# Web applications design

Semester B, Mandatory modules, ECTS Units: 3

http://webdesign.georgepavlides.info

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## the aim

- Introduce basic principles of
  - **designing web sites** and individual web pages
  - linking client applications to web pages
  - data structuring
  - semantic web concepts
  - data and systems **interoperability** issues
  - design for all aspects
  - **security** concerns
  - design for optimal **functionality** and platform **scalability**
  - basic **web authoring and programming** and the available **markup languages**

# learning objectives

- To introduce students to
  - the **overall lifecycle of web development** from specifications to deployment from a user-centric point of view
  - web authoring involving user interface design based on international best practices
  - **basic open source packages** for developing portals, sites and blogs
  - **dynamic web** programming and database applications

## ...on completion

- Understand
  - the basic principles of web page design
  - how to write a basic web page
  - how to customize an open source package using a web authoring tool
  - basic concepts of **data structuring**
- Be able to
  - implement an application that uses a database and has a simple user interface

#### course outline

- Introduction
  - What is 'design'
  - What is the Web
  - What are the principles
- Client-side web programming
  - Markup languages
  - Static programming with HTML
  - Dynamic programming with CSS and Javascipt
  - Introduction to HTML5
- Visual media production
  - Introduction to light, vision, perception
  - Introduction to basic image processing
  - Grid design with image processing
  - The golden ratio in design
- Server-side web programming
  - Introduction to PHP and MySQL
  - Usage of open-source CMS/blog packages

first, let us define our playground and agree upon basic concepts

- Google >> define: design
  - About 4,820,000,000 results
  - Noun
    - A **plan or drawing** produced to show the look and function or workings of a building, garment, or other object before it is built or made
  - Verb
    - Decide upon the look and functioning of (a building, garment, or other object), typically by making a detailed drawing of it.
  - Synonyms
    - noun. plan intention scheme draft project - purpose
    - verb. plan project scheme intend draw sketch

- http://dictionary.reference.com/
  - verb (with/without an object)
    - to **prepare** the preliminary sketch or the plans for (a work to be executed), especially to plan the form and structure of: to design a new bridge
    - to **plan and fashion** artistically or skillfully
    - to **intend** for a definite purpose: a scholarship designed for foreign students
    - to **form** or **conceive** in the mind: the prisoner designed an intricate escape
    - to **assign** in thought or intention: *he designed to be a doctor*
    - <u>Obsolete</u>. to **mark out**, as by a sign to indicate

- http://dictionary.reference.com/
  - noun
    - an **outline**, **sketch**, **or plan**, as of the form and structure of a work of art, an edifice, or a machine to be executed or constructed
    - organization or structure of formal elements in a work of art; composition
    - combination of details or features of a picture, building, etc.; the pattern or motif of artistic work: the design on a bracelet
    - the **art of designing**: a school of design
    - a **plan or project**: a design for a new process
    - a **plot or intrigue**, especially an underhand, deceitful, or treacherous one: *his political rivals formulated a design to unseat him*
    - (designs), a **hostile or aggressive project** or scheme having evil or selfish motives: *he had designs on his partner's stock*
    - intention; purpose; end
    - adaptation of means to a preconceived end

#### where is design applied to?

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- Design in **art** 
  - Applied arts
    - Industrial design, graphic design, fashion design, interior design, decorative arts
- Design in **engineering** 
  - Blueprinting, prototyping
- Design in **production** 
  - Vision, marketing
- Process design

# design approaches

- Many approaches
  - KISS principle (Keep it Simple Stupid)
    - eliminate unnecessary complications
  - There is more than one way to do it (TIMTOWTDI)
    - "Tim Toady"
    - multiple methods of doing the same thing
  - · Use-centered design
    - associated with the use of the artifact, rather than the end user
  - User-centered design
    - focuses on the needs, wants, and limitations of the end user
  - Critical design
    - uses designed artifacts as an embodied critique or commentary on existing values, morals, and practices in a culture
  - Service design
    - designing around the service associated with an artifact's use
  - Transgenerational design
    - staying compatible with human aging
  - Speculative design
    - using designed objects to provoke questions and stimulate discussion in academic and research settings

# methods of designing?

• A broad area based primarily on

#### • Divergence

- Explore possibilities and constraints to create new understanding
- Transformation
  - Redefine specifications
- Convergence
  - Prototype and build on possible scenarios

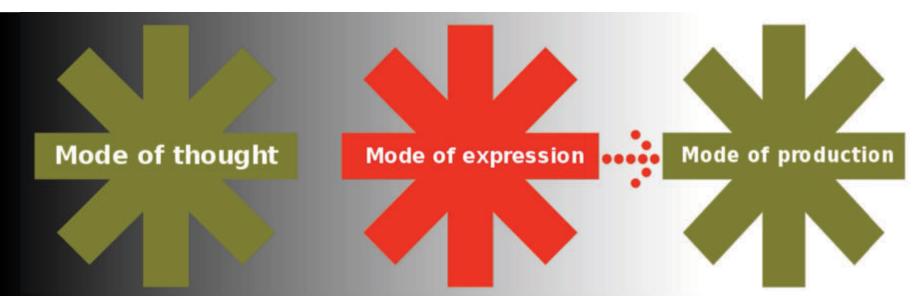
#### • Sustainability

• Manage the process of exploring, redefining and prototyping continually over time

#### • Articulation

• Focusing on the visual relationship between the parts and the whole

#### design, expression and production



Design is finally a way of making artifacts - limited by the way media is structured and exploiting its inherent qualities by what is expected, or by the unexpected

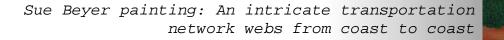
Design is also a way of taking thought systems and applying them to visual equivalents - usually defined by exploiting a medium's unique qualities to maximize meaning

Design is a plan or framework of linking ideas together into a system of meaning. It can also be an end in itself, an abstraction which generates ideas and concepts

# enough with design now...what's that "web"?

#### what's that "web"?

- •google >> define: web
  - About 13,940,000,000 results
  - Noun
    - A **network of fine threads** constructed by a spider from fluid secreted by its spinnerets, used to catch its prey
  - Verb
    - Move or hang so as to form a weblike shape: "an intricate transportation network webs from coast to coast"
  - Synonyms
    - net-tissue-cobweb-fabric-cloth



### ...well, not that "web"

- google >> define: world wide web
  - About 1,200,000,000 results
  - A widely used **information system** on the Internet that provides facilities for documents to be connected to other documents by hypertext
- W3C (w3c.org) defines it as follows:
  - The World Wide Web (known as "WWW', "Web" or "W3") is the universe of network-accessible information, the embodiment of human knowledge
  - The World Wide Web **began as a networked information project at CERN**, where Tim Berners-Lee developed a vision of the project
  - The Web has a **body of software**, and a **set of protocols and conventions**
- The World Wide Web Consortium (W3C) is an international community where Member organizations, a full-time staff, and the public work together to develop Web standards. Led by Web inventor Tim Berners-Lee and CEO Jeffrey Jaffe, W3C's mission is to lead the Web to its full potential.

#### the web

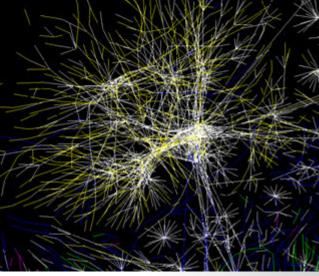
- The Web is a **system of interlinked hypertext documents** accessed via the Internet
- With a web browser, one can view web pages that may contain text, images, videos, and other multimedia, and navigate between them via hyperlinks
- Tim Berners-Lee and Robert Cailliau proposed in 1990 to use hypertext
  - "to link and access information of various kinds as a web of nodes in which the user can browse at will"



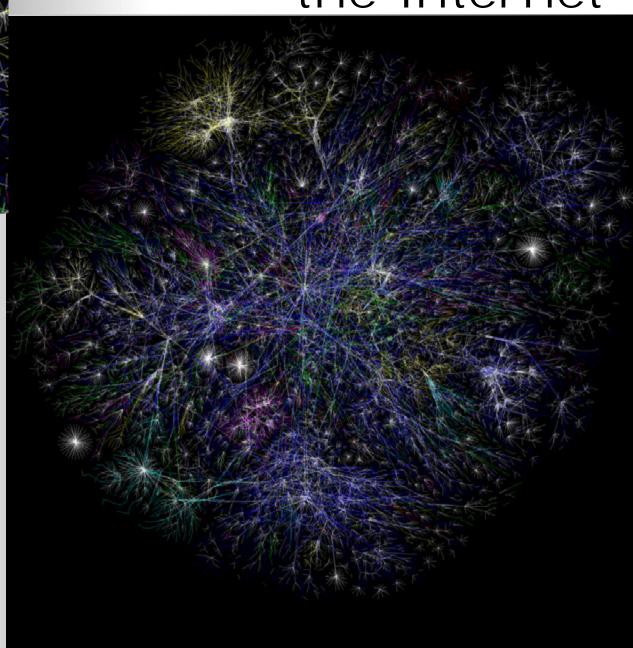
#### the web

- The Web is **not to be confused** with the Internet
  - a global system of interconnected computer networks that use the standard Internet protocol suite (TCP/IP) to serve billions of users worldwide
  - a **network of networks** that consists of private, public, academic, business, and government networks
    - linked by a broad array of electronic, wireless and optical networking technologies
  - carries an extensive range of information resources and services, such as the inter-linked hypertext documents of the World Wide Web (WWW) and the infrastructure to support email

#### the internet

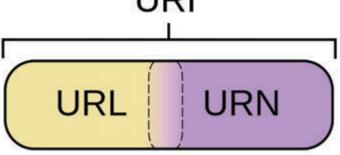


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#### the web and the internet

- The Web is a global set of documents, images and other resources, logically interrelated by hyperlinks and referenced with Uniform Resource Identifiers (URIS)
  - URIs symbolically identify services, servers, and other databases, and the documents and resources that they can provide
  - Can take the form of a Uniform Resource Locator (URL), a Uniform Resource Name (URN), or both URI

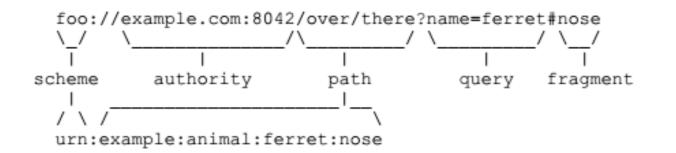


### "uniform resource" what?

- A **URN** functions like a person's name
  - global, persistent, location-independent identifiers for resources
    - urn:isbn:047041796X
      - corresponds to the book 'Web Design All-in-one For Dummies' by Sue Jenkins, 8 May 2009, JW&S
- A **URL** resembles a person's street address
  - references to Internet resources
    - scheme://domain:port/path?query#fragment
      - - corresponds to the facebook page of your teacher

#### now we use URIs

- example URIs from RFC 3986/2005
  - ftp://ftp.is.co.za/rfc/rfc1808.txt
  - http://www.ietf.org/rfc/rfc2396.txt
  - ldap://[2001:db8::7]/c=GB?objectClass?one
  - mailto:John.Doe@example.com
  - news:comp.infosystems.www.servers.unix
  - tel:+1-816-555-1212
  - telnet://192.0.2.16:80/
  - urn:oasis:names:specification:docbook:dtd
    :xml:4.1.2



#### ...and what's that "http"?

- Hypertext Transfer Protocol (HTTP)
  - the main access protocol of the World
     Wide Web
  - only **one of the hundreds** of communication protocols used on the Internet
  - web services use HTTP to allow software systems to communicate in order to share and exchange business logic and data
  - the `s' (https) stands for `secure'



#### why do we need a browser?

#### • Web browser software

- such as Microsoft's Internet Explorer, Mozilla Firefox, Opera, Apple's Safari, and Google Chrome
- lets users **navigate the web** from one web page to another via hyperlinks embedded in the documents
  - webpages contain any combination of media and interactivity
  - client-side software (**plugins**) can also be used to provide further functionality for content, gaming, visualization, office automation, etc

#### why use the web?

010 00

- Simply, because the web enables publishing ideas and information
  - to the largest audience

NOD

- at greatly **reduced expense**
- with virtually no time delay

# ok then... but what's an application?

### what's an application?

- •google >> define: application
  - About 1,910,000,000 results
  - Noun
    - A formal request to an authority for something
    - The action or process of making such a request
  - Synonyms
    - request use petition

## nope, it's application software

- wikipedia >> application software
  - Application software, also known as an application or an app,
    - computer software designed to help the user to perform specific tasks
    - examples include
      - enterprise software, accounting software, office suites, graphics software and media players
  - Recently, the abbreviation **app** has specifically come to mean application software written **for mobile devices**
- 2013 reports
  - 800.000 iOS apps
  - 800.000 Android apps
  - 145.000 Windows apps
  - 120.000 BlackBerry

# Web application design: do we get the picture now?

Organization and structuring of various elements into an interactive composition to become an application software that provides web functionalities according to specifications

# are there any principles?

- Design of an **effective web application** 
  - more than just gathering data and posting
  - that involves aspects regarding
    - (research)
    - organization
    - selection
    - presentation
    - interaction
  - with ultimate goal
    - be clear
    - be consistent
    - be **engaging**

- Checklist
  - Audience
    - interests, needs, tech level, device
  - Purpose
    - personal, corporate, educational, entertainment
  - Location
    - ISP, organization, personal
  - Content
    - Content type (text, graphics, video, forms)
    - Home page (intro data and statement)
    - Content (matching purpose, current, appropriate)
  - Technology
    - graphics, videos, apps and interactivity
  - Style
    - pro, casual, artistic, scholarly, child/teen
    - consistency, navigation clarity
  - Copyrights
    - if any, clearly stated and considered

- Many different approaches
  - 4 principles
    - Contrast
      - color, sizes, textures, fonts-gives focal point
    - Repetition
      - repetition of elements, consistency
    - Alignment
      - layout, grid
    - Proximity
      - alike elements together-grouping, layout

- Many different approaches
  - 5 principles
    - Balance
      - element weight-layout
    - Contrast
      - color, sizes, textures, fonts
    - Emphasis
      - attention-fonts, semantic markup, color
    - Rhythm
      - repetition of elements, consistency
    - Unity
      - alike elements together-grouping, layout

- Many different approaches
  - 7 principles
    - Balance
      - weight of elements and symmetry
    - Grid
      - "compartmentization" columns golden ratio
    - Color
      - stick to color palettes (colourlovers.com)
      - get accustomed to contemporary trends (bestwebgallery.com)
    - Graphics
      - graphics add to the visual message carefully
    - Typography
      - careful selection not the same for everyone
    - White space or negative space
      - makes content stand out and adds 'class'
    - Connection
      - consistency together with unity

# web design principles

- Many different approaches
  - 8 principles
    - Visual hierarchy
      - prominent visuals get the attention
    - Divine proportions
      - golden ratio φ=1.618... (http://www.miniwebtool.com/golden-section-calculator/)
    - Hick's law
      - every additional choice increases the time required to take a decision
    - Fitt's law
      - the time required to move to a target area (e.g. click a button) is a function of the distance to the target and the size of the target
    - Rule of thirds
      - best images follow the rule of thirds (similar to  $\varphi$ )
    - Gestalt design laws (perception)
      - the whole exists independently of the parts
    - White space and clean design
      - enables objects to exist in the page
    - Occam's razor
      - the simplest solution is usually best

# web design principles

- Many different approaches
  - 9 principles
    - Precedence
      - guide the eye with position, color, contrast, size
    - Spacing
      - spacing makes things clearer (lines, padding)
    - Navigation
      - where are you? where can you go?
    - Design to build
      - still in photoshop...but can it be really coded?
    - Typography
      - most common element of design
    - Usability
      - it ain't about pretty pictures!
    - Alignment
      - ordering, consistency
    - Clarity
      - it's all about the pixels
    - Consistency
      - theme everything to be coherent between pages

## web design principles

- Many different approaches
  - 10 principles
    - · Don't make users think
      - be obvious and self-explanatory
    - · Don't squander users' patience
      - the less action is required from users the more likely is to get satisfied
    - · Manage to focus users' attention
      - guide users through the steps you want them to take
    - Strive for feature exposure
      - letting the user see clearly what functions are available is a fundamental principle of successful user interface design
    - Make use of effective writing
      - get to the point and avoid cute words and exaggeration
    - Strive for simplicity
      - The "keep it simple" principle
    - · Don't be afraid of the white space
      - reduces the cognitive load and complexity
    - Communicate effectively with a "visible language"
      - organize economize communicate (match to the user)
    - Conventions are our friends
      - conventions reduce the learning curve
    - Test early, test often (TETO)
      - TETO-principle should be applied to every web design project

# aha...and what do users have to say?

is there a way to evaluate users experience, attention and preference?

# what do users think• Eye tracking - not only a face



Less attention

# what do users think• Eye tracking - banner blindness



Less attention

More attention

• Eye tracking - search results



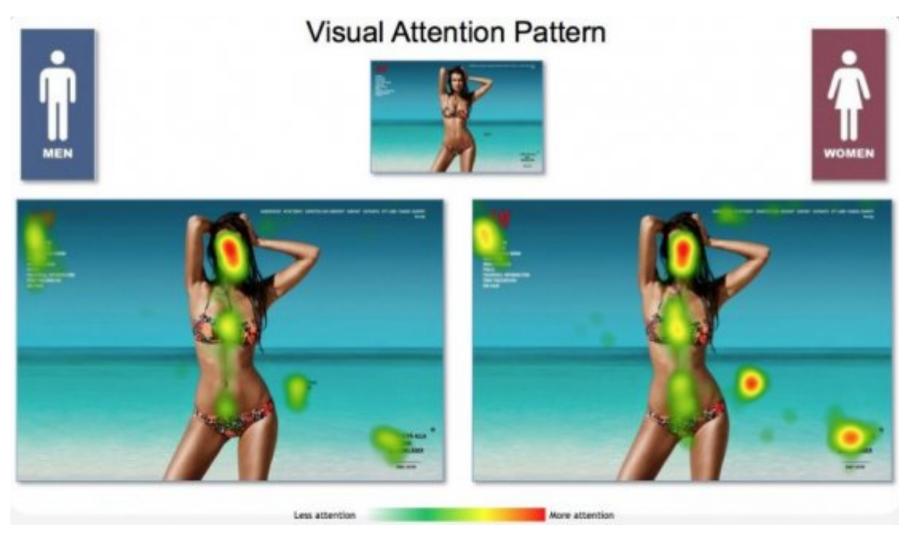
• Eye tracking - photos win



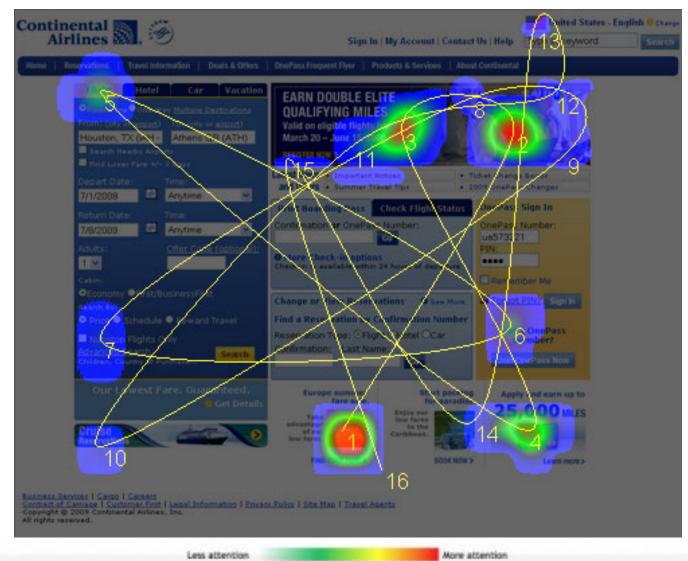
Less attention

More attention

• Eye tracking - men & women



• Eye tracking-there is also the path



# ok, and how is this useful?

## redesign for the use



## redesign for the use

## original

#### Will Wait for Food

Judging by the long, snaking lines you encounter outside burger shacks and burnto hurs these days, an alien visitor to our city might think that there was a pre-perestroika, Soviet-style food-rationing program going on. How long are you wilting to wait for a hunk of cheese, a spicy tuna roll, or an adorable cupcake? Find out below, and whether it's worth it.

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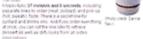
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#### Burger Joint

atLe Parker Nondien, 113 IV 50th St. Senind the OUTSIN OT THE NODY Monday, 120 p.m. The Wart A clamorous 26 minutes and 42 seconds, with lowd classic rock and an overworked, understaffed by station contributing to the chaos and our temporarily misplacing our ticket

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#### Magnolia Bakery

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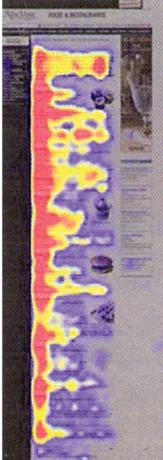
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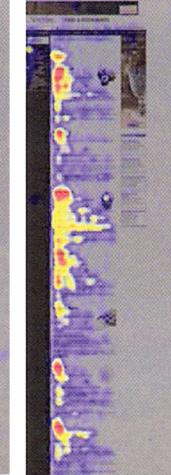
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### Magnolia Bakery



## we need some psychology and understanding of human perception to get things going...

in addition, we have to remember sex and age differences, while trying to keep it clean, clear, organized and simple...yet artistic...