way that was most technically efficient but …
- …the approach that works best for the technology is almost never the approach that works best for the person using it
  - Perception that "software is complicated, confusing, and hard to use"
- Conceptual models, often based on real-world metaphors
  - E.g., shopping cart component in an e-commerce site

Interaction design

- Error handling
  - What does the system do when people make mistakes?
  - What can the system do to prevent those mistakes from happening in the first place?
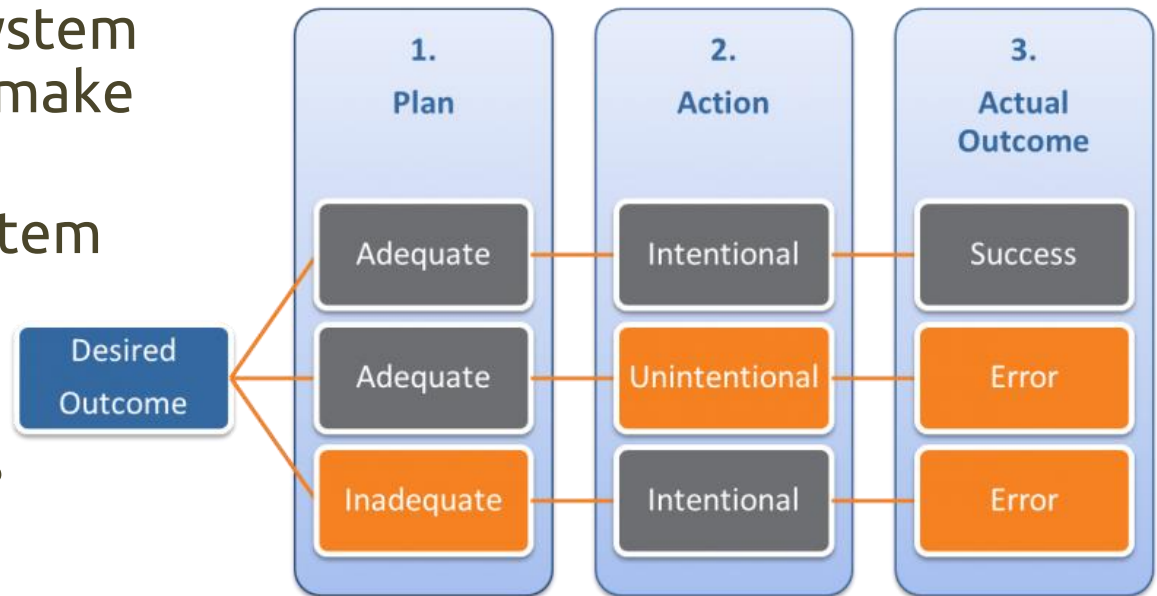

- Three layers
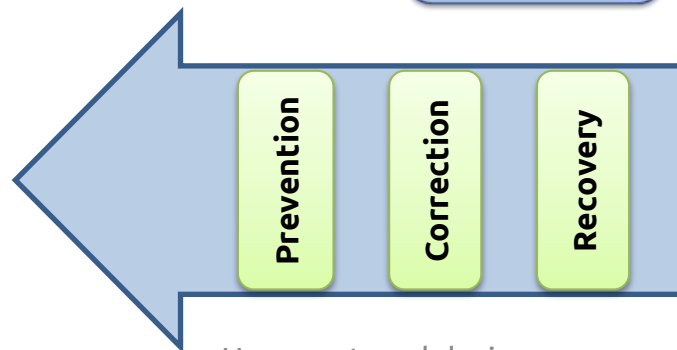
Information architecture

- Should consider how people cognitively process information to make sense of it

- Creating organizational and navigational schemes that allow users to move through site content efficiently and effectively

- Related to information retrieval: the design of systems that enable users to find information easily

- Most commonly, information architecture problems require creating categorization schemes
  - Top-down approach: involves creating the architecture directly from an understanding of product objectives and user needs
  - Bottom-up approach: derives categories and subcategories based on an analysis of the content and the functional requirements
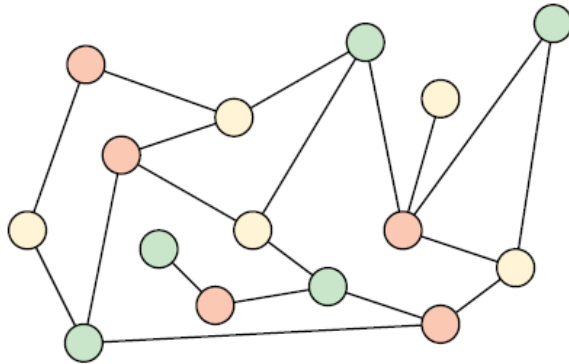
Architectural approaches

- Hierarchical structure
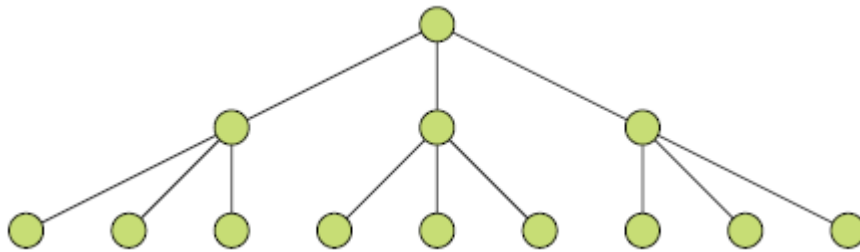
- Matrix structure
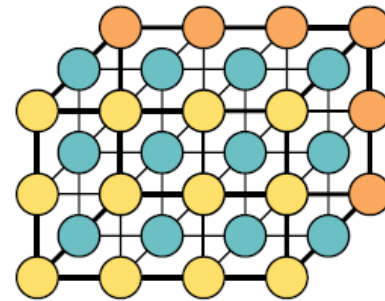
- Organic structure
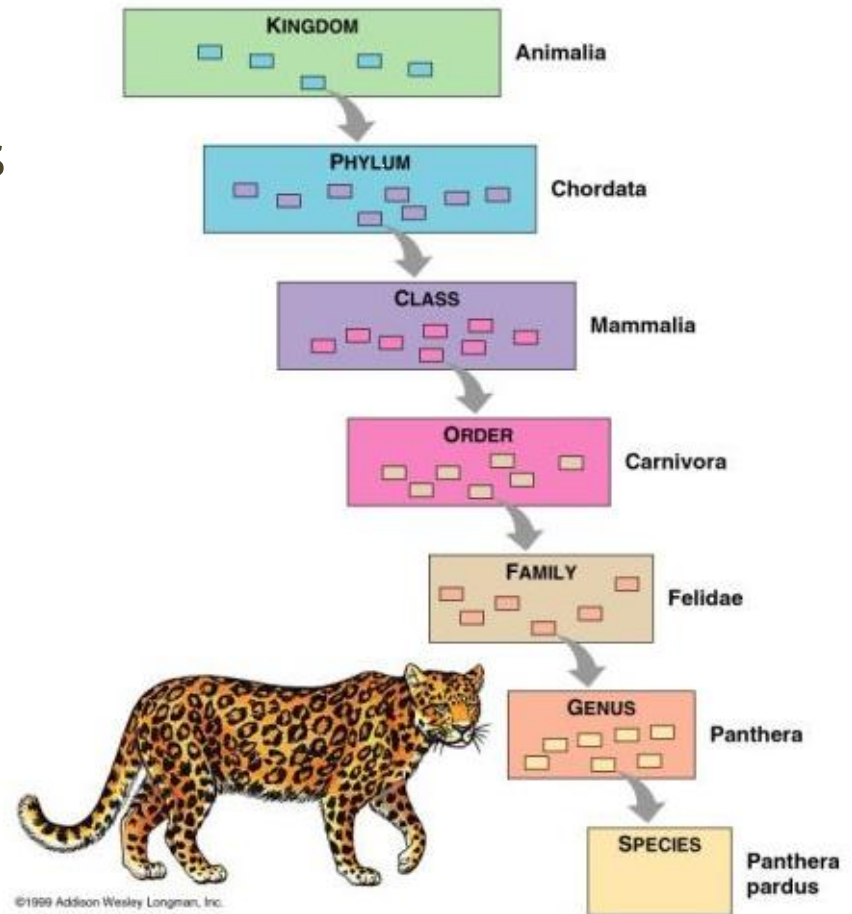
- Sequential structure

Language and metadata

- Even if the structure is a perfectly accurate representation of the way people think about your subject matter, your users won't be able to find their way around the architecture if they can't understand your nomenclature: the descriptions, labels, and other terminology the site uses
  - Subject-based classification: controlled vocabularies, taxonomies, thesauri, ontologies
  - Metadata
- Talking to users and understanding how they communicate is the most effective way to develop a system of nomenclature that will feel natural to them
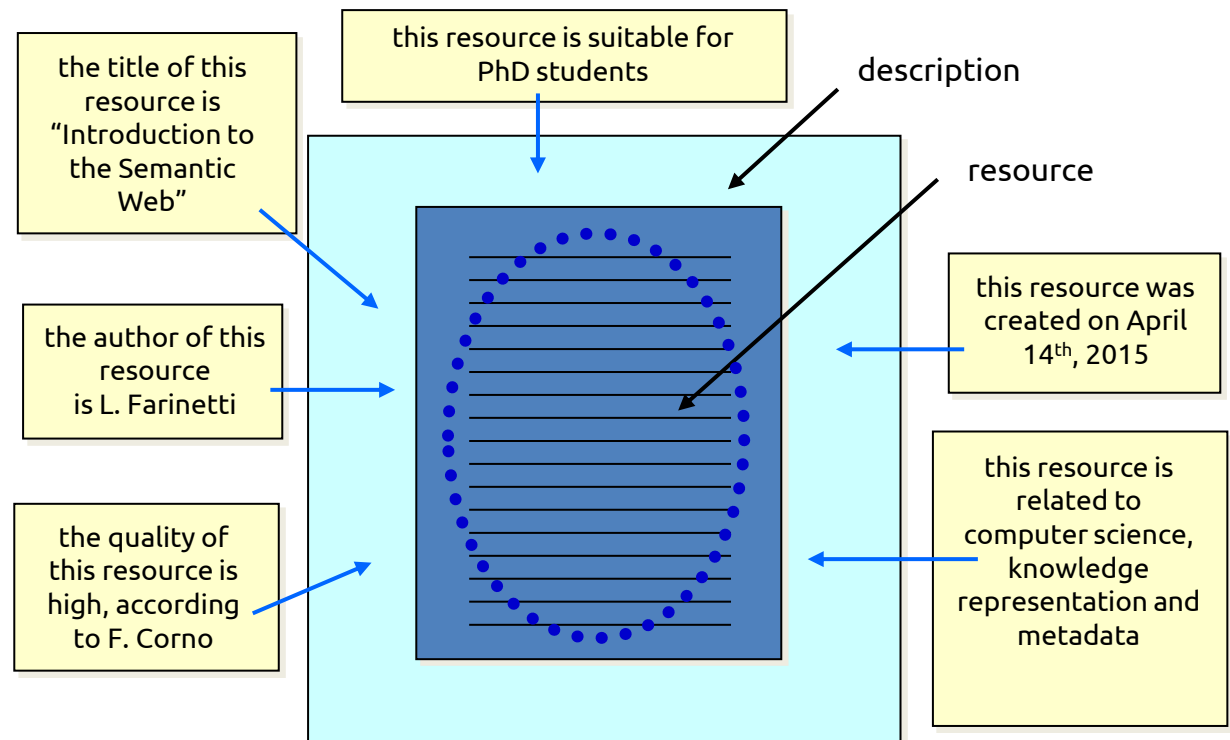
Subject-based classification

- Controlled vocabulary: a closed list of named subjects
- Taxonomy: arranges the terms in the controlled vocabulary into a hierarchy
- Thesaurus: extends taxonomies with more relationship type (BT, USE, TT, RT, …)
- Ontology: extends the other classification approaches because has open vocabularies and open relationship types

KINGDOM — Animalia
PHYLUM — Chordata
CLASS — Mammalia
ORDER — Carnivora
FAMILY — Felidae
GENUS — Panthera
SPECIES — Panthera pardus

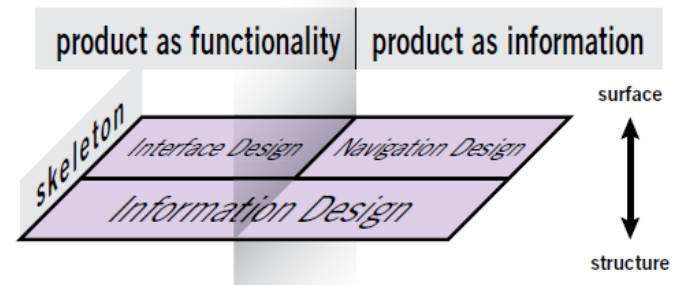©1999 Addison Wesley Longman, Inc.

Metadata

- Resource and description

- Good metadata can provide a faster and more reliable way for users to find information on your site than a basic full-text search engine

The skeleton plane

- Structure plane: the large-scale issues of architecture and interaction
- Skeleton plane: smaller scale of individual components and their relationships
- Interface design
  - Design of the interface elements (buttons, input fields, …) to facilitate user interaction with functionalities
- Navigation design
  - Design of the interface elements to facilitate the user navigation through the information architecture
- Information design
 - Presentation of information for effective communication

The skeleton plane

- The three elements are closely bound together but…
  - … if it involves providing users with the ability to do things, it's interface design
  - … if it involves providing users with the ability to go places, it's navigation design
  - …if it involves communicating ideas to the user, it's information design
- Habit and reflex are the foundation for much of our interaction with the world
  - Importance of consistency (with other products and within the product itself)
- Page layout is where information design, interface design, and navigation design come together to form a unified, cohesive skeleton
  - Wireframes (page schematics) or prototypes!!!

Interface design

- All about selecting the right interface elements for the task the user is trying to accomplish and arranging them on the screen in a way that will be readily understood and easily used
- Tasks will often stretch across several screens, each containing a different set of interface elements for the user to contend with
  - Which functions end up on which screens is a matter of interaction design down in the structure plane
  - How those functions are realized on the screen is the realm of interface design
- Successful interfaces are those in which users immediately notice the important stuff
  - Unimportant stuff is not there at all (possibly)
- A well-designed interface recognizes the action users are most likely to take and makes those interface elements easiest to access and use

Interface conventions: example
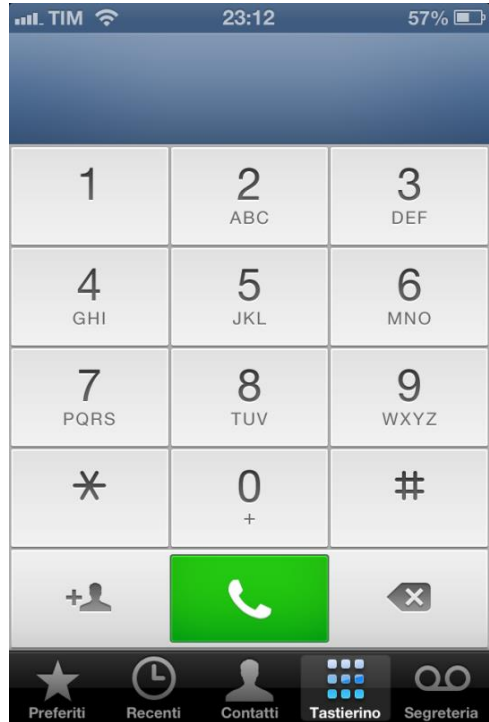
Phone

Calculator

- How is the ATM numeric keyboard?
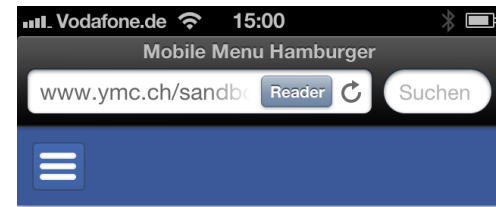
Interface conventions

- Slowly, but they change

Checkboxes are independent
So they can come in groups

Or stand alone

Radio buttons
Come in groups
And are used to make
Mutually exclusive selections

Hamburgher menu

The Hamburger

A Mobile Menu Template

Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet.

Navigation design

- Designing navigation for the Web looks simple: put links on every page that allow users to get around on the site…

- … But in reality it is really complex: three simultaneous goals
  - It must provide users with a means for getting from one point to another on the site: selection of links to facilitate users' behavior
  - It must communicate the relationship between the elements it contains: are some links more important then others?
  - It must communicate the relationship between its contents and the page the user is currently viewing: what this links has to do with the present content?

- It is of vital importance that every page of a Web site communicate clearly to users where they are on the site and where they can go

Navigation design

- It's hard to know how (or how much) people keep the structure of Web sites in their heads: without that knowledge, the best approach is to assume that users carry no knowledge with them from page to page

  - Besides, search engines index the sites, so any page can be an entry point

- Multiple navigation systems should be provided in the site

- Navigation elements that appear throughout a site are called persistent

Navigation systems

- Global navigation
  - Provides access to the set of key points that users might need to get from one end of the site to the other
  - Example: navigation bars linking to all the main sections of a site
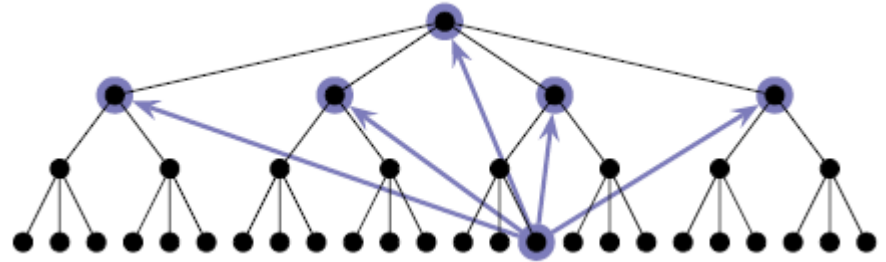
- Local navigation
  - Provides access to what's "nearby" in the architecture
  - Example: in a strictly hierarchical architecture, local navigation might provide access to a page's parent, siblings, and children
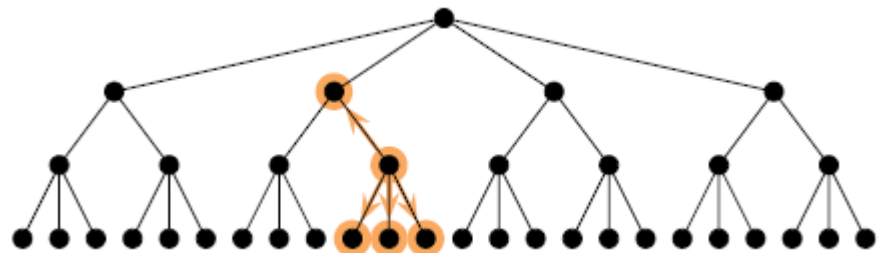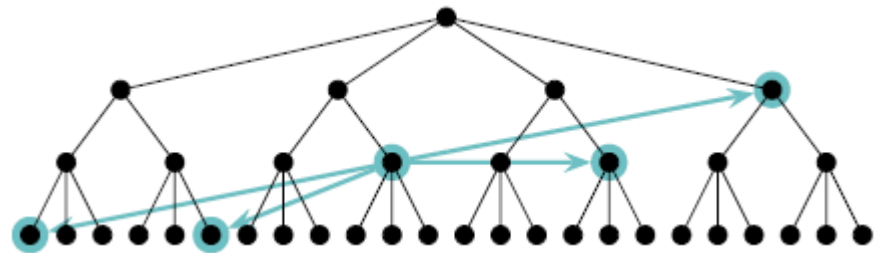
Navigation systems

- Supplementary navigation
  - Provides shortcuts to related content that might not be readily accessible through the global or local navigation
  - Example: in faceted classification allows users to shift the focus of their exploration of the content without starting over at the beginning
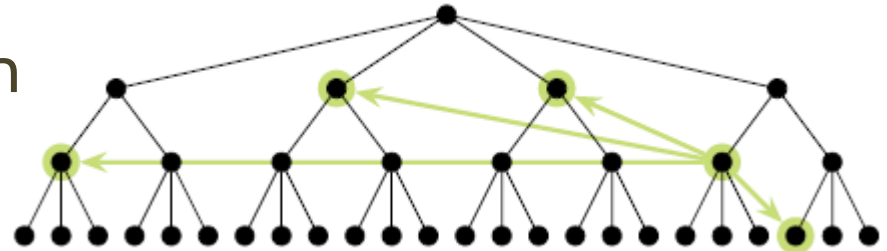
- Contextual navigation (or inline navigation)
  - Is embedded in the content of the page
 - Example: a hyperlink within the text of a page
  - Often underutilized or misutilized

Navigation systems

- Courtesy navigation
  - Provides access to items that users don't need on a regular basis, but that are commonly provided as a convenience
  - Example: links to contact information, feedback forms, and policy statements

- Remote navigation tools
  - Navigational devices aren't embedded within the structure of the pages, but stand on their own
  - Users turn to them when they get frustrated with the other navigational systems
  - Site map: gives users a concise, one-page snapshot of the overall site architecture
  - Index: alphabetical list of topics with links to relevant pages

User-centered design
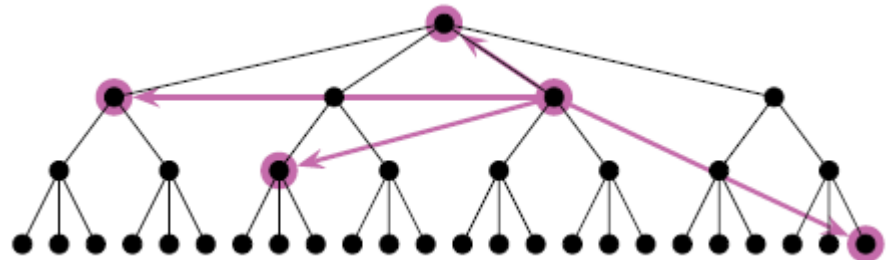
Information design

- Making decisions about how to present information so that people can use it or understand it more easily
- Sometimes is visual
  - Pie charts or bar charts?
- Sometimes involves grouping or arranging pieces of information

Your Contact Details

Name: *(Required)*
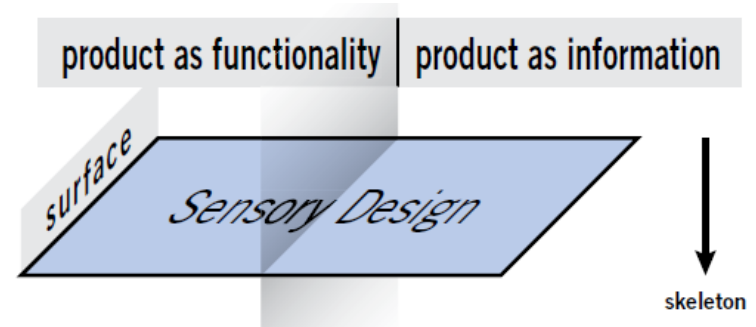
Web Address:

Personal Information

Place of Birth: USA

Date of Birth: January

Favorite Color:
☐ red   ☐ orange
☐ yellow   ☐ purple
☐ pink   ☐ blue
☐ green   ☐ other

The surface plane

product as functionality | product as information

surface — Sensory Design

skeleton

- Sensory design
  - The aspects of the product the users will notice first
  - The term extends «visual design»
- Content, functionality and aesthetics come together to produce a finished design that pleases the senses while fulfilling all the goals of the other four planes
- Visual treatment of text, graphic page element, use of sound and navigational components
- Graphic and sound treatment of interface element (the «look» in «look and feel»)
- Effective tools for attracting and directing attention
 - Empty space, contrast, colors, …

Follow the eye

- The movement of the user's eyes around the page doesn't happen by accident
  - It's the result of a complex set of deeply instinctive responses to visual stimuli that all humans share
- If your design is successful, the pattern the user's eye follows has two important qualities
  - It follows a smooth flow: when user comment that a design is "busy" or "cluttered", it means that their eyes bounce back and forth among a variety of elements all clamoring for their attention
  - It gives users a sort of guided tour of the available possibilities without overwhelming them with detail: possibilities shouldn't distract from information or functions that users will need to fulfill their goals

Contrast and uniformity

- Contrast
  - Is vital to drawing the user's attention to essential aspects of the interface
  - Helps the user understand the relationships between the navigational elements on the page
  - Is the primary means of communicating conceptual groups in information design
  - Example: error messages
- The contrast has to be significant enough for the user to clearly tell that the design choice is intended to communicate something
- Maintaining uniformity in design is an important part of ensuring that your design communicates effectively without confusing or overwhelming your users
  - E.g., keeping the sizes of elements uniform can make it easier to recombine them into new designs as you need them

Contrast example

- Neutral layout (no contrast)

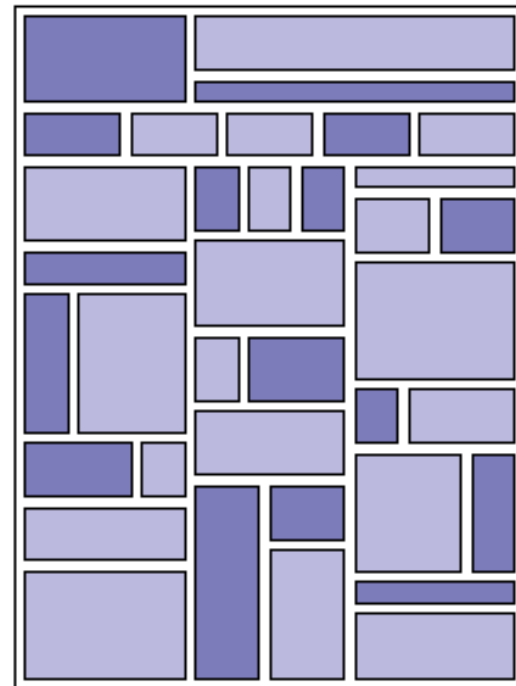- Contrast used to guide user's eyes around the page
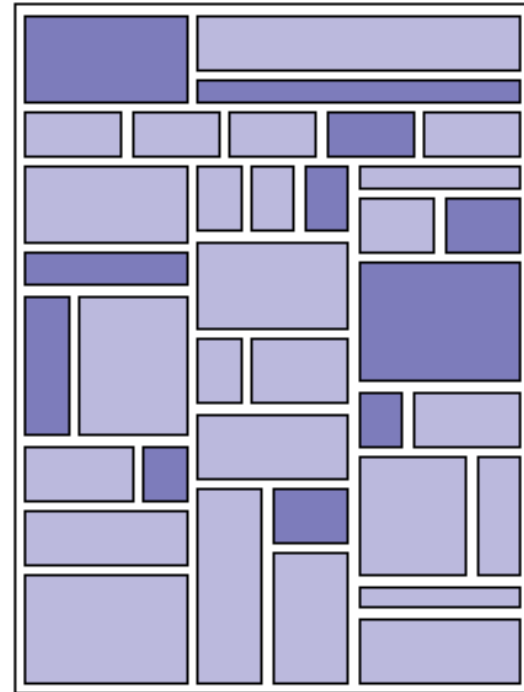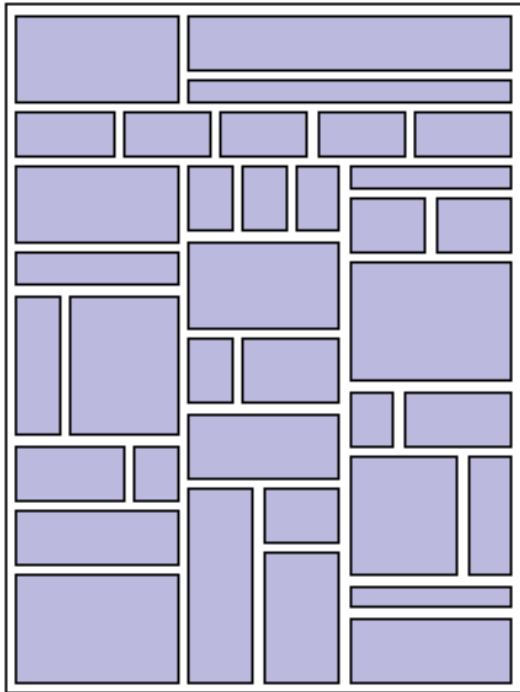
Contrast example

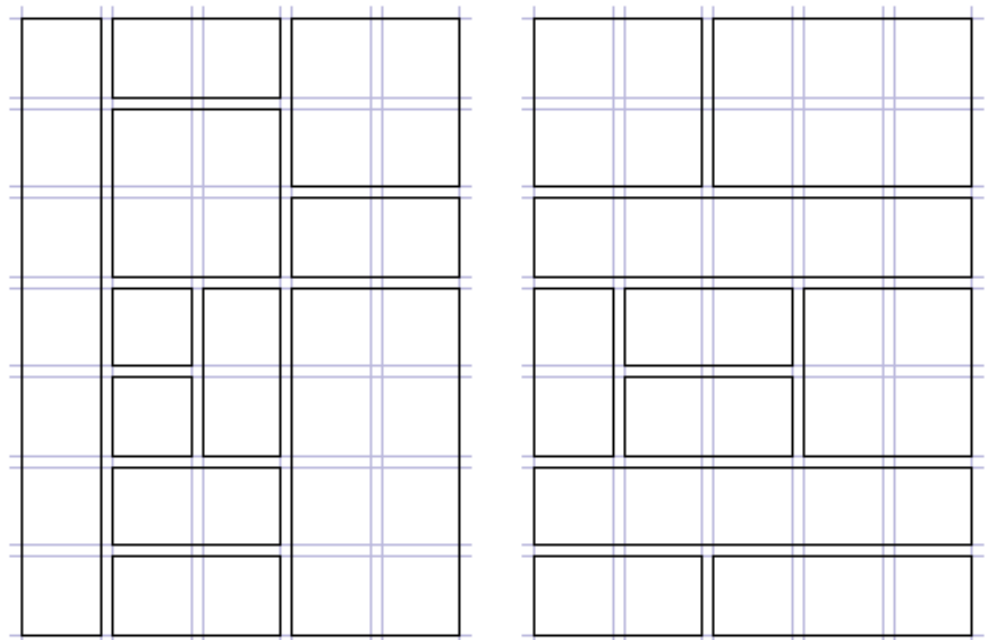- Contrast used to draw attention to a few key elements
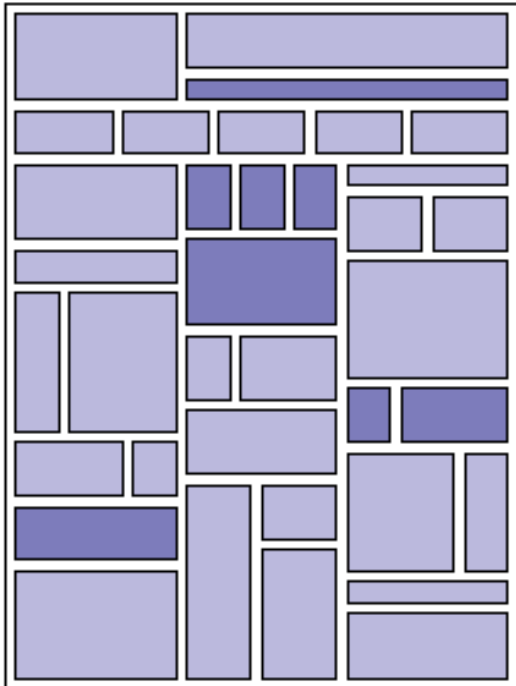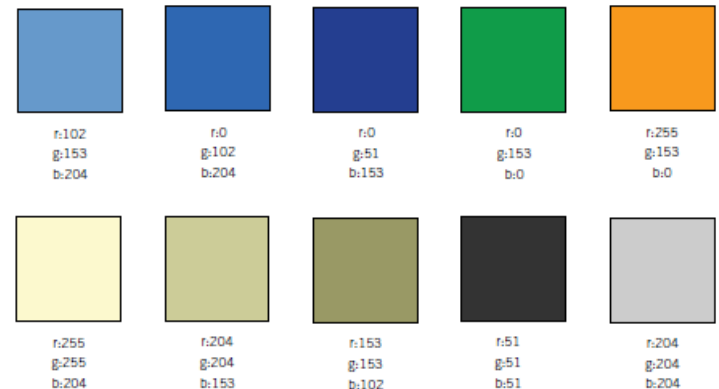
- Overuse of contrast

Grid-based layout

- Ensures uniformity of design through a master layout that is used as a template for creating layout variations
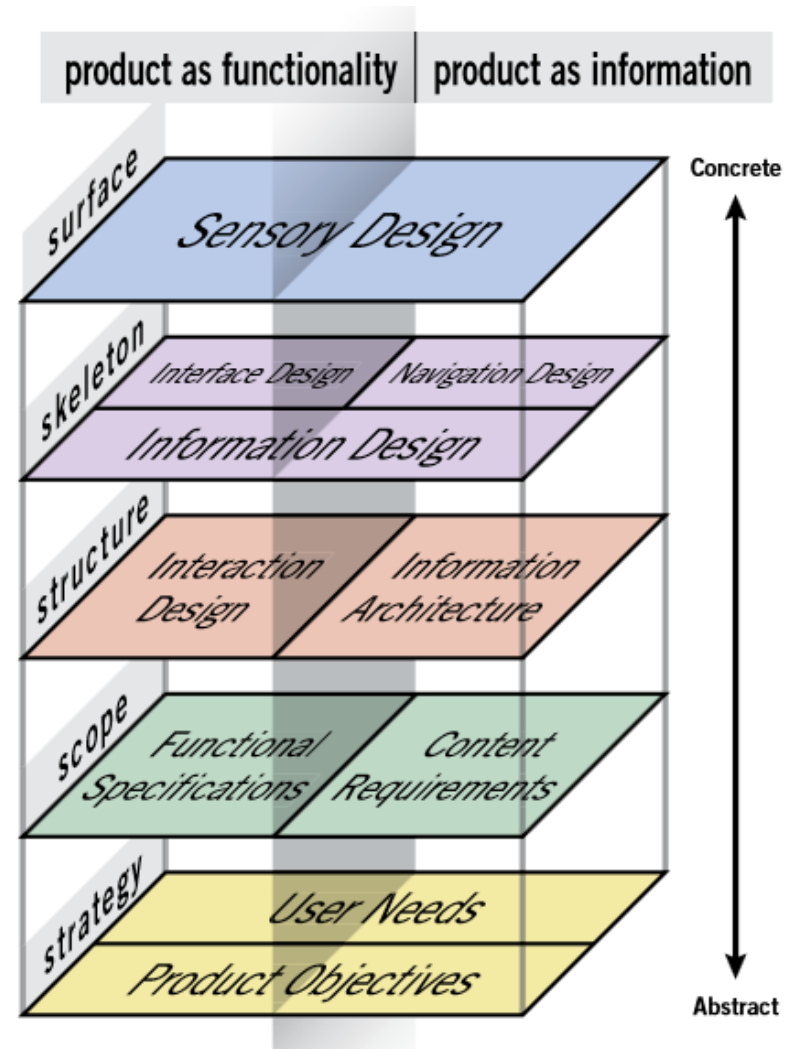
Color palette and typography

- The core brand colors are usually part of a broader color palette used in all of a company's materials
- For body text, or any material that will be presented in larger blocks, the simpler the better
- For larger text elements or short labels like those on navigational elements, typefaces with a little more personality are appropriate
- Few fonts, not to overwhelm users

r:102
g:153
b:204

r:0
g:102
b:204

r:0
g:51
b:153

r:0
g:153
b:0

r:255
g:153
b:0

r:255
g:255
b:204

r:204
g:204
b:153

r:153
g:153
b:102

r:51
g:51
b:51

r:204
g:204
b:204

The design process

- Each of the elements should be considered, from bottom to top

- Iteration and interaction with the users

| product as functionality | product as information |

surface — Sensory Design — Concrete

skeleton — Interface Design | Navigation Design — Information Design

structure — Interaction Design | Information Architecture

scope — Functional Specifications | Content Requirements

strategy — User Needs | Product Objectives — Abstract

Link to software engineering

- Some overlap in techniques
  - Use cases
  - Iterative life cycle

- Traditional life cycle
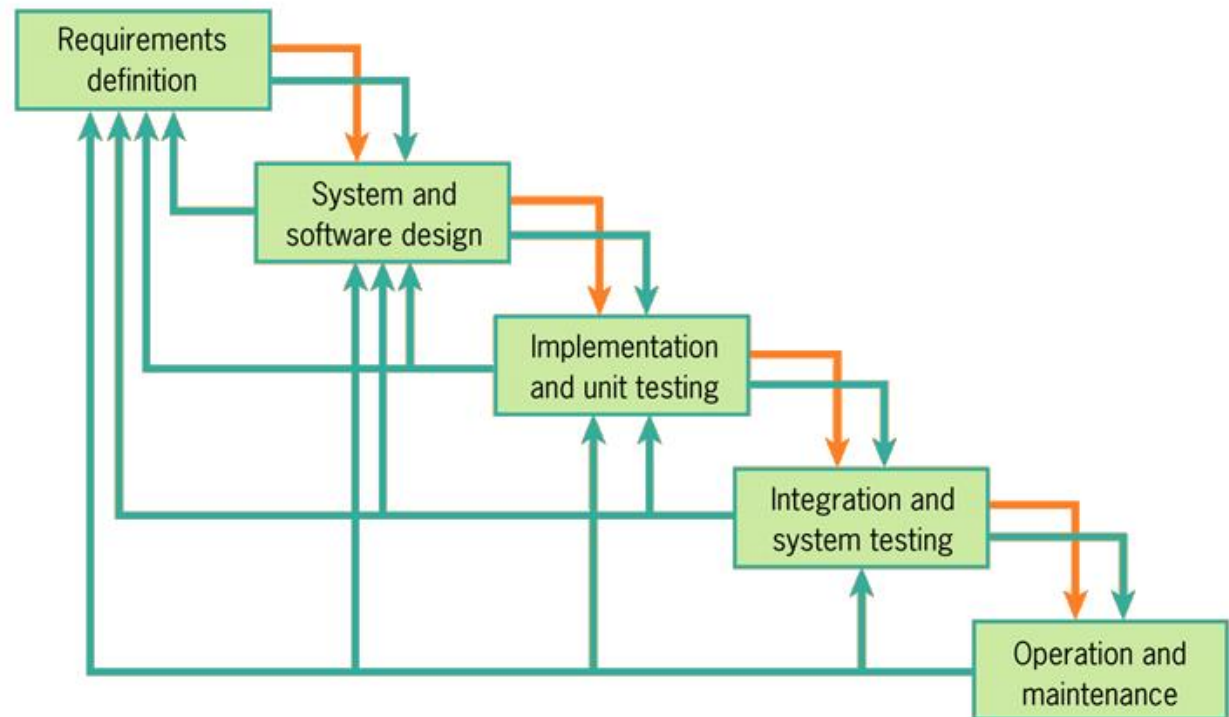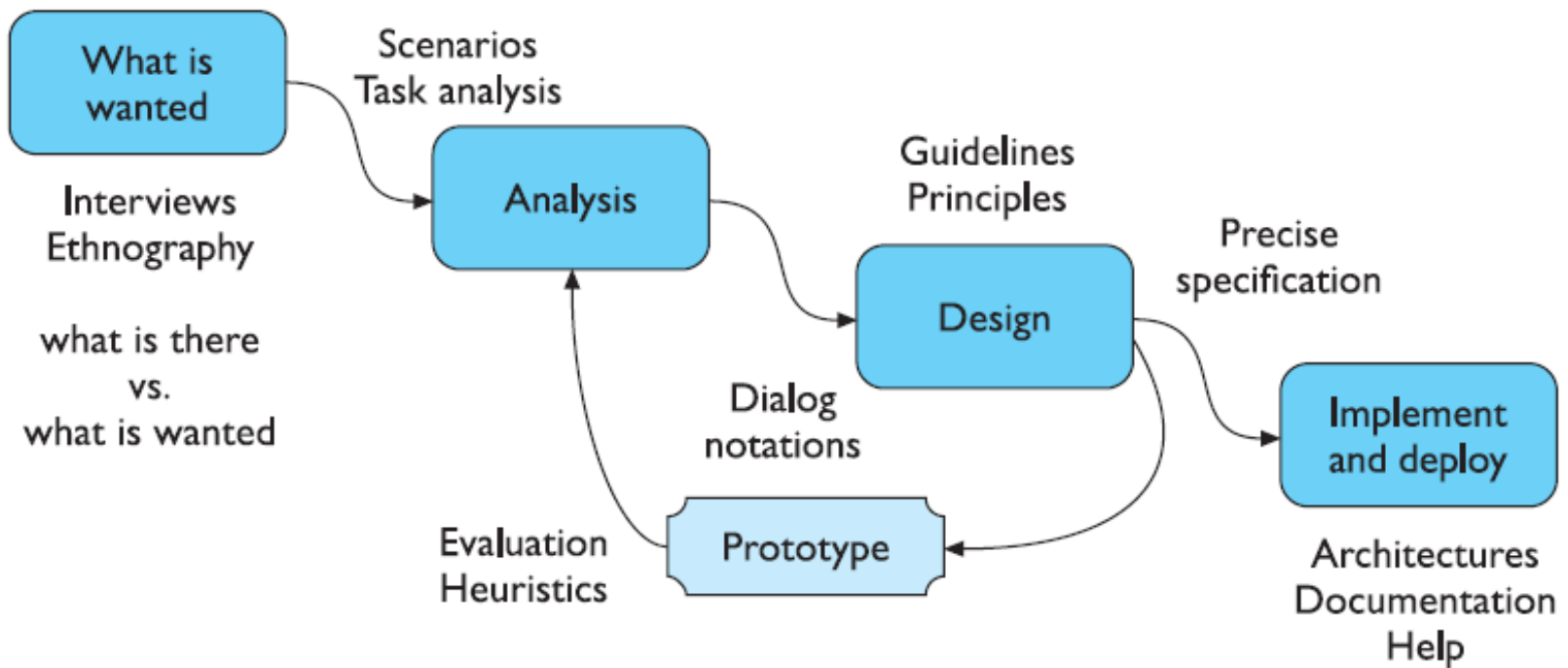
Evaluation-centered life cycle

User-centered design
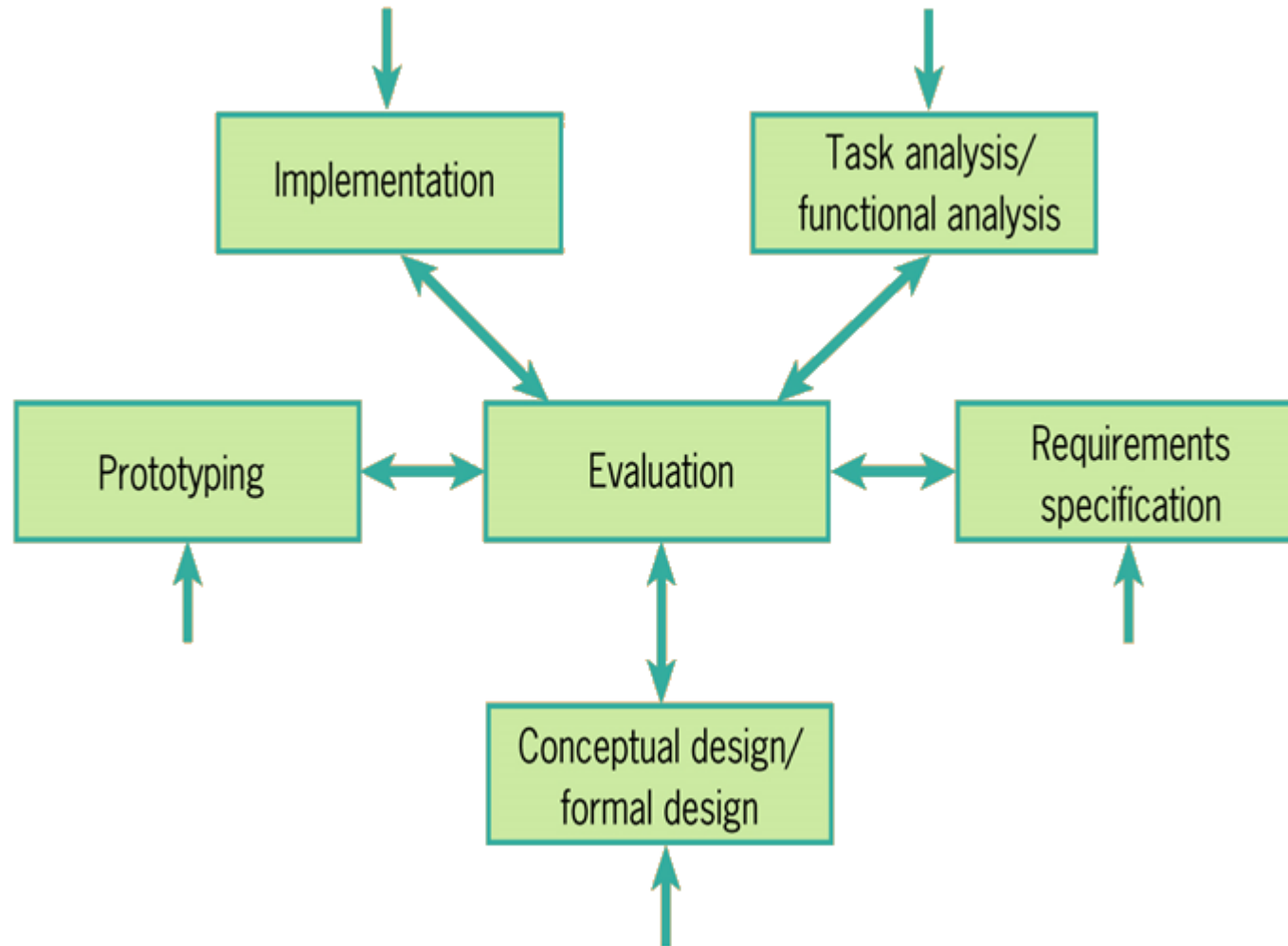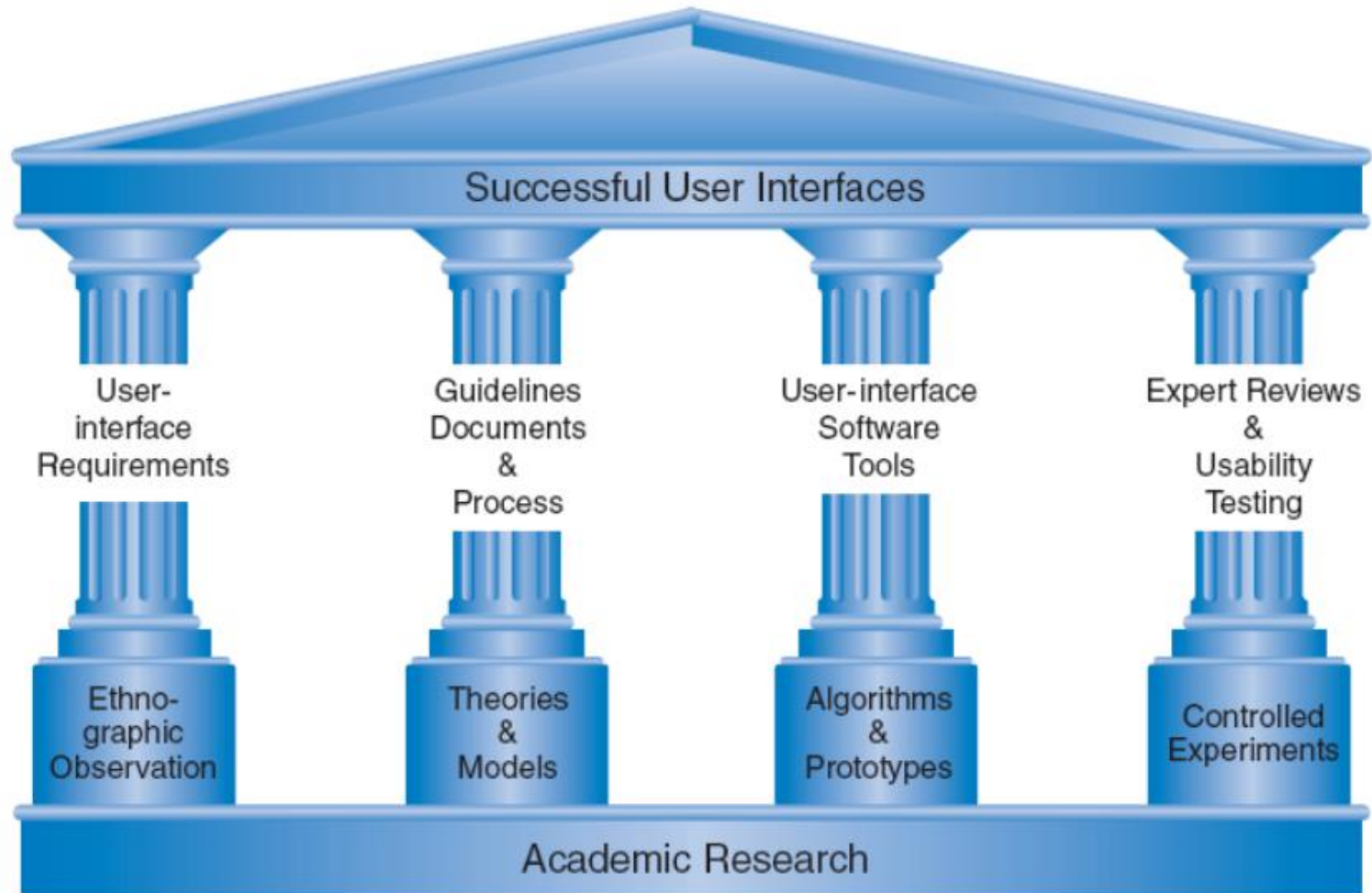
Simplified iterative model
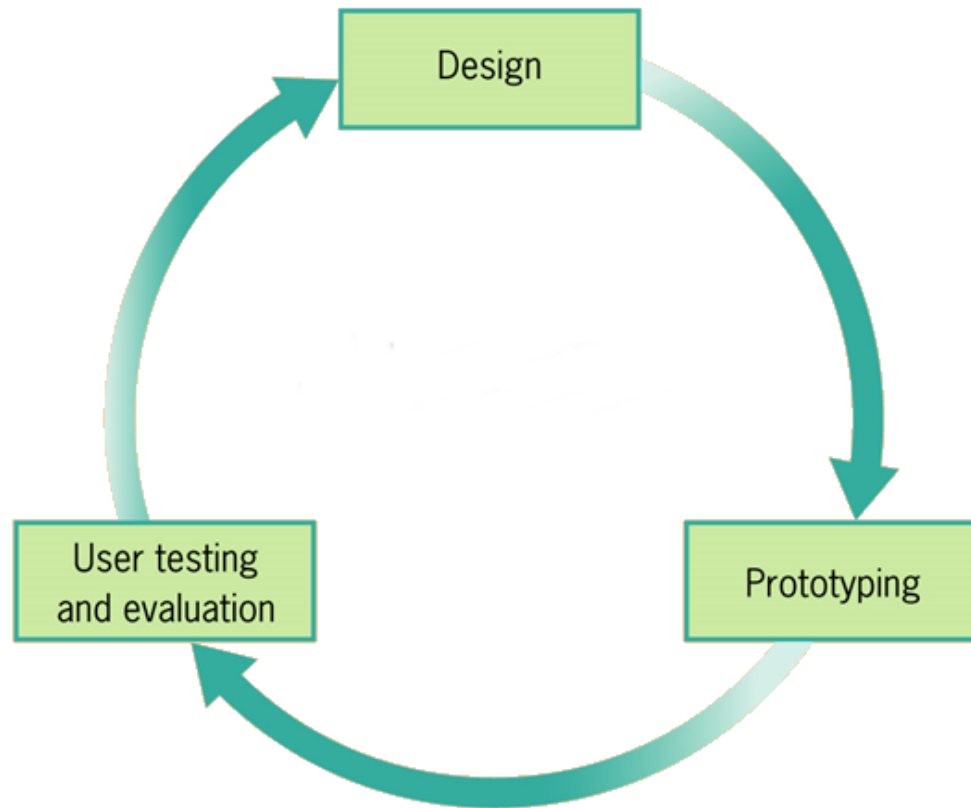
The process of interaction design

- Put the user first, keep the user in the center and remember the user at the end

The pillars of interaction design

Successful User Interfaces

| User-interface Requirements | Guidelines Documents & Process | User-interface Software Tools | Expert Reviews & Usability Testing |

| Ethno-graphic Observation | Theories & Models | Algorithms & Prototypes | Controlled Experiments |

Academic Research

The process of interaction design

- Requirements (what is wanted)
  - The first stage is establishing what exactly is needed
  - What is currently happening? What is the goal?
  - Techniques used in HCI: interviewing people, videotaping them, looking at the documents and objects that they work with, observing them directly, ethnography (a form of observation derived from anthropology)…

The process of interaction design

- Analysis
  - The results of observation and interview need to be ordered in some way to bring out key issues and communicate with later stages of design
  - Techniques: scenarios (rich stories of interaction), task models, task analysis methods
  - These techniques can be used both to represent the situation as it is and the desired situation

- Results:
  - Functional specifications
  - Content requirements
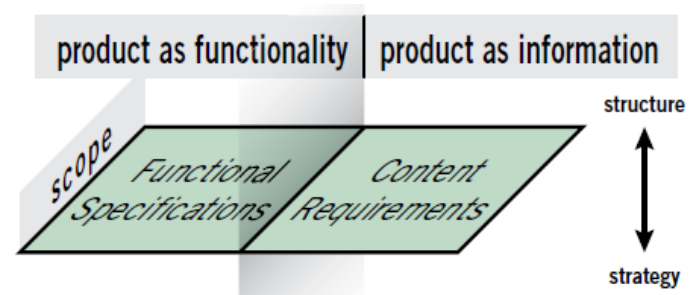
The process of interaction design

- The best requirements are
    - Complete (express a whole idea or statement)
    - Correct (technically and legally possible)
    - Clear (unambiguous and not confusing)
    - Verifiable (it can be determined that the system meets the requirement)
    - Necessary (should support one of the project goals)
    - Feasible (can be accomplished within cost and schedule)
    - Prioritized (tracked according to business need levels)
    - Consistent (not in conflict with other requirements)
    - Traceable (uniquely identified and tracked)
    - Modular (can be changed without excessive impact)
   - Design-independent (do not pose specific solutions on design)

The process of interaction design

- Design
  - The central stage, when you move from what you want, to how to do it
  - Many rules, guidelines and design principles can be used to help
  - Need to record all design choices in some way: various notations and methods
  - Input from theoretical work is helpful: cognitive models, organizational issues and communication understanding

- Results:
  - Information architecture
  - Interaction design
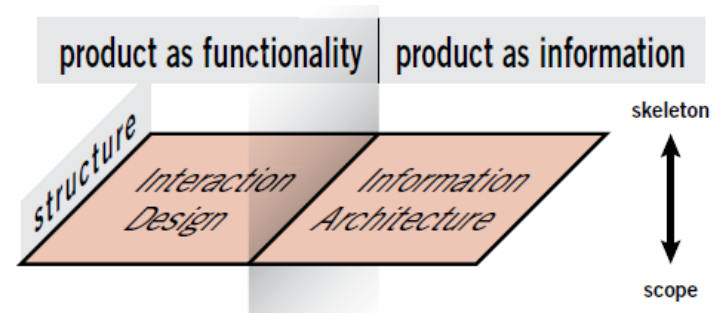
The process of interaction design

- Iteration and prototyping
  - We cannot expect to get designs right first time: we need to evaluate a design to see how well it is working and where there can be improvements: evaluation techniques
  - Some forms of evaluation can be done using the design on paper, but it is hard to get real feedback without trying it out
  - Most user interface design i
    form of prototyping,
    producing early versions
    of systems to try out
    with real users

product as functionality	product as information

surface — Sensory Design

skeleton — Interface Design | Navigation Design

Information Design

- Results:
  - Interface design
  - Navigation design
  - Sensory design (partially)
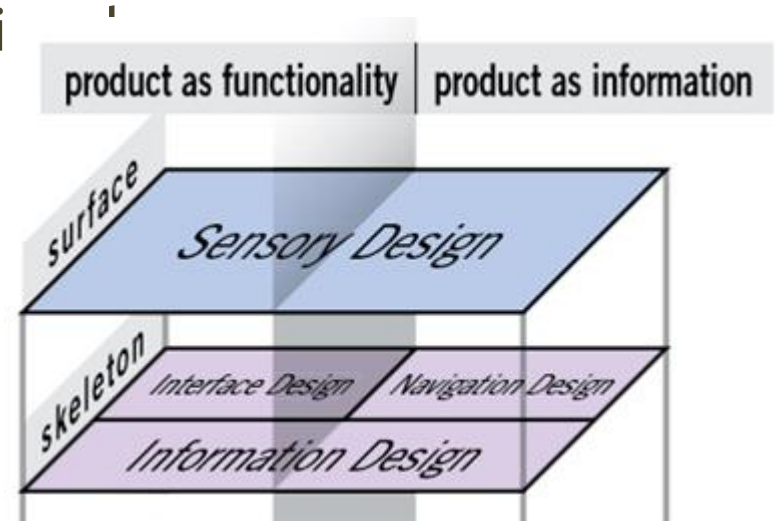
The process of interaction design

- Implementation and deployment
  - When we are happy with our design, we need to create it and deploy it
  - This involve writing code, perhaps making hardware, writing documentation and manuals (everything that goes into a real system that can be given to others)
  - Software architectures for user interfaces
- Results:
  - Sensory design

More on ...

- Methods for user research
- Personas and user scenarios
- Design rules, principles and guidelines
- Usability
- Techniques for prototyping
- Information architecture
- Evaluation techniques
- Web accessibility

- Guidelines for your SNS development
  - Simplified process
  - Tools and methods
  - Required documentation

The goose game

designing the
user experience
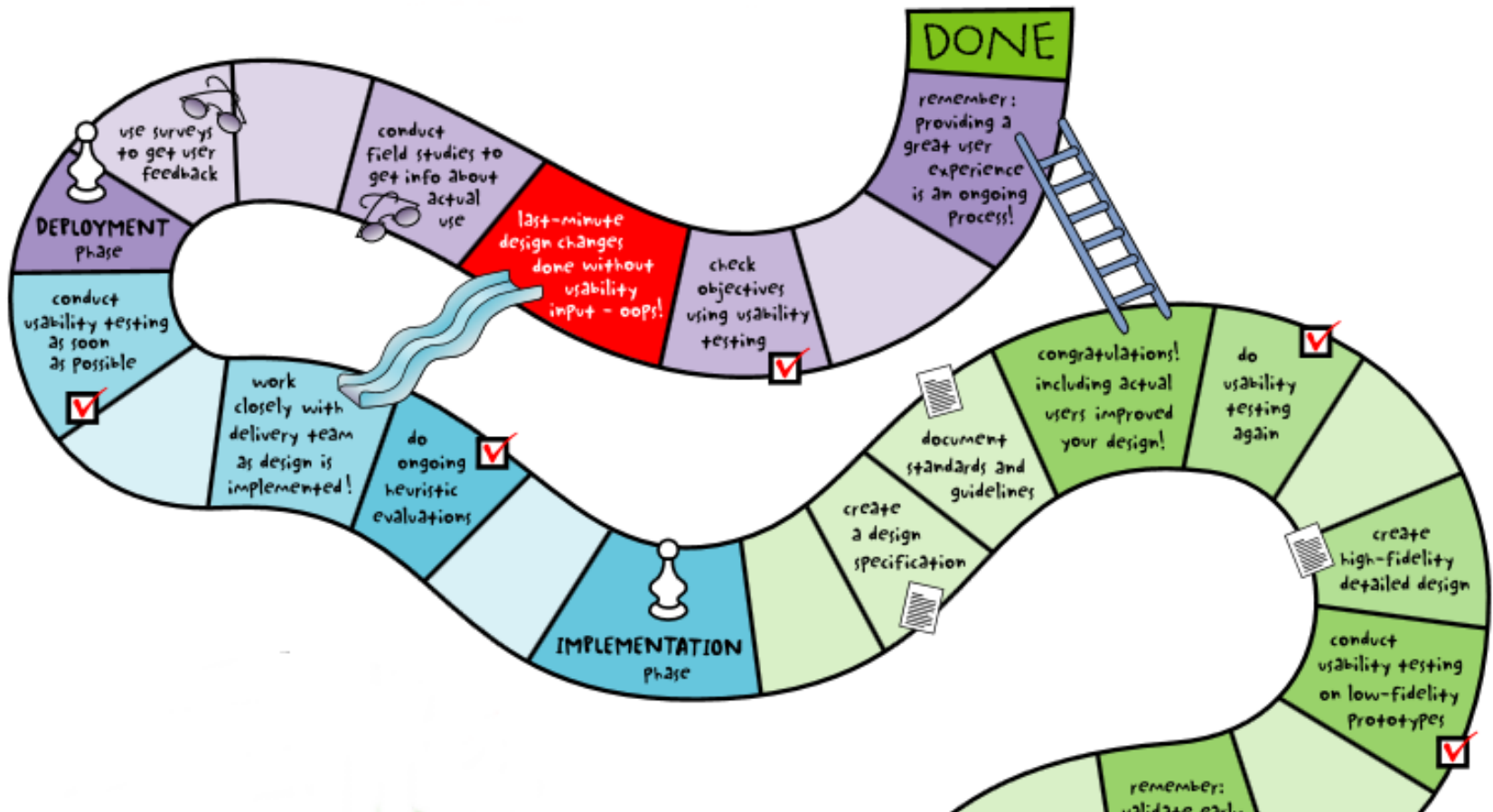
User-centered design

The goose game

https://www.smashingmagazine.com/2012/08/beyond-wireframing-real-life-ux-design-process/

The goose game

designing the **user** experience

References

- J. J. Garett, "The Elements of User Experience: User-Centered Design for the Web and Beyond, Second Edition", Pearson

- J. Porter, "Designing for the Social", New Riders

- A. Dix, J. Finlay, G. D. Abouw, R. Beale, "Human-Computer Interaction, 3rd Edition", Pearson

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