

Web Technologies

Kamran
Lecture 1

- ◆ Book

- ◆ 1) Web Engineering The Discipline of Systematic Development of Web Applications
- ◆ Kappel, G., Proll, B. Reich, S. & Retschitzegger, W. (2006). Web Engineering, 1st ed. Hoboken, NJ: Wiley & Sons. ISBN: 04700-1554-3.
- ◆ 2) Wrox, Beginning HTML, XHTML, CSS and JavaScript, Jon Duckett
- ◆ 3) W3Schools.com

Languages and Tools

- ◆ HTML
- ◆ CSS
- ◆ JavaScript
 - jQuery
 - AJAX
- ◆ Bootstrap
- ◆ PHP
- ◆ ASP.NET
- ◆ C#
- ◆ Node Js
- ◆ XAMPP , VS Code

XAMPP Control Panel v3.2.2 [Compiled: Nov 12th 2015]

XAMPP Control Panel v3.2.2

Service	Module	PID(s)	Port(s)	Actions			
	Apache			Start	Admin	Config	Logs
	MySQL			Start	Admin	Config	Logs
	FileZilla			Start	Admin	Config	Logs
	Mercury			Start	Admin	Config	Logs
	Tomcat			Start	Admin	Config	Logs

Modules

Config

Netstat

Shell

Explorer

Services

Help

Quit

```
3:47:46 PM [main] Initializing Control Panel
3:47:46 PM [main] Windows Version: Windows Server 2012 R2 64-bit
3:47:46 PM [main] XAMPP Version: 5.5.30
3:47:46 PM [main] Control Panel Version: 3.2.2 [ Compiled: Nov 12th 2015 ]
3:47:46 PM [main] Running with Administrator rights - good!
3:47:46 PM [main] XAMPP Installation Directory: "c:\xampp5.6\
3:47:46 PM [main] Checking for prerequisites
3:47:46 PM [main] All prerequisites found
3:47:46 PM [main] Initializing Modules
```

< >

- ◆ The World Wide Web is omnipresent!
- ◆ Why?
 - ◆ global and permanent availability
 - ◆ comfortable and uniform access
 - ◆ anyone can produce and publish contents

- ◆ **Web Engineering:**
- ◆ Web engineering is basically all about designing and promoting web based systems.

What is Web Engineering

- ◆ The application of systematic and quantifiable approaches to cost-effective analysis, design, implementation, testing, operation, and maintenance of high-quality Web applications.” – Kappel et al.

Defining Web Applications

- ◆ A *Web application* is a system that utilizes W3C standards & technologies to deliver Web-specific resources to clients (typically) through a browser.
 - A strict definition that ensures software and UI aspects of the Web are examined carefully
- ◆ Technology + interaction.
 - Web site with no software components?
 - Web services?

Development of Web Applications: today's approach

- ◆ ad-hoc development
- ◆ based on knowledge, experiences and practices of individual developers
- ◆ reuse of existing applications by “copy&paste” approach
- ◆ insufficient documentation of design decisions
- ◆ isolated activity: no “design for change”
- ◆ missing methodical approach

Reasons for Quality Deficiencies

- ◆ document-centered view
 - ◆ development of web applications seen as editorial activity: “
(textual) web pages, links and use of graphics”
- ◆ misconception that web applications are simple
 - ◆ due to availability of tools like HTML-editors and form generators
- ◆ no use of know-how of relevant disciplines
 - ◆ no use of software engineering know-how
 - ◆ no use of hypermedia or HCI (Human Computer Interaction) know-how

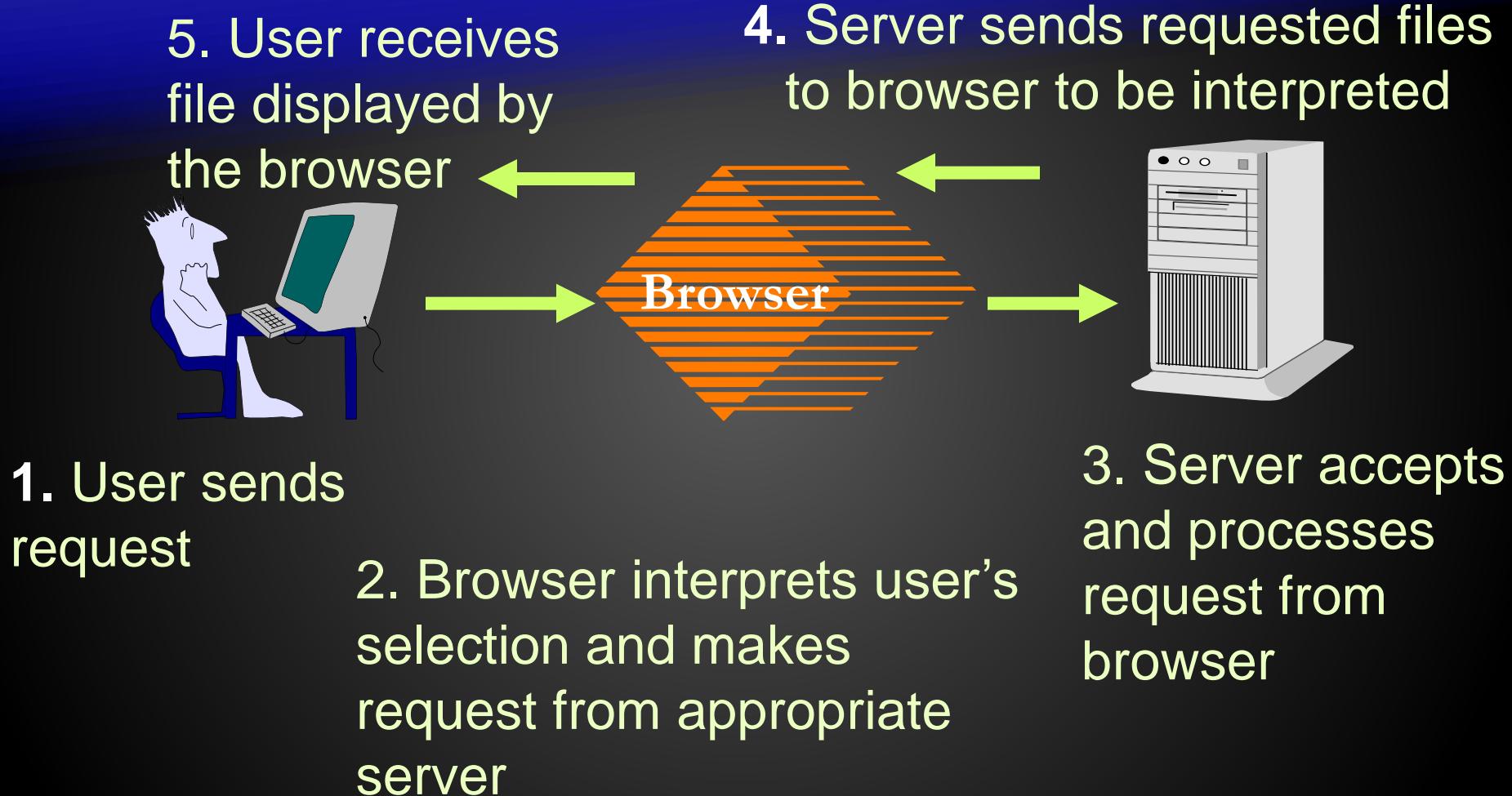
Web Crisis

- comparable to software crisis at the end of the 60'ies
- lead to origin of “software engineering” discipline
- “web engineering” is needed!

- ◆ **Web client**- machine that initiates internet request
- ◆ **Web server** – machine that services internet request
- ◆ **Browser** - software at the client side to interact with web data
- ◆ **Intranet** – an internal network of computers confined to a single place
- ◆ **Extranet** – when two or more intranets are connected with each other, they form an Extranet – e.g, Virtual Private Network
- ◆ **Internet** – a global network of networks

- ◆ **WWW = World Wide Web = Web**
 - ◆ **Global distributed information system in Internet**
 - ◆ **A service in Internet (like E-mail, DNS, ...)**
 - ◆ **Consists of set of documents (and other resources) located on different Internet servers**
 - ◆ **Accessed through standard protocols like HTTP, HTTPS and FTP by their URL**
 - ◆ **Web servers provide Web content**
 - ◆ **Web browsers display the Web content**

Web application development

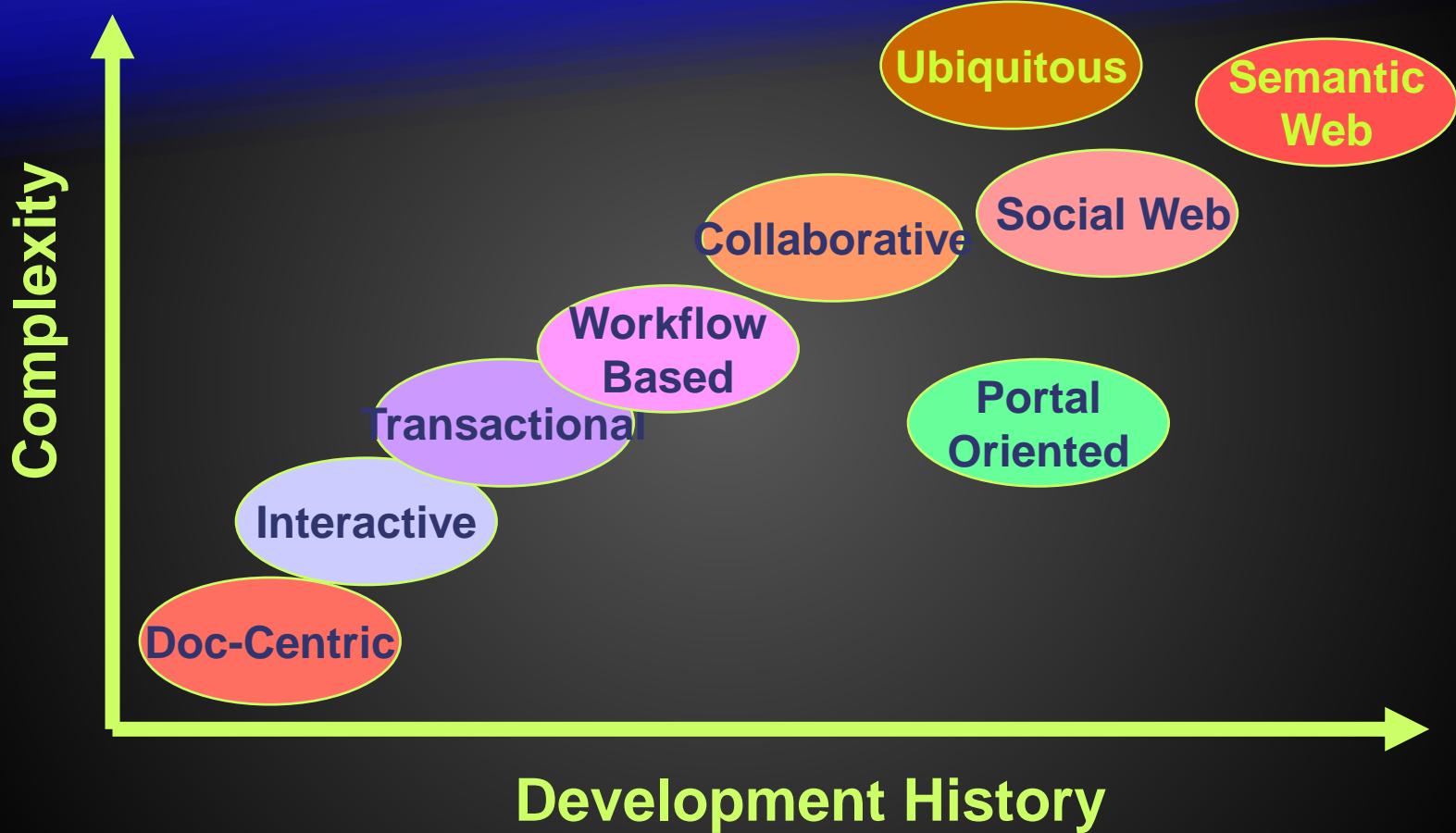


- ◆ Application development on the Web remains largely *ad hoc*.
 - ◆ Spontaneous, one-time events
 - ◆ Individual experience
 - ◆ Little or no documentation for code/design
- ◆ Short-term savings lead to long-term problems in operation, maintenance, usability, etc.
- ◆ Because Web apps are so interdependent, the problem is compounded.

- ◆ Root Causes of poor design
 - ◆ Development as an authoring activity
 - ◆ Development is “easy”
 - ◆ Techniques that *should not* be used are misapplied.
 - ◆ Techniques that *should* be used are *not*.
- ◆ Particularly alarming given...
 - ◆ Most projects are now Web-based
 - ◆ More “mission-critical” apps moving to the Web

- ◆ Top project pitfalls (Cutter, 2000)
 - 84% - Failure to meet business objectives
 - 79% - Project schedule delays
 - 63% - Budget overrun
 - 53% - Lack of functionality
- ◆ Web Engineering's solution:
 - Clearly defined goals & objectives
 - Systematic, phased development
 - Careful planning

Categories of Web Applications



- ◆ Precursors to Web applications
- ◆ Static HTML documents
- ◆ Manual updates
- ◆ Pros
 - ◆ Simple, stable, short response times
- ◆ Cons
 - ◆ High management costs for frequent updates & large collections
 - ◆ More prone to inconsistent/redundant info
- ◆ Example: static home pages

◆ Content of a website is dynamically generated as response to a user request

◆ form-based input is the primary mechanism for communication between client and server

◆ usage of HTML-forms and Common Gateway Interface (CGI) techniques

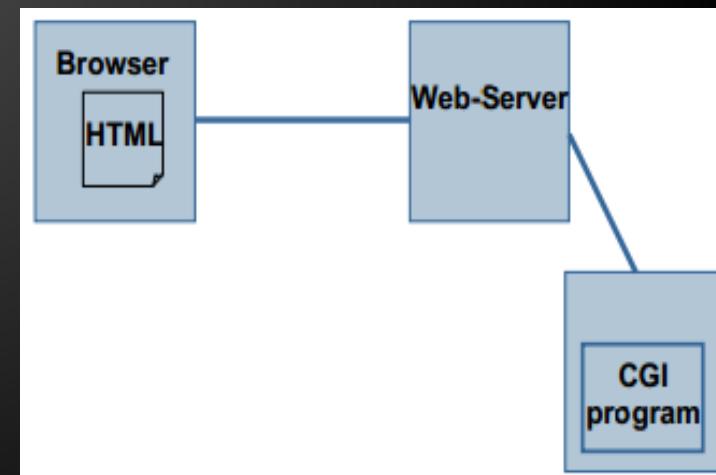
◆ radio button, string input, choice lists

◆ examples:

◆ dynamic HTML pages

◆ public transport schedules

◆ search engines



- ◆ complex interactions
- ◆ read and write actions
- ◆ usage of transaction management of database systems
 - ◆ efficient and consistent data management
 - ◆ structured data and queries
- ◆ Examples: news sites, booking systems, online banking

- ◆ A workflow application is a software tool that automates the tasks involved in a business process.
- ◆ Designed to handle business processes across departments, organizations & enterprises
- ◆ Business logic defines the structure
- ◆ The role of Web services
 - ◆ Interoperability
 - ◆ Loosely-coupled
 - ◆ Standards-based
- ◆ Examples: B2B & e-Government

- ◆ Unstructured, cooperative environments
- ◆ support cooperation in case of unstructured flow of activities and high degree of communication
- ◆ examples:
 - ◆ support of shared information- and workspaces
 - ◆ Wiki, <http://c2.com/cgi/wiki>
 - ◆ chat rooms
 - ◆ e-Learning platforms

◆ Berners-Lee: Information on the Web should be readable to machines, as well as humans.

◆ information available on the web

- ◆ adequate for human understanding and
- ◆ adequate for automatic manipulation
- ◆ „knowledge management“
 - ◆ derivation of new knowledge
 - ◆ re-use of knowledge (RSS, Atom)
 - ◆ based on ontology's
- ◆ examples: Web 2.0, social software: wiki, Flickr, del.icio.us, Google

- ◆ Single points-of-entry to heterogeneous information

- ◆ Yahoo!, AOL.com, portal.kfupm.edu.sa

- ◆ Specialized portals

- ◆ Marketplace portals (horizontal & vertical)
- ◆ Daraz example of vertical marketplaces
- ◆ Uber, Airbnb, TaskRabbit, METRO Market, and Rover are all examples of vertical marketplaces
- ◆ Horizontal portals have “something for everyone” and appeal to a wide range of interests. Aol or Yahoo UK are prime examples, (e. B2C)

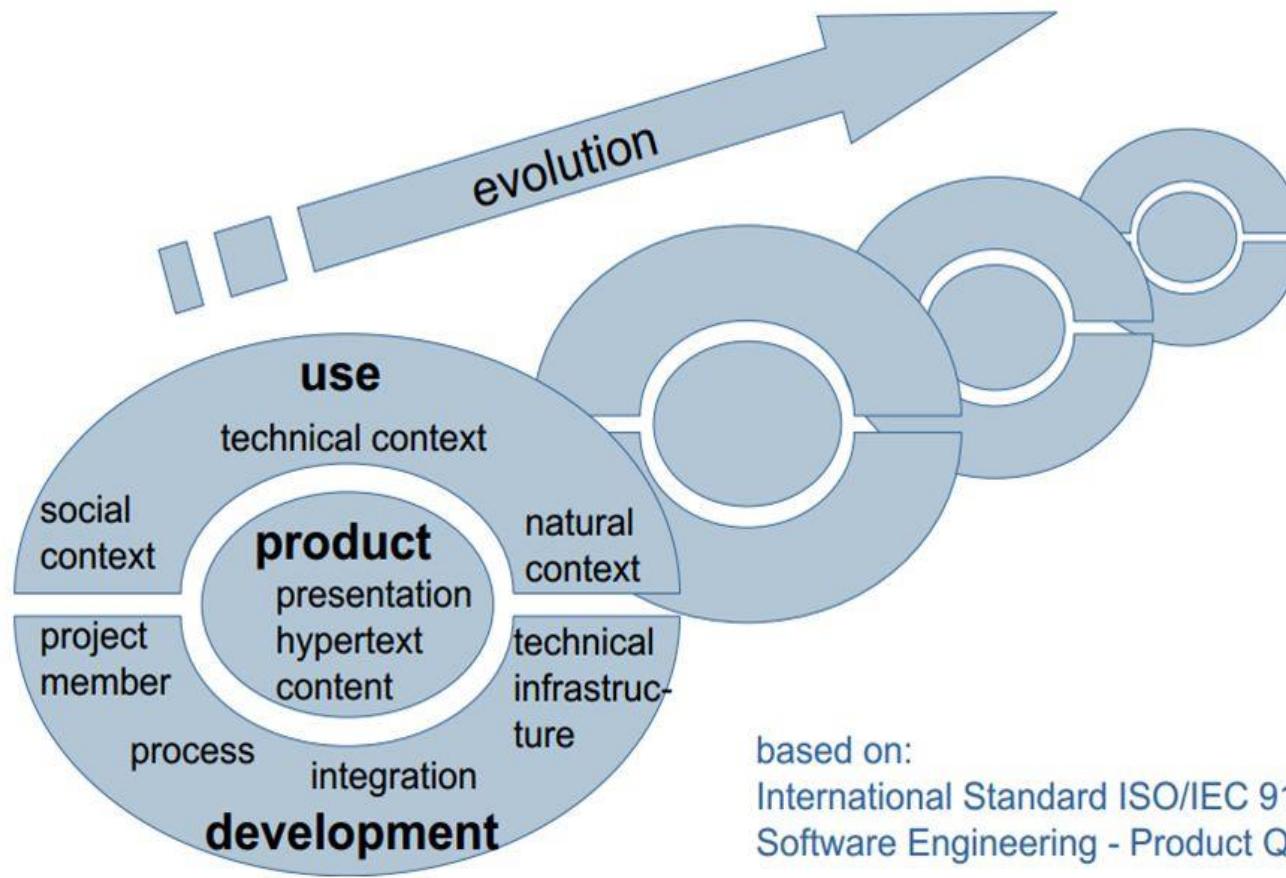
telerik Ubiquitous web applications (UWA)

- ◆ UWA are a new type of web applications which are accessed in various contexts, i.e. through different devices, by users with various interests, at anytime from anyplace around the globe!
- ◆ HCI is critical
 - Limitations of devices (screen size, bandwidth?)
 - Context of use
- ◆ Still an emerging field; most devices have single focus:
 - Personalization
 - Location-aware
 - Multi-platform delivery

Characteristics of Web Apps

- ◆ How do Web applications differ from traditional applications?
- ◆ Or, another way, what Software Engineering methods & techniques can be adapted to Web Engineering?
- ◆ 3 dimensions of the ISO/IEC 9126-1 standard
 - ◆ Product
 - ◆ Usage
 - ◆ Development
- ◆ To this we can add a 4th dimension peculiar on the web, need for continuous and fast evolution!

Characteristics of Web Applications



- ◆ Product-related characteristics constitute the “building blocks” of a Web application
- ◆ Content
 - document-centered and multi-media text, tables, graphics, animation, audio, video
 - main objective of web applications is to communicate content high usability demands
 - Quality demands: current, exact, consistent, reliable
- ◆ Navigation Structure (Hypertext)
 - Non-linearity , Potential problems: Disorientation & cognitive overload
- ◆ User interface (Presentation)
 - Aesthetics
 - Self-explanation



Product

- Presentation
- Hypertext
- Content

Characteristics of Web Applications:

Content

- Product-related characteristics constitute the “building blocks” of a Web application
- document-centered and multi-media
 - text, tables, graphics, animation, audio, video
 - main objective of web applications is to communicate content
 - high usability demands
- high quality demands
 - actuality, preciseness, correctness, reliability, size
 - e-shopping: information about price, availability of products
 - quality is critical factor for acceptance of web applications

Product

- Presentation
- Hypertext
- Content

Characteristics of Web Applications:

Hypertext

- non-linearity
 - main distinction to traditional software systems
 - systematic reading (“browsing, query, guided tour”)
 - navigation in information space depends on interest and previous knowledge of user
 - great challenge for web application authors
- risks
 - disorientation: loss of sense of locality and direction
 - cognitive overload for users

Product

- Presentation
- Hypertext
- Content

Characteristics of Web Applications:

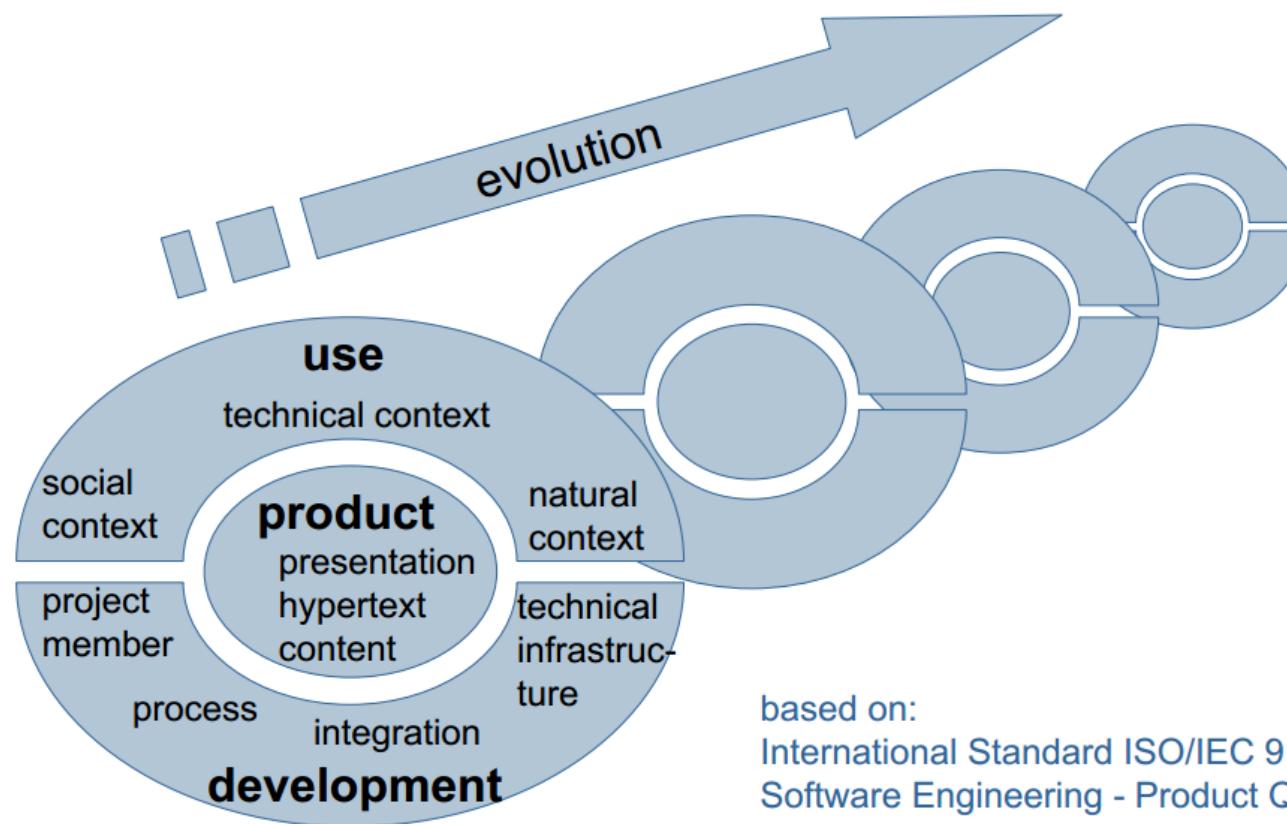
Presentation

- aesthetics
 - look and feel
 - depending on current fashion
- self-explanatory
 - intuitive use without reading any documentation
 - uniform application logics

Product

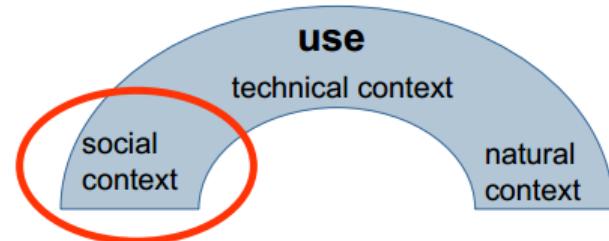
- Presentation
- Hypertext
- Content

Characteristics of Web Applications



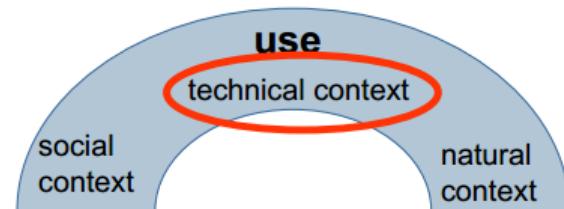
Characteristics of Web Applications:

- spontaneity
 - users come and go ..
 - unknown number of users
 - scalability important issue
- multiculturality
 - anonymous type of user
 - limited knowledge about previous knowledge, handicaps, preferences of users
 - desired adaptation of content and presentation



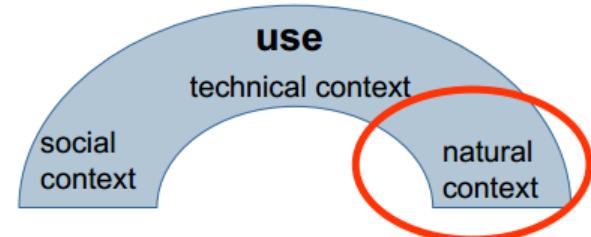
Characteristics of Web Applications:

- quality of service
 - unknown network characteristics (e.g., bandwidth, rel
- multi platform delivery
 - different types of devices (PC, tablet, mobile phone)
 - different versions of browsers
 - different degree of functionality, performance, display size, ...



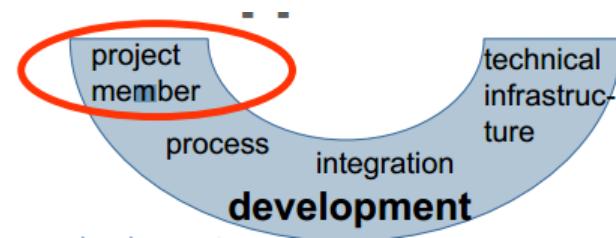
Characteristics of Web Applications:

- place and time of access
- globality
 - internationalization of web applications
 - regional, cultural, linguistic differences have to be taken into account
 - demands on security
 - prevent access to private or confidential data
- availability
 - instant delivery mechanism (also in case of partial realizations)
 - permanent (24/7)
 - time-dependent services



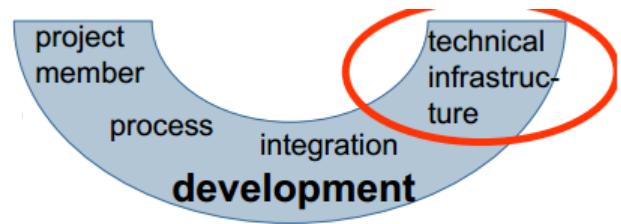
Characteristics of Web Applications:

- multi disciplinary
 - mixture of
 - print publishing and software development
 - marketing and computer science
 - art and technology
 - IT-experts, hypertext experts, UI designer, domain experts, ...
- young average age of developers
 - “technology freak”
- community development
 - open source
 - open content



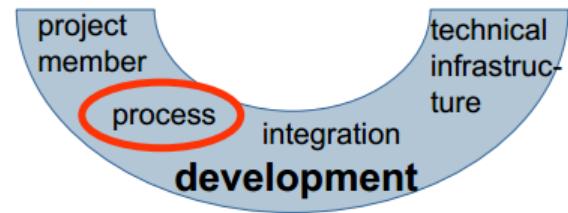
Characteristics of Web Applications:

- inhomogeneity
 - two essential components
 - Web server (under control of developer)
 - Web browser (out of control of developer)
- immaturity
 - “buggy” components due to time-to-market pressure
 - continuous evolution of base technology



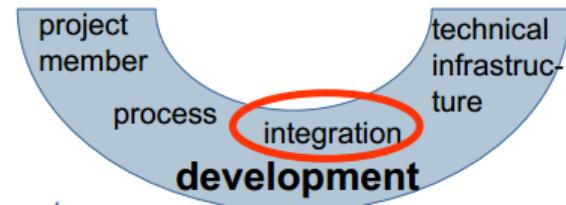
Characteristics of Web Applications:

- flexibility
 - changing requirements
 - changing context
 - requires agile, light-weight processes
- parallelism
 - of development of parts of web applications
 - of development steps

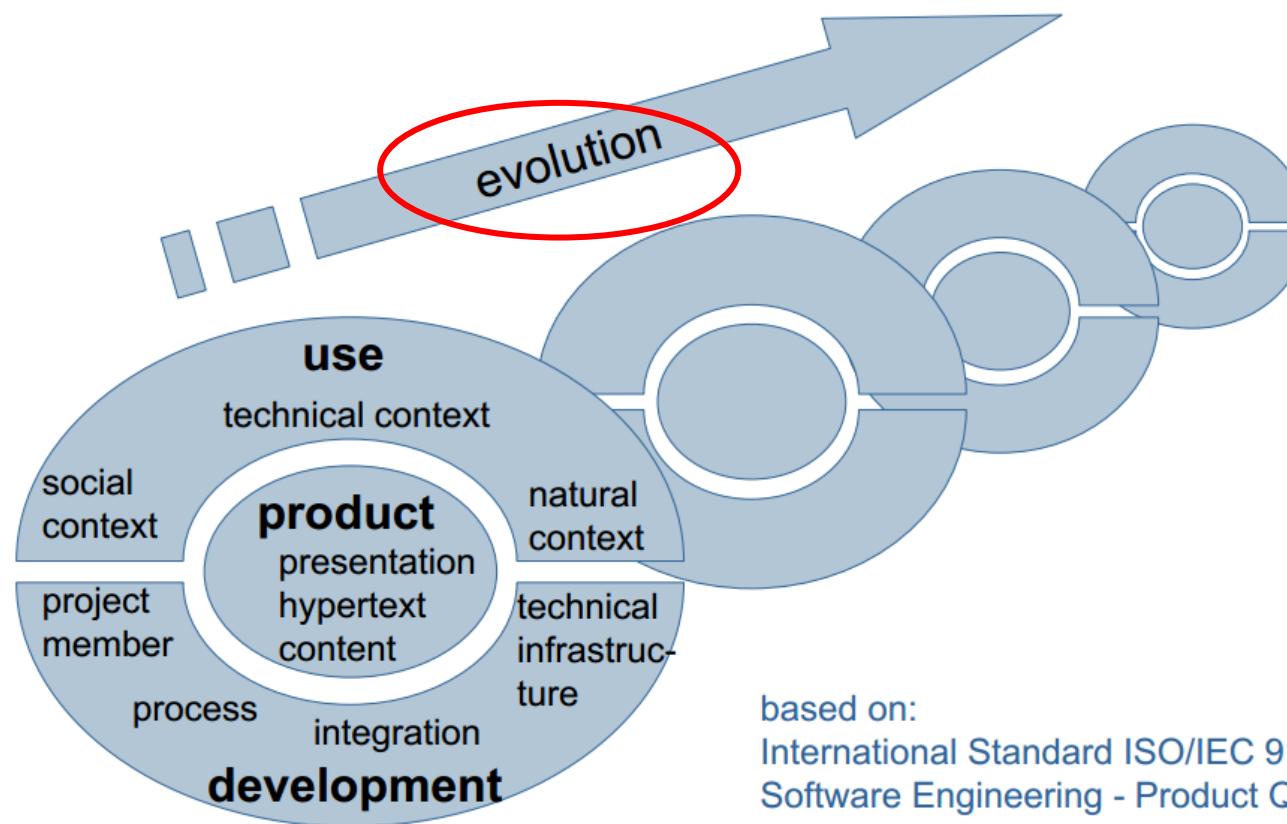


Characteristics of Web Applications:

- internal integration
 - add web access to legacy systems
- external integration
 - of content and services of external web applications (“web services”)
 - similarity to integration of heterogeneous database systems, but
 - high autonomy of sources w.r.t. to availability and change
 - few detailed information about sources
 - heterogeneity on different levels (data, schema, data model)



Characteristics of Web Applications



Characteristics of Web Applications:

- All the above mentioned dimension are governed by evolution principle
- continuous change
 - permanent evolution
 - changing requirements and contexts
 - change of characteristics product, use, or development
- competitive pressure
 - time-to-market
 - necessity of web presence
 - leads to shorter product life cycles
 - leads to shorter development cycles
- fast pace
 - “either you are fast or irrelevant”



- ◆ Read first chapter of book (Web Engineering
- ◆ The Discipline of Systematic Development
- ◆ of Web Applications by Gerti Kappel)

Questions?