What is hypermedia?

- For most people, it is the WWW
- It is an application which allows us to navigate through an information space using associative linking
  - Non linear
  - Interactive
- The user is not constrained to read it in a specific order
- Instead, the user can choose one of many different paths
Characteristics of Hypermedia

- Non linearity
- Meaningful collection of nodes
- Use of multiple types of media (hence hypermedia)
- Cohesive integration of media

Hypermedia can be implemented in different ways:
- "Nodes" can be presented in separate windows or overlayed screens
- Link can be uni- or bi-directional

The main goal of hypermedia: Enabling access to information
Hypertext and Hypermedia

- Hypertext, strictly speaking, does not involve any other type of media except text.
- Often they are used interchangeably
- Hypermedia extends hypertext with other types of media
- Hypermedia application: the end result of the hypermedia development process, the product which has been developed for end-users
Hypermedia Applications

![Diagram showing hypermedia applications]

Structural focus: long-life evolutionary
- Service manuals
- Parts catalogues
- Documentation
- Reference works
- Educational material
- Archives and Journals
- Image/Audio/Text libraries

Presentation focus: short-life and one-off
- Annual reports
- Electronic magazines
- Marketing material
- Promotional material
- Advertisements
- Announcements

Small size
- Correspondence
- Memos
- Letters
- Updates
- Hypertext fiction
Large Size Hypermedia Applications

- Large does not only mean that it has lots of data
- It usually means that the application is complex
  - Lots of types of data
  - Lots of relationships
  - Multiple views
  - Multiple developers
  - Multiple users
  - Usually have a long life (require plenty of maintenance)
What a Web Application is

• An application that combines:
  – Hypermedia features
  – An optional software application back-end
  – Uses the Web as its main transport medium (http protocol)

• Two main categories:
  – Informational applications
  – Software applications

• Applications are evolving into a combination of both

• For the purpose of this course, a Web Application is a hypermedia applications

- Effective Navigation
- Searching and Indexing
- Information contextualization
- Handling of information security
- Appropriate presentation mechanisms
- Support for Customization
- Effective use of resources
- Handling of temporal data
Non functional characteristics

• Correctness
• Referential integrity
• Relevance
• Completeness
• Organization
Non functional characteristics...

- Efficiency
- Maintainability
- Reusability
- Reliability
- Testability
- Interoperatibility, flexibility, portability and genericness
Examples of Web Applications

- Any Web site you can think of!
- E-commerce sites
- Intranets
- Corporate Web sites
- Help systems
- Auction sites
- ... software systems that use the Web as its interface
Soft. Apps vs. Web Apps

- Most Web Apps are document oriented and content driven, having as final product static and/or dynamic pages
- Look and feel is critical in Web Apps
- The WWW is an unreliable medium
- Wide range of users
Two Types of Developers

- Document, hypermedia and graphics design people trying to build software systems.
- Software developers having to adapt their applications to the hypermedia and WWW world.
- Regardless on which side you are, you need to learn from the other.
A Multidisciplinary Field

Web Engineering

- Multimedia
- Hypertext/Hypermedia
- Graphic Design
- Project Management
- Testing
- Software Engineering
- System Analysis and Design
- Marketing
- Human–Computer Interaction

2–14 Introduction to Hypermedia (1.0.0) C SC 483b/ C SC 583a F03 dmgerman@uvic.ca
Hypermedia/Web Crisis

- Hypermedia is at the stage that software was 30 years ago
  - In general, ad-hoc, hand crafted development
  - There must a shift from the tools to a process that supports the development of large-scale, high quality applications.
  - It is necessary to adopt a “hypermedia/web engineering approach”
What is Web Engineering?

• Web Engineering is the establishment and use of sound scientific, engineering and management principles, and disciplined and systematic approaches to the successful development, deployment and maintenance of Web-based systems and applications.

• It tries to incorporate well-known software engineering principles and practices.
A different discipline

- “Fundamental differences [between hypermedia and other disciplines] however, make a pure transposition of techniques both difficult and inadequate. An important part of hypertext design concerns aesthetic and cognitive aspects that software engineering environments do not support”

Nanard and Nanard, 1995
The Web Engineering Process

Requirements Analysis

Conceptualization

Design

Prototyping

Implementation

Evolution
The Web Engineering Process

- Requirements Analysis
  - Definition of the application goals
  - The customer is often not the user
  - Human-Computer interaction plays an important role

- Conceptualization
  - Creation of an abstract model of the application that conveys the main characteristics of the application
  - It is necessary to capture the relationships as they appear to the user, not only data relationships
The Web Engineering Process...

- **Prototyping and Validation**
  - Testing of ideas at early state crucial
  - Emulate the look and feel
  - User feedback very important

- **Design**
  - Conceptual design is translated into a representation closer to the needs of the implementation
  - Requires a precise description of what the application is expected to do
  - Still fairly independent of implementation
The Web Engineering Process...

- Implementation
  - Choosing of final development and delivery platforms
  - Creating the different components of the application
  - Creating content and relationships
  - Coding

- Evolution and Maintenance
  - Changed due to bugs and new requirements

- It is a waterfall model
Development Constrains

- As with any engineering process, we are bounded by limits in resources:
  - Financial
  - Time
  - Human resources
  - Tools and technology
  - Hardware
  - Bandwidth, both at server and client
Separation of Concerns

A typical Web application is composed of the following main concerns:

- Content: the building blocks of your application
- Structure: collating and organizing content
- Navigation: what links to what
- Presentation: e.g. normal Web browser vs. wireless device, low vs. hi res, graphical vs. text
- Behaviour and user interaction: how the application reacts to user requests
- Process logic: what processes are required (data maintenance, report generation...)
Concentrate on the Design

- Determine what the concerns are:
  - What is the underlying content of your application?
  - How is this content organized?
  - What navigational facilities are you going to provide? What links are you going to provide?
  - How is the content going to be presented?
  - What is the behaviour?
Reuse

• Content reuse: building different uses for the same content
  – Different views: for different users, roles, purposes, or browsing platforms

• Implementation reuse: reusing the implementation infrastructure
  – Libraries, programs, components, Java Beans

• Design Reuse: reusing designs and design experience
  – Design Patterns
Areas of research

- Requirements analysis
- Specification, both formal and informal
- Configuration and Project Management
- User interfaces
- Information modeling
- Re-engineering of soft. app. for the Web
- Legacy W-BA
- Testing, verification and validation