

Web applications design

Semester B, Mandatory modules, ECTS Units: 3

<http://webdesign.georgepavrides.info>

George Pavlides

<http://georgepavrides.info>

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 Javascript
 - 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

what is "design" after all?

what is "design" after all?

- 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

what is "design" after all?

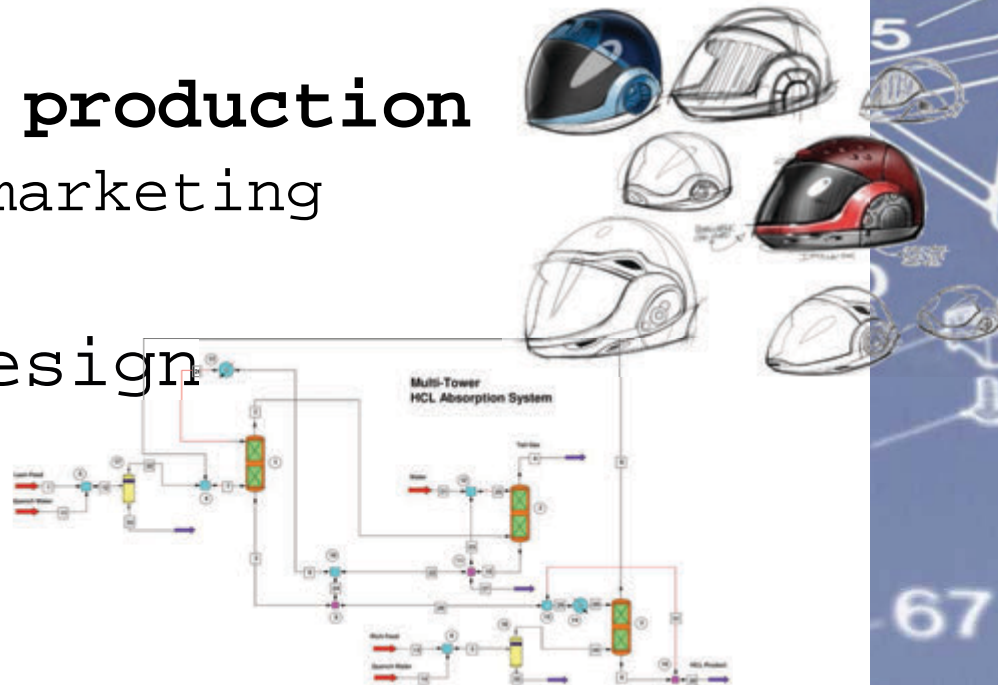
- <http://dictionary.reference.com/>
 - verb (with/without an object)
 - to **prepare** the preliminary sketch or the plans for (a work to be executed), especially to plan the form and structure of: *to design a new bridge*
 - to **plan and fashion** artistically or skillfully
 - to **intend** for a 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*
 - Obsolete. to **mark out**, as by a sign to indicate

what is "design" after all?

- <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?

- 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 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

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 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

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

Sue Beyer painting: An intricate transportation network webs from coast to coast

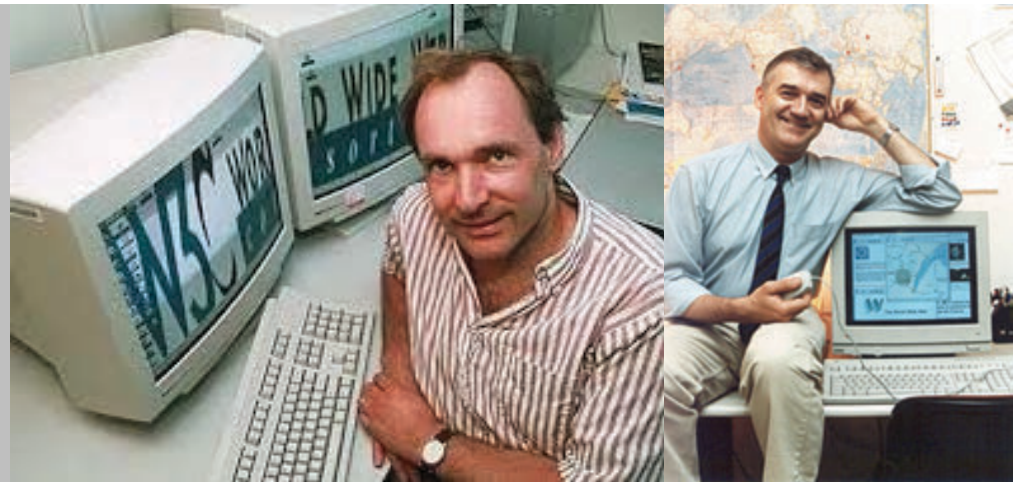


...well, not that "web"

- 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"

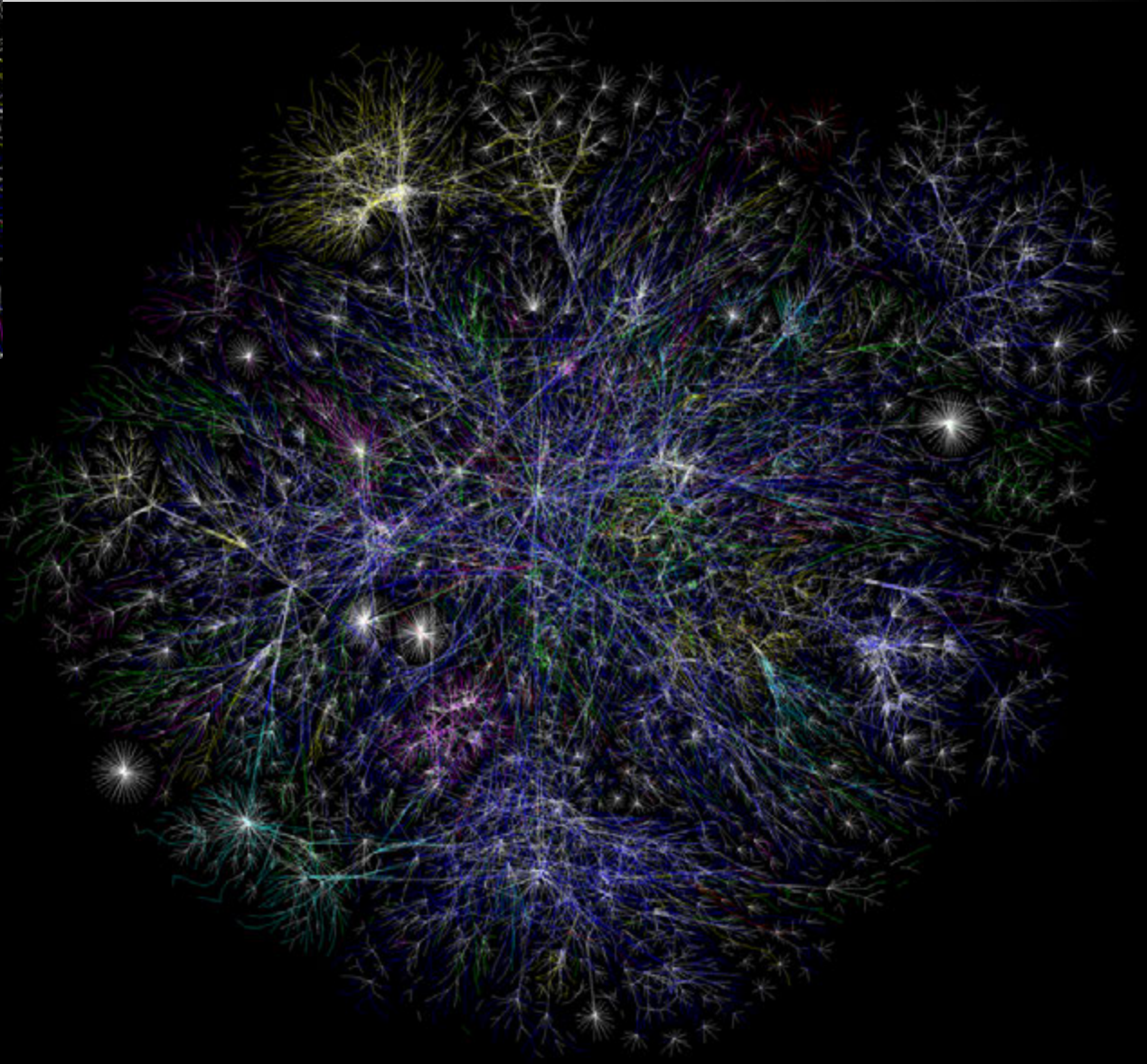
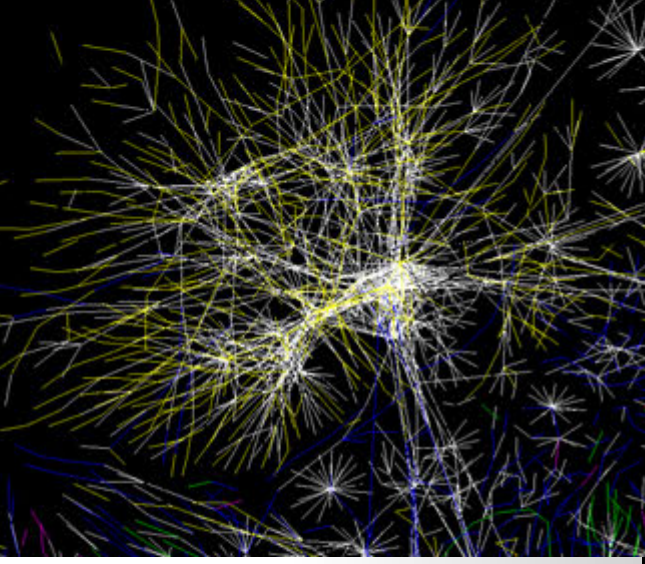


the web

- 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

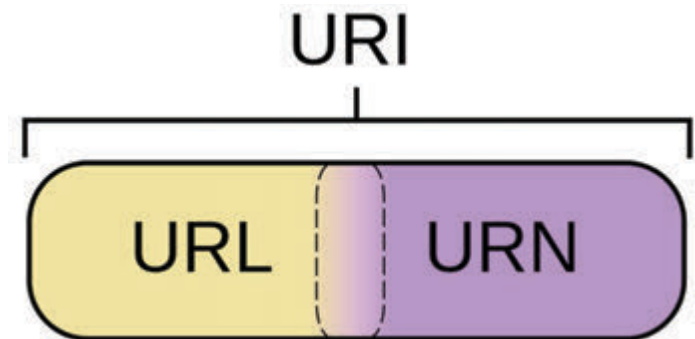
the internet

An **Opte Project**
visualization of routing
paths through a 30% portion



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



"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**
 - **https://www.facebook.com/da.username**
 - 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`

`foo://example.com:8042/over/there?name=ferret#nose`

\ / \ \ / \ \ / \ /

| | | | |

scheme authority path query fragment

| |

/ \ / \

`urn:example:animal:ferret:nose`

...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'



https://www.

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?

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

web design 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**

web design principles

- 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

web design principles

- 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

web design principles

- 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

web design principles

- 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 $\phi=1.618\dots$
(<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 ϕ)
 - **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

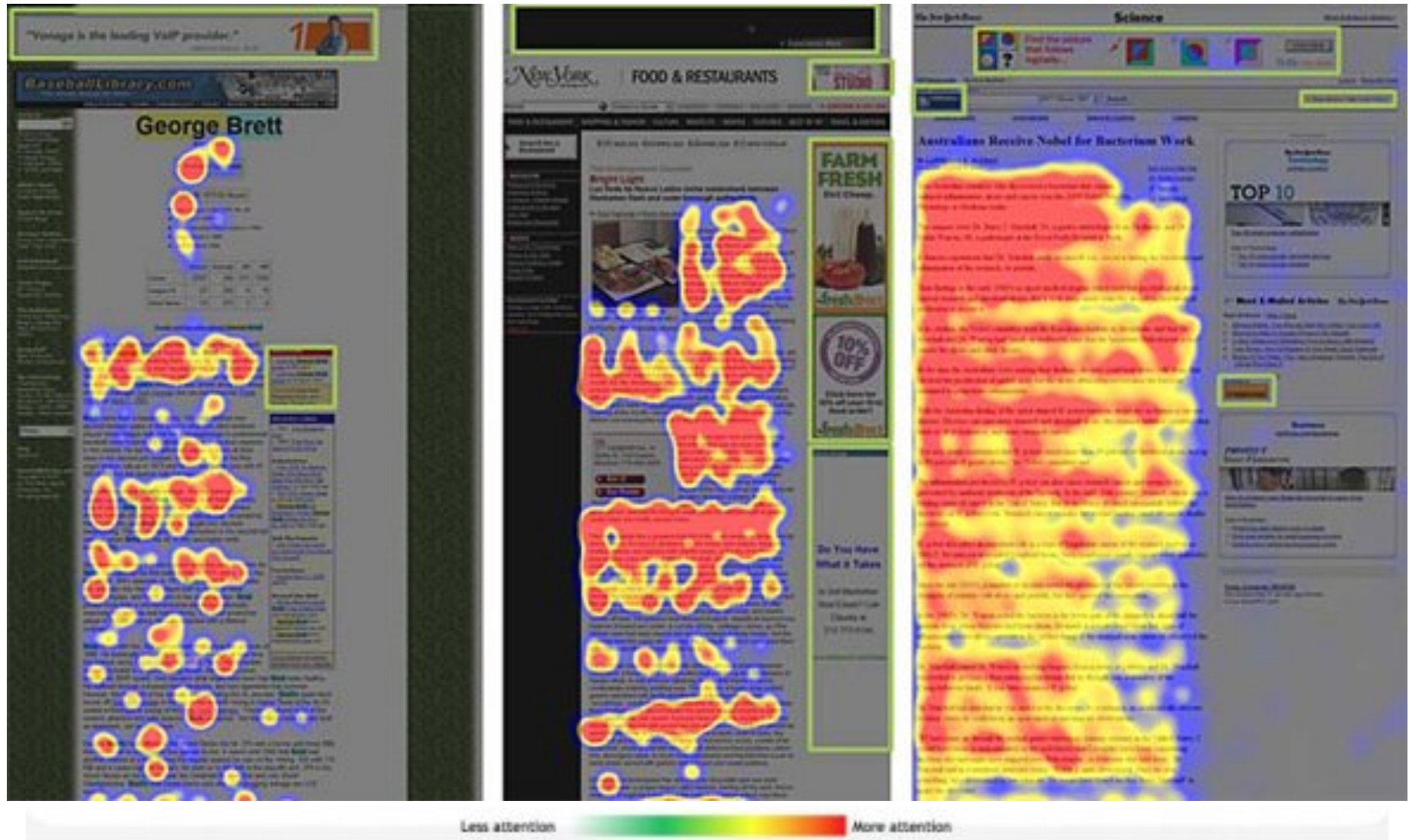
- Eye tracking - not only a face



Less attention  More attention

what do users think

- Eye tracking – banner blindness



Less attention More attention

- Less attention More attention

what do users think

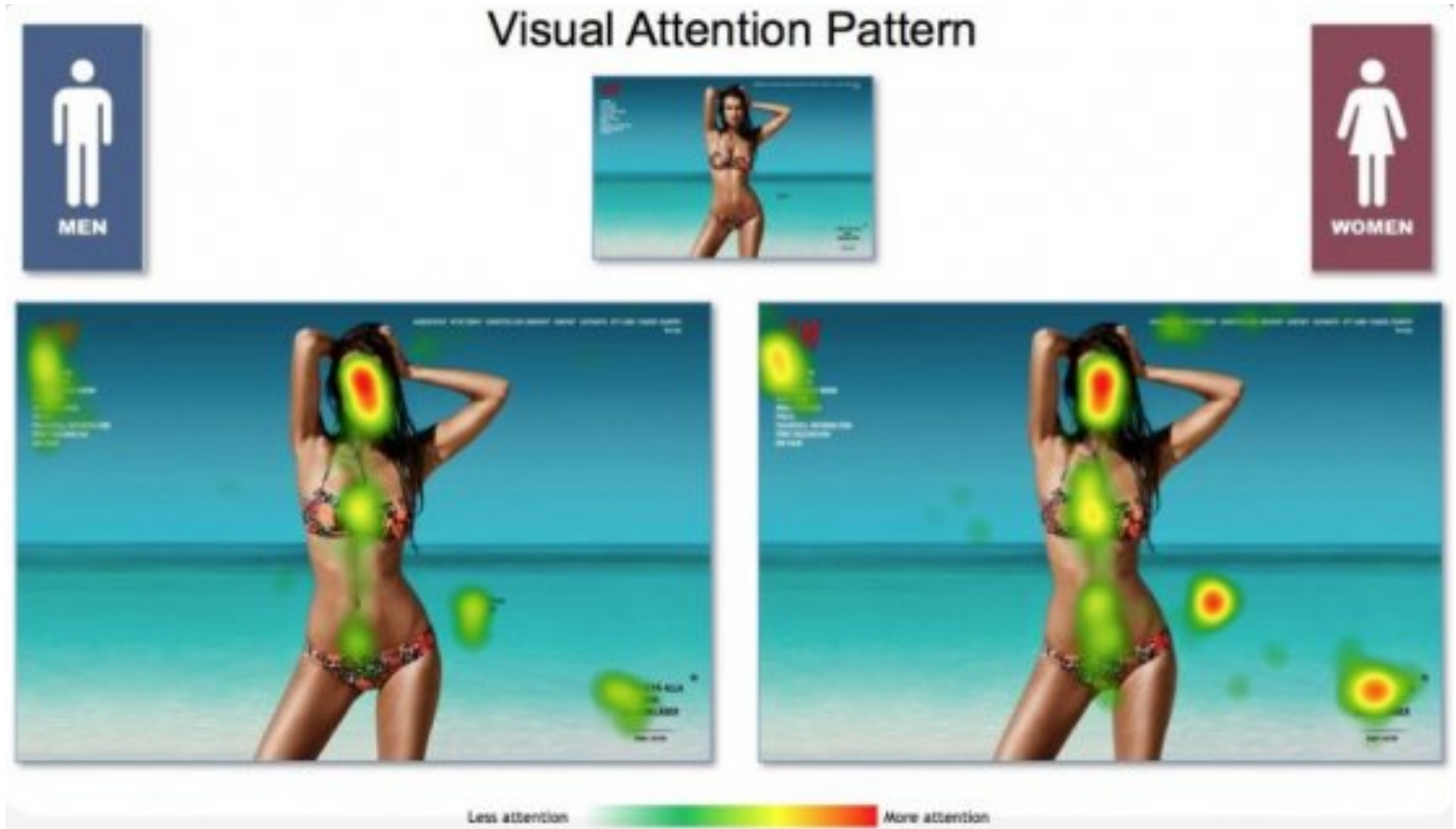
- Eye tracking - photos win



Less attention  More attention

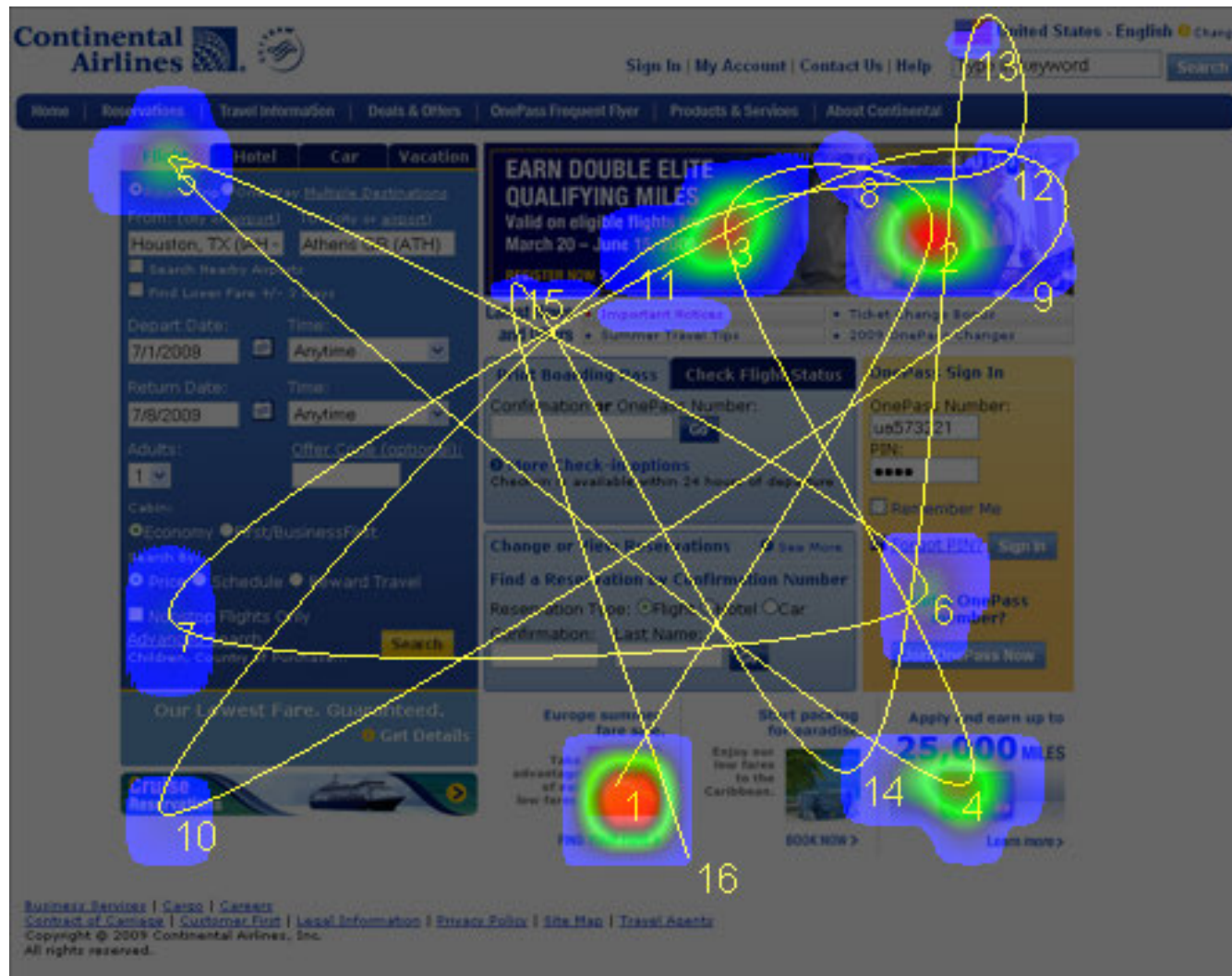
what do users think

- Eye tracking - men & women



what do users think

- Eye tracking—there is also the path



ok, and how is this useful?

redesign for the use



High Low

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...