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***Adapting the Website Design Method WSDM towards  
Recent Common Practices in Web Development***

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*Graduation thesis submitted in partial fulfillment of the requirements for the degree of  
Master in Computer Science*

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## Abstract

The Web Semantic Design Method (WSDM) is a method for designing websites that uses models to describe the informational, functional, and conceptual structures of the websites in detail. As a lot of websites are offering the same kind of functionality and information, a lot of these informational, functional, and conceptual models are being repeated for various tasks and various projects. To solve this problem, the concept of design patterns, i.e. the idea of reusing existing models to solve reoccurring problems, was introduced in this methodology earlier. However, these design patterns were related to quite low-level models, and represented the navigational and functional structure of trivial functions and flows. Therefore, the challenge was to escalate them, which means, defining design patterns from a higher level point of view, namely, based on “website genres”. Indeed, for one particular genre of website, websites have several significant factors in common. These significant commonalities can be marked as “design patterns”. For example, all “e-commerce” websites share certain functionalities such as shopping cart, product comparison, checkout, etc. Having such a high level definition of design patterns based on website genres would be quite useful, because firstly, it is known what should be included in the design of a website of a particular genre, and secondly, having a detailed model of a high level design pattern makes the design procedure for websites of the same genre much faster. Therefore, the main focus of the first part of this thesis is to identify various website genres, and then define several design patterns for each one of them. The scale of this phase can reach a level, where we would end up with having a complete library of website genres and related design patterns.

Another challenge for website design methodologies is the popularity of web content management system frameworks for implementing web systems. The existing design methodologies were developed before web content management systems became popular and mature for implementing more advanced web systems. Although there are some design methodologies in which the design or rather the implementation choice using a web content management system is taken into account, their methodologies are quite specialized to a particular web content management system framework and do not provide a general solution. Hence, the second part of this thesis is concerned with the adaptation of WSDM to be used in combination with a web content management system framework and the aim is to come up with a method applicable to all web content management system frameworks regardless of their specifics. To accomplish this, two different versions of WSDM are proposed in which, one is entirely dedicated to the design of web applications with web content management system frameworks.

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## 1. Introduction

The importance of having a proper design before starting any implementation is undoubtedly one of the most important aspects of any project belonging to any industry; the world of Web is no exception. As it will be seen in the next chapters, the importance of having a properly documented design was recognized a long time ago and many attempts were made to make this happen in a scientific way. Design methodologies were created based on the context of the industry in which they would be used. In terms of website design, an important and well-known design methodology is the “Web Semantic Design Method” (WSDM) which is the base of this thesis. Previous research and attempts were made on WSDM to either add to or to make it adaptable to new aspects and trends that showed up in websites and website development (e.g., design patterns). This thesis also contributes to the effort of keeping WSDM up to date with the evolution of the Web technologies and trends in web development. More in particular, the thesis focuses on the following trends: (1) a lot of websites can be categorized as belonging to a particular website genre (e.g., e-commerce website, social network site) and the websites of such a genre usually contains the same kind of functionalities, and (2) more and more Content Management Systems are used to implement web systems.

### 1.1 Research Objectives

- To examine the attempts already made in categorization of websites based on their genre.
- Research on previous attempts to define design patterns for websites and relate them to specific genres.
- To incorporate website genres and related design patterns into WSDM.
- To examine the limitations current website design methodologies have in terms of adaptability to recent implementation tools and frameworks.
- To adapt WSDM properly to overcome these limitations.
- To demonstrate the effectiveness of the adapted WSDM version by means of an example.

## 1.2 Problem Statement

WSDM is a design methodology that models the informational, functional and conceptual structure of a website in detail to ease the process of implementation by knowing what exactly needs to be implemented and how it should be carried out. Since there are tons of website that serve the same purpose, a massive amount of these models could be reused each time such a website is modeled. This introduces the use of design patterns in the methodology; previous researches on this methodology proposed a definition of design pattern in terms of a quite low level model (either informational or navigational). The challenge this thesis addresses is to take the definition of design pattern to a higher level, namely based on the genre a website belongs to; therefore there is the need to capture the common factors websites belonging to a particular genre have. But first, websites need to be categorized based on their genre. Categorizing websites based on their genre and then identifying design patterns belonging to particular genres leads to the third objective of this thesis, which is adapting them to WSDM.

Another challenge for WSDM and other similar design methodologies is the popularity of web content management system frameworks for implementing web systems. The existing design methodologies were developed before web content management systems existed or became popular as implementation environment, and therefore these design methodologies are not quite compatible with web content management systems. Although there are some design methodologies in which the design or rather the implementation choice using a web content management system is taken into account, their methodologies are either quite specialized to a particular web content management system framework or not dedicated to a particular design methodology, and thus do not provide a general solution. Therefore, after analyzing the limitations of current design methodologies, the challenge would be to adapt WSDM to overcome them. As one of the significances of a web content management system is that its users are not concerned with the details regarding how a certain function is implemented (unless they build it themselves from the scratch) and just merely employ whatever module or component that suits their needs best. Therefore, having a detailed design of these functions is a rather troublesome task, as the users don't have control over how the existing modules are actually implemented. Most of the times, the selected module or component of a WCMS and the design made using the methodology will not completely match. Therefore a different version of WSDM has to be

created specifically for websites that are aimed to be created using a web content management system framework.

### **1.3 Proposed Solution**

In order to fulfill the objectives and answer the problems addressed in the problem statement section, this thesis proposes the following approach. A thorough study on the categorization of websites based on genre will be conducted in the next chapters. In this thesis, the focus will be on four genres of websites and therefore, design patterns for these website genres will be identified, a short description on the website genre and each design pattern will be given, the motivations behind using the patterns and the problems that may arise by using them will also be mentioned. In order to schematize the website genres and the related patterns to each genre, a modeling technique, namely the Feature Assembly Modeling, will be used.

In order to change the WSDM to be adaptable to web content management system frameworks, two version of WSDM will be proposed in which the result of the first part of the thesis, namely website genres and design patterns will be applied. These two versions could be called “WCMS-based WSDM” which is dedicated to web content management system frameworks and the other one could be “Code-driven WSDM” which will be used for code-based implementation of websites.

## 1.4 Thesis Structure

This thesis is composed of seven chapters as follow:

The first chapter is the introduction; this chapter is divided into four sections: research objectives, problem statement, proposed solution, and lastly the thesis structure which describes the organization of the content in this document.

The second chapter gives the background on certain topics related to this thesis. This chapter is composed of four sections as follow: the first section provides a short background on WSDM. The second section provides some background on the concept of design patterns in different contexts. In section three, the relationship between design patterns and WSDM will be shown; and lastly in section four a description of Feature Assembly Modeling technique is given to become more familiar with the technique as it will be used later on in future chapters.

Chapter three describes website genres, the researches that have already been conducted on this and the attempts made on categorizing websites based on genre.

Chapter four is about design patterns for website genres for which four website genres are selected, namely social networking, news, e-commerce, and corporate websites and the related design patterns are identified for them. These four genres and the related design patterns constitute the first section of this chapter. In the second section, the relevant feature assembly diagrams for each of the website genres based on their design patterns are provided. Section three is about anti-design patterns and dark patterns, in which a list of famous wrong design patterns (both intentional and unintentional) are mentioned and discussed. And lastly, section four provides the conclusion of this chapter.

Chapter five describes the adaptation of WSDM to deal with website genres. This chapter is composed of three sections, the first section is about the WCMS-based WSDM version, the second section is about the code-driven WSDM version; and lastly, the third section provides a case study to demonstrate the new versions of WSDM.

Chapter six treats related work.

Chapter seven gives conclusions and future work.



## 2. Background

In this chapter, a brief introduction to “Web Semantic Design Method”, the base of the discussion of this thesis, will be given. Then, the general concept of design patterns will be explored. Furthermore, the relationship between design patterns and WSDM will be briefly introduced. And lastly the Feature Assembly Modeling technique will be introduced.

### 2.1 Web Semantic Design Method (WSDM)

WSDM is a website design methodology that was developed by Professor De Troyer and Leune in 1998. WSDM originally stood for “Web Site Design Method”, but over the years the methodology was extended in different ways and now stands for the “Web Semantic Design Method”. The significance of WSDM and what makes it distinguishable from other design methods, is that it is “audience driven”. Another advantage of WSDM compared to other design methods is that, WSDM is as a matter of fact a design methodology that not only provides modeling primitives for describing a website or web application, but also provides systematic guidelines for the development. The WSDM methodology consists of several phases including: mission statement, audience modeling, conceptual design, implementation design and finally implementation. Each of the mentioned phases includes various sub phases, which compose the detailed specifics of that particular phase. The detailed description of this methodology can be found in (De Troyer, Casteleyn & Plessers 2008, pp. 303-352).

### 2.2 Design Patterns

The general idea of having design patterns is to ease the process of reusing a design. In more scientific words, design patterns are an attempt to capture the solution to a reoccurring problem so that it can be used later to solve similar problems. This means capturing the essence of a problem and the solution to

that problem in a systematic way. Design patterns are generated based on own and other's experiences. Put simply, design patterns help a designer to get a "right" design faster.

Design patterns are not only concerned with the design of websites, as a matter of fact the concept has quite a rich history, from "building architectures" to "software architectures" and here "website design". The concept was first introduced by Christopher Alexander, a famous Austrian architect, and his colleagues in two books called "A Pattern Language" (Alexander 1977) and "The Timeless Way of Building" (Alexander 1979). They aimed to capture the common problems and their solutions in designing buildings.

Christopher Alexander said: *"Each pattern describes a problem which occurs over and over again in our environment"*, and then describes the solution to that problem, in such a way that it could be used a million times over, without ever re-doing it the same way twice. (Alexander 1977)

As it appears from the quotation above, the concept of design patterns has not changed throughout time and from context to context, but the level of its usage has varied from design patterns for quite low level problems, to higher level problems. From the view point of the software engineering, each pattern has four essential elements:

1. The pattern name.
2. The problem, which describes when the pattern would be applicable.
3. The solution, which describes the elements that exist in a pattern, the relationship between the patterns, their responsibilities and their collaborations.
4. The consequences, which are the results of applying the pattern.

There are several famous design patterns that are applied in software architecture, to mention some of them; one can refer to "Factory pattern", "Visitor Pattern", "Singleton Pattern" and so on. The description of these patterns are outside the scope of this thesis, however by observing the definition structure of a pattern, as it was mentioned above, one can see the applicability of this structure to other forms of design patterns for different contexts.

In terms of website design, patterns began to play an important role in the late 90s. A brief introduction on design patterns in websites is appropriate here. There has been undoubtedly quite a lot of research on design patterns for websites, for instance the paper "Pattern for Dynamic Websites" (Lyardet, Rossi & Schwabe 1998) addresses two design patterns for dynamic websites, namely "the news pattern" and

“dynamic configuration pattern”. Based on their definition, the “news pattern” is concerned with handling the problem of how users should become aware about the changes that have occurred in the website, and the “dynamic configuration pattern” is regarding the activities that are performed by the users and the way these activities can be validated.

The solution brought to the “news pattern” by the authors might be considered to be rather intuitive but nevertheless is quite essential and important. The solution is simply as follow:

*“Provide visual feedback to clearly announce the recent changes to provide immediate feedback to the website visitors.”* (Lyardet, Rossi & Schwabe 1998)

Most websites in one way or the other somehow follow this pattern to inform their users about the changes occurred in the system. As for the second pattern, “dynamic configuration pattern”, the nature of the problem is to figure out, how to provide a convenient way for the users to select an option out of a relatively large list of options and perform the necessary validation over the selection while keeping track of other selections and the rest of the options.

Again the solution proposed is used rather widely in many different websites now a day, the solution proposed in the paper is as follow:

Provide users with different metaphors that resemble the activity of navigation being used, as an example, to allow users to select a particular item while browsing and traversing through a list of items, a mechanism to add the selected item to a particular list can be used. This is quite similar to the notion of a “shopping cart” in e-commerce websites. This feature appends an “add” button for instance to every item inside a page, releases the user from the burden of writing down product names and etc, and thus reducing the navigational overhead. Furthermore, it adds a very important capability to the system, which is item validation upon selection. For example some checking or validation on the arrival and return time of a flight could be performed when a user attempts to buy a ticket online. (Lyardet, Rossi & Schwabe 1998) As one can immediately notice, this pattern is widely used in most e-commerce websites.

In the same paper, Lyardet et al. also mention another pattern that is called “information-interaction decoupling pattern” which is in direct relation with the patterns above. Briefly, this pattern is about the differentiation between the content and various types of controls in the interface. The proposed solution is to divide the input communication channels from the output channels by grouping both sets

separately; which results in input interaction groups to remain fixed while the output group reacts dynamically to the control activation. (Lyardet, Rossi & Schwabe 1998)

Another resource that is worthy to mention is the paper “What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software”, authored by Tim O'REILLY. In this paper, Tim O'REILLY compares Web 1.0 with Web 2.0 and points out the differences in the two and the design patterns used in Web 2.0.

For instance he formulates the differences between Web 1.0 and Web 2.0 as follow:

<i>Web 1.0</i>	<i>Web 2.0</i>
DoubleClick	--> Google AdSense
Ofoto	--> Flickr
Akamai	--> BitTorrent
mp3.com	--> Napster
Britannica Online	--> Wikipedia
personal websites	--> blogging
evite	--> upcoming.org and EVDB
domain name speculation	--> search engine optimization
page views	--> cost per click
screen scraping	--> web services
publishing	--> participation
content management systems	--> wikis
directories (taxonomy)	--> tagging ("folksonomy")
stickiness	--> syndication

(Figure 1) Comparison of Web 1.0 and Web 2.0 (O'REILLY 2007)

O'Reilly goes through the list shown in (Figure 1) one by one and then addresses these features for Web 2.0 by showing the way they have affected the Web. For example, in his paper regarding BitTorrent he writes as follow:

BitTorrent, like other pioneers in the P2P movement, takes a foundational approach to internet decentralization which is based on the motto that “every client is also a server”; this means that files are broken up into various fragments that can be served to users from multiple locations. Consequently, it transparently uses the most from the network of downloaders in terms of both bandwidth and data to other users. The mentioned actually results in a rather important and useful characteristic, which means, the more popular the file, the faster it can be served, as there are more users providing bandwidth and fragments of the complete file. BitTorrent therefore demonstrates a key principle of

Web 2.0 which is “the service automatically gets better as more people use it”. While Akamai must add servers to improve service to support the increase in the number of its users, every BitTorrent consumer brings his own resources to the party. There's an implicit "architecture of participation", a built-in ethic of cooperation, in which the service acts primarily as an intelligent broker, connecting the edges to each other and employing the power of the users themselves. (O'REILLY 2007)

Tim O'REILLY clearly shows the significances of Web 2.0 by indicating the term “architecture of participation”; consequently, the concept of a design pattern introduced by him is quite high level and is mostly defined for each pattern around the philosophy of web 2.0 which is “user participation”.

## 2.3 WSDM and Design Patterns

As WSDM is a design methodology, one can logically deduce that the concept of design patterns can be embedded and used in the methodology. The aforementioned was as a matter of fact introduced in WSDM some time ago (Huyen 2010); however, the level of the design pattern introduced to WSDM previously is different from the one being introduced in this thesis. It is noteworthy to mention that these different design patterns can and will coexist inside the WSDM methodology, as they are concerned with different levels of design. Since WSDM provides task and navigational modeling, the concept of design patterns were originally related to reusing these models for similar tasks and navigations. So instead of reinventing the wheel each time the same or a similar task or navigation needs to be modeled, one can reuse a design and adapt it to the specific situation at hand. Thus, the idea was to store these “low level” models to be used later on in an appropriate situation.

Before giving an example of a design pattern done by Le Van Hugen, it is necessary to mention that Le Van Hugen defined a pattern with the flowing elements (Huyen 2010):

**Pattern Name:** The pattern must have a meaningful name. Good pattern names form a vocabulary for discussing conceptual abstractions.

**Problem:** Statement of the problem that the pattern addressed.

**Context:** Description the context in which the pattern can be applied. Designers, when considering a new design, use the context description to determine if a particular pattern is appropriate.

**Solution:** This section describes the solution the pattern offers. Moreover, it shows how the pattern works and how the users interact with the system in order to achieve the certain goal.

**Rational:** Briefly describes how the use of the pattern improves the task structure and how the goal can be accomplished by using the pattern.

**Structure:** This part presents the task structure, the object chunks, and the task navigational model of the pattern.

**Related pattern:** List of related patterns, which might be predecessor patterns whose application leads to this pattern; successor patterns whose application follows from this pattern; alternative patterns that describe a different solution to the same.

An example of a pattern for “selecting an Item” done by Le Van Hugen is as follow (Huyen 2010):

**Pattern Name:** Select Item

**Problem:** The users want to select item(s) from a list.

**Context:** This pattern is used when a user should be able to select an item from a list of items to perform some action on it or when a user should be able to select multiple items from a list of items to perform some action on those items (e.g., delete multiple items)

**Solution:** There are two types of this pattern: Select One Item and Select Multiple Items. They have the same structure; that is one user interaction task “Select Item” to select one item from a list or “Select Multiple Item” to select multiple items. In the task “Select Multiple Item”, of course, the user should have the option to select multiple items. This is specified in the object chunk associated with this task.

**Rational:** With this pattern, an item, respectively a list of items (depending on which type of pattern we use) can be selected by the user and will be returned.

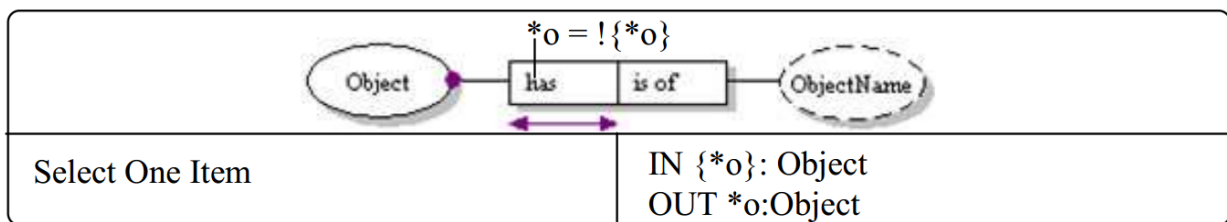
Structure

Task Model

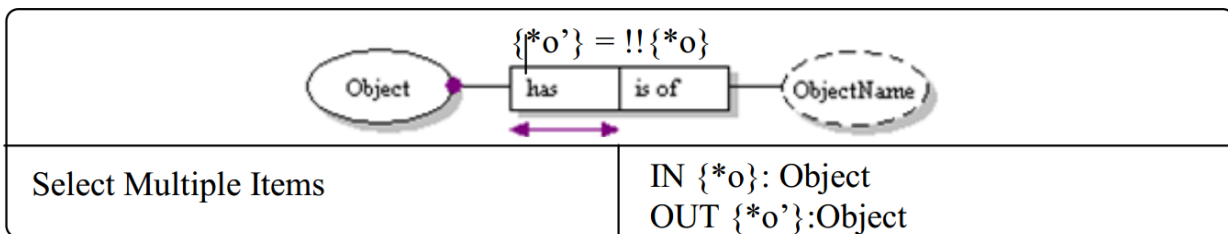


(Figure 2) Task Model for select Item (Huyen 2010)

Object chunks:

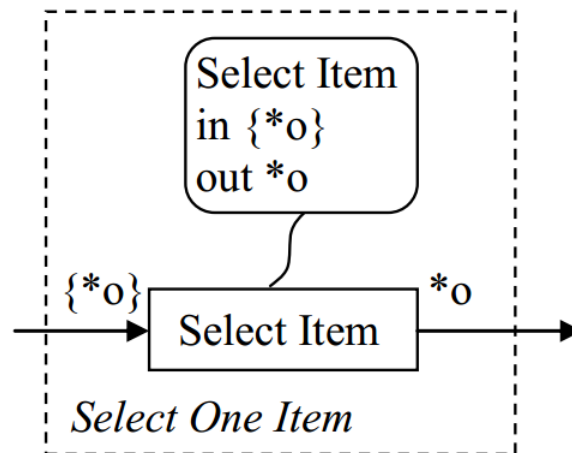


(Figure 3) Object Chunk "select One Item" (Huyen 2010)

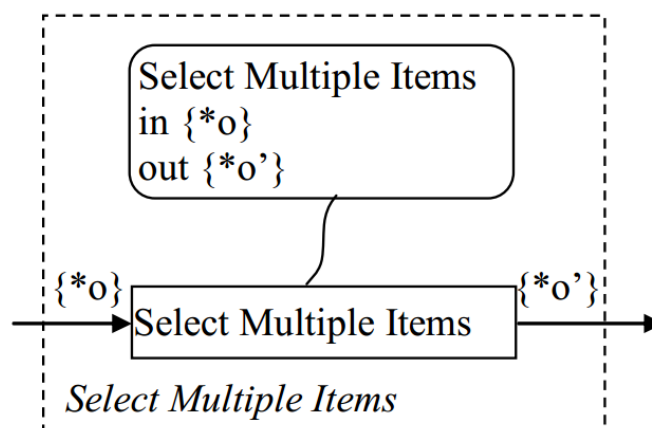


(Figure 4) Object Chunk "select Multiple Items" (Huyen 2010)

## Task navigational model:



(Figure 5) Task Navigation for the Task "Select One Item" (Huyen 2010)



(Figure 6) Task Navigation for the Task "Select Multiple Items" (Huyen 2010)

The new concept of design patterns, which will be introduced in this thesis, is more high level. The original purpose of this thesis was to investigate if it is possible to incorporate Web application patterns into WSDM and how WSDM needs to be adapted to achieve this; which means identifying design patterns for certain website types or genres, and then incorporate them into the WSDM methodology. The concept of design pattern is more related to certain significant common functionalities among websites belonging to the same type or genre. These high-level design patterns have to be captured and documented and the possible ways in which they can be incorporated with the WSDM methodology has to be explored.



## 2.4 Feature Assembly Diagrams for Website Genres

In order to have a general overview of the patterns that can be used for the different website genres, a feature modeling technique called “Feature Assembly Modeling” (Abo Zaid, Kleinermann & De Troyer 2010) is employed. This technique is used to model product lines in terms of features. A product line represents a family of products. For a product line, it is indicated which feature are common for all products of the product line and which are optional. Also dependencies between features can be expressed.

For our purpose, a website genre can be considered as a family of websites and thus as a product line. Furthermore, the different patterns can be considered as the features of the product line. In this way we can indicate which patterns appear in which website genres and which are mandatory and which are optional. This modeling technique also allows indicating the dependencies between the patterns, for instance two patterns can be related using the “Include”, “exclude”, “requires”, “same as”, and so on relationships, which implies a dependency between them. As example of such a dependency, consider the login pattern that requires a registration pattern. The models are graphically represented, for the notations used in the diagrams and more information on the Feature Assembly Modeling technique we refer to section 4.2. The usefulness of the Feature Assembly diagrams will become clear in chapter 5, where they are used to tailor the WSDM process for a specific website genre.

### 3. Website Genres

As one of the objectives of the thesis is to propose design patterns for certain website types or genres, it is rather important for the success of this thesis to provide a proper classification of websites into types or genres.

In an attempt to categorize websites based on genres, several resources were studied, some of which cannot really be considered as a scientific work (e.g., Wikipedia). However, there are other resources in which the categorization and classification of websites are performed by academic people. In order to come up with a proper classification of website genres, a combination of these resources were taken into account.

The first resource that was studied is Wikipedia. In an article, called “websites”, there is a section titled, “types of websites” in which a long list of website types are provided. There are many varieties of websites mentioned, each specializing in a particular type of content or use, and they may be arbitrarily classified in any number of ways (Website 2012). Some of them are shown in the table below:

Website type	Description	Example
<b>Archive site</b>	Aimed to archive valuable electronic content to preserve them from extinction.	Internet Archive, Google Groups
<b>Blog (web log)</b>	Websites that are generally designed and used to post online diaries which may include discussion forums (e.g., blogger, Xanga). Many individuals (bloggers) use blogs like an editorial section of a newspaper to express their ideas on any topic. Some bloggers are professional ones and are paid by different entities to blog about a certain subject.	Blogger
<b>Click-to-donate site</b>	Website that allows the visitor to donate to charity by clicking on a button or answering a question.	The Hunger Site, Freerice, Ripple (charitable organization)

<b>Electronic commerce (e-commerce) site</b>	A site providing online sale of its goods and services and enabling online transactions for such sales.	Amazon, Nike
<b>Forum website</b>	A site where people have discussions regarding different topics.	Theforumsite
<b>Government Site</b>	Website made by the government or any governmental entity. Usually these sites also operate websites that are intended to inform tourists or support tourism.	Richmond.com is the geodomain for Richmond, Virginia.
<b>Gaming website, Gambling website</b>	A site that let users play online games. Some sites support online gambling thus enabling online transaction.	Addictinggames
<b>Information site</b>	Most websites could fall in this category of website to some extent; many of them do not pursue any commercial purposes and act merely as an informational portal.	RateMyProfessors, Free Internet Lexicon and Encyclopedia. Most government, educational and nonprofit institutions have an informational site.
<b>Media sharing site</b>	A site that enables users to upload and view media such as pictures, music, and videos.	Flickr, YouTube, PureVolume and Google Videos
<b>News site</b>	Similar to information site, but dedicated to dispensing news of different kind.	CNN, BBC
<b>p2p/Torrents website</b>	Websites that index torrent files.	Mininova, The Pirate Bay
<b>Question and Answer (Q&amp;A) Site</b>	A site where people can ask questions & get answers.	Yahoo! Answers, Stack Exchange Network (including Stack Overflow)
<b>Search engine site</b>	A website that indexes material on the Internet or an intranet (and lately on traditional media such as books and newspapers) and provides links to information as a response to a query.	Google Search, Bing, GoodSearch, Ecosia
<b>Social bookmarking site</b>	A site where users share other content from the Internet and rate and comment on the content.	StumbleUpon and Digg are examples.

<b>Social networking site</b>	A site where users can communicate with one another and share content such as pictures, videos, music, blogs, etc These sites may include games and other web applications too.	Facebook, Orkut, Google+
<b>University/school site</b>	A site on which teachers, students, or administrators can post information about current events at or involving their school. The site also provides information for prospective students as well.	vub.ac.be
<b>Warez</b>	A site designed to host or link to materials such as music, movies and software for the user to download.	warez-bb.org
<b>Webmail</b>	A site that provides a webmail service.	Hotmail, Gmail
<b>Wiki site</b>	A site which users collaboratively compose/edit its content.	Wikipedia, WikiHow

(Figure 7) Website Genres (Website 2012)

The table above shows only a few of the website types mentioned in Wikipedia. According to Wikipedia, there are 42 different types of website. For viewing the complete table, one can refer to the article itself (Website 2012).

Another resource that was studied for this section comes from the academic community. The author is Dr. Martijn van Welie who possesses a PhD in Human Computer Interaction, has worked at Vrije Universiteit Amsterdam, and is currently a senior consultant at Philips design. He has created a library of website types and related design patterns and has classified them into different categories such as: Navigational around, Searching, Shopping, etc. The library is available on his website<sup>1</sup>:

(Figure 8) below shows a list of website types identified by Welie (indicated with a red rectangle) (Welie 2008):

<sup>1</sup> <http://www.welie.com/patterns/>

<b>Application needs</b>		
Patterns that help the application, or you the designer, communicate better with the user		
<b>Drawing attention</b> <ul style="list-style-type: none"> <li>· <a href="#">Captcha</a></li> <li>· <a href="#">Center Stage</a></li> <li>· <a href="#">Color Coded Section</a></li> <li>· <a href="#">Premium Content Lock</a></li> <li>· <a href="#">Grid-based Layout</a></li> <li>· <a href="#">Liquid Layout</a></li> <li>· <a href="#">Outgoing Links</a></li> <li>· <a href="#">Alternating Row Colors</a></li> </ul>	<b>Feedback</b> <ul style="list-style-type: none"> <li>· <a href="#">Input Error Message</a></li> <li>· <a href="#">Processing Page</a></li> </ul>	<b>Simplifying interaction</b> <ul style="list-style-type: none"> <li>· <a href="#">Enlarged Clickarea</a></li> <li>· <a href="#">Font Enlarger</a></li> </ul>
<b>Context of design</b>		
The context of the design		
<b>Site types</b> <ul style="list-style-type: none"> <li>· <a href="#">Web-based Application</a></li> <li>· <a href="#">Artist Site</a></li> <li>· <a href="#">Automotive Site</a></li> <li>· <a href="#">Branded Promotion Site</a></li> <li>· <a href="#">Campaign Site</a></li> <li>· <a href="#">E-commerce Site</a></li> <li>· <a href="#">Community Site</a></li> <li>· <a href="#">Corporate Site</a></li> <li>· <a href="#">Multinational Site</a></li> <li>· <a href="#">Museum Site</a></li> <li>· <a href="#">Personalized 'My' Site</a></li> <li>· <a href="#">News Site</a></li> <li>· <a href="#">Portal Site</a></li> <li>· <a href="#">Travel Site</a></li> </ul>	<b>Experiences</b> <ul style="list-style-type: none"> <li>· <a href="#">Community Building</a></li> <li>· <a href="#">Information Management</a></li> <li>· <a href="#">Fun</a></li> <li>· <a href="#">Information Seeking</a></li> <li>· <a href="#">Learning</a></li> <li>· <a href="#">Assistance</a></li> <li>· <a href="#">Shopping</a></li> <li>· <a href="#">Story Telling</a></li> </ul>	<b>Page types</b> <ul style="list-style-type: none"> <li>· <a href="#">Article Page</a></li> <li>· <a href="#">Blog Page</a></li> <li>· <a href="#">Case Study</a></li> <li>· <a href="#">Contact Page</a></li> <li>· <a href="#">Event Calendar</a></li> <li>· <a href="#">Forum</a></li> <li>· <a href="#">Guest Book</a></li> <li>· <a href="#">Help Page</a></li> <li>· <a href="#">Homepage</a></li> <li>· <a href="#">Newsletter</a></li> <li>· <a href="#">Printer-friendly Page</a></li> <li>· <a href="#">Product Page</a></li> <li>· <a href="#">Tutorial</a></li> </ul>

(Figure 8) Website Types from Welie (Welie 2008)

Another credible resource is the book called “The design of Sites: patterns for Creating Winning Websites” (Duyne, Landy & Hong 2007). In this book, websites are categorized based on their genre as follow:

- ❖ Personal E-commerce
- ❖ News Mosaics
- ❖ Community Conference
- ❖ Self-Service Government
- ❖ Nonprofits As Networks Of Help
- ❖ Grassroots Information Sites
- ❖ Valuable Company Sites

- ❖ Educational Forums
- ❖ Stimulating Art And Entertainment
- ❖ Web Apps That Work
- ❖ Enabling Intranets
- ❖ Blogs

The full description for each of these website genres can be found in the book (Duyne, Landy & Hong 2007).

Each of the mentioned resources had their own philosophy for categorizing websites; for example in the “The design of Sites: patterns for Creating Winning Websites” book, this categorization is rather general compared to Welie’s website or Wikipedia in which the categorization is more specialized. The strategy behind the categorization of websites based on their genre in this thesis is a combination of the ones seen; we will use the high level, more general categorization of (Duyne, Landy & Hong 2007) and the more specialized categorization of Welie and Wikipedia for certain genres. However, the focus in this thesis is merely on four genres; namely, Social Networking, News, corporate and E-commerce.

Two of the mentioned resources for the classification of websites based on their genres, also provide design patterns for each one of these genres. Welie see (Figure 9) and (Figure 10) provides a list of design patterns and categorizes them based on the kind of solution they provide, for instance: Navigational around, Searching, Shopping, etc. Also, Duyne et al. provide a list of design patterns specific to each website genre defined in their book.

All patterns are listed here. It's quite a bunch of them, but I have tried to group them meaningfully.

## User needs

Patterns that meet a direct need of the user.

### Navigating around

- [Accordion](#)
- [Headerless Menu](#)
- [Breadcrumbs](#)
- [Directory Navigation](#)
- [Doormat Navigation](#)
- [Double Tab Navigation](#)
- [Faceted Navigation](#)
- [Fly-out Menu](#)
- [Home Link](#)
- [Icon Menu](#)
- [Main Navigation](#)
- [Map Navigator](#)
- [Meta Navigation](#)
- [Minesweeping](#)
- [Panning Navigator](#)
- [Overlay Menu](#)
- [Repeated Menu](#)
- [Retractable Menu](#)
- [Scrolling Menu](#)
- [Shortcut Box](#)
- [Split Navigation](#)
- [Teaser Menu](#)
- [To-the-top Link](#)
- [Trail Menu](#)
- [Navigation Tree](#)

### Basic interactions

- [Action Button](#)
- [Guided Tour](#)
- [Paging](#)
- [Pulldown Button](#)
- [Slideshow](#)
- [Stepping](#)
- [Wizard](#)

### Searching

- [Advanced Search](#)
- [Autocomplete](#)
- [Frequently Asked Questions \(FAQ\)](#)
- [Help Wizard](#)
- [Search Box](#)
- [Search Area](#)
- [Search Results](#)
- [Search Tips](#)
- [Site Index](#)
- [Site Map](#)
- [Footer Sitemap](#)
- [Tag Cloud](#)
- [Topic Pages](#)

### Dealing with data

- [Carousel](#)
- [Table Filter](#)
- [Collapsible Panels](#)
- [Details On Demand](#)
- [Collector](#)
- [Inplace replacement](#)
- [List Builder](#)
- [List Entry View](#)
- [Overview by Detail](#)
- [Parts Selector](#)
- [Tabs](#)
- [Table Sorter](#)
- [Thumbnail](#)
- [View](#)

### Personalizing

- [Customizable Window](#)
- [Login](#)
- [Registration](#)

### Shopping

- [Booking](#)
- [Product Comparison](#)
- [Product Advisor](#)
- [Product Configurator](#)
- [Purchase Process](#)
- [Shopping Cart](#)
- [Store Locator](#)
- [Testimonials](#)
- [Virtual Product Display](#)

### Making choices

- [Country Selector](#)
- [Date Selector](#)
- [Language Selector](#)
- [Poll](#)
- [Rating](#)

### Giving input

- [Comment Box](#)
- [Constraint Input](#)
- [Form](#)

### Miscellaneous

- [Footer Bar](#)
- [Hotlist](#)
- [News Box](#)
- [News Ticker](#)
- [Send-a-Friend Link](#)

(Figure 9) Design Patterns Welie (Welie 2008)

<b>Application needs</b>		
Patterns that help the application, or you the designer, communicate better with the user		
<b>Drawing attention</b> <ul style="list-style-type: none"> <li>· <a href="#">Captcha</a></li> <li>· <a href="#">Center Stage</a></li> <li>· <a href="#">Color Coded Section</a></li> <li>· <a href="#">Premium Content Lock</a></li> <li>· <a href="#">Grid-based Layout</a></li> <li>· <a href="#">Liquid Layout</a></li> <li>· <a href="#">Outgoing Links</a></li> <li>· <a href="#">Alternating Row Colors</a></li> </ul>	<b>Feedback</b> <ul style="list-style-type: none"> <li>· <a href="#">Input Error Message</a></li> <li>· <a href="#">Processing Page</a></li> </ul>	<b>Simplifying interaction</b> <ul style="list-style-type: none"> <li>· <a href="#">Enlarged Clickarea</a></li> <li>· <a href="#">Font Enlarger</a></li> </ul>
<b>Context of design</b>		
The context of the design		
<b>Site types</b> <ul style="list-style-type: none"> <li>· <a href="#">Web-based Application</a></li> <li>· <a href="#">Artist Site</a></li> <li>· <a href="#">Automotive Site</a></li> <li>· <a href="#">Branded Promotion Site</a></li> <li>· <a href="#">Campaign Site</a></li> <li>· <a href="#">E-commerce Site</a></li> <li>· <a href="#">Community Site</a></li> <li>· <a href="#">Corporate Site</a></li> <li>· <a href="#">Multinational Site</a></li> <li>· <a href="#">Museum Site</a></li> <li>· <a href="#">Personalized 'My' Site</a></li> <li>· <a href="#">News Site</a></li> <li>· <a href="#">Portal Site</a></li> <li>· <a href="#">Travel Site</a></li> </ul>	<b>Experiences</b> <ul style="list-style-type: none"> <li>· <a href="#">Community Building</a></li> <li>· <a href="#">Information Management</a></li> <li>· <a href="#">Fun</a></li> <li>· <a href="#">Information Seeking</a></li> <li>· <a href="#">Learning</a></li> <li>· <a href="#">Assistance</a></li> <li>· <a href="#">Shopping</a></li> <li>· <a href="#">Story Telling</a></li> </ul>	<b>Page types</b> <ul style="list-style-type: none"> <li>· <a href="#">Article Page</a></li> <li>· <a href="#">Blog Page</a></li> <li>· <a href="#">Case Study</a></li> <li>· <a href="#">Contact Page</a></li> <li>· <a href="#">Event Calendar</a></li> <li>· <a href="#">Forum</a></li> <li>· <a href="#">Guest Book</a></li> <li>· <a href="#">Help Page</a></li> <li>· <a href="#">Homepage</a></li> <li>· <a href="#">Newsletter</a></li> <li>· <a href="#">Printer-friendly Page</a></li> <li>· <a href="#">Product Page</a></li> <li>· <a href="#">Tutorial</a></li> </ul>

(Figure 10) Design Patterns Welie (Welie 2008)

In order to list the design patterns for specific website genres (next chapter), in addition to the mentioned resources the observations and experiences of the author of this thesis was employed.



## **4. Design Patterns for Website Genres**

In this section, the most important and common patterns for websites based on their genres will be given and described. As mentioned before, a combination of the design patterns mentioned in the resources examined for this thesis and the observations and experiences of the author of this thesis has been employed.

We focus on four important types of websites: social network websites, news websites, e-commerce websites, and corporate websites. Treating all possible website genres is not possible in the scope of this thesis but of course this work can be further continued and a proper vast library of website genres can be created in the future.

For each website genre, a brief description about that particular website genre will be given as well as some example websites, and then the relevant design patterns for that website genre will be listed. For each design pattern, a short description of the pattern will be given with possibly some examples from existing websites, a set of instruction on when it would be appropriate to apply the pattern, the possible problems that may arise when using the pattern and the solutions to those problems will be discussed. It is worthy to mention that it is possible for a design pattern not to have problems associated with it and thus also no solutions for those problems. In order to have a general overview of the patterns that can be used in these website genres, a modeling technique called “Feature Assembly Modeling” is employed to model them in a diagrammatical fashion and to indicate possible dependencies.

At the end of this chapter, we will also provide a few guidelines regarding “Anti-design patterns”. Anti-design patterns are solutions that are used for problems, but are actually bad solutions. The idea of having a section as such is to inform the designers and developers of such bad design patterns and provide a guideline for them to be able to identify these patterns and avoid applying them, even though some famous websites employ such patterns.

## 4.1 Website Genres and their Design Patterns

### 4.1.1 Social Networking Websites

**Definition:** A social networking website is a website that focuses on building and reflecting social relations among people through for example, sharing interest, activities, events and different forms of communication. A social networking website usually includes a “user profile” for each user that contains personal information, social links of the user, and a variety of additional services. Social networking websites generally provide different means of communication between users, including asynchronous (e.g., wall-writing, e-mail) and synchronous (e.g., chat) communications. (Social networking service 2012)

**Examples:** Facebook, Qzone, Habbo, Twitter, Myspace, Orkut, LinkedIn, hi5, google+, etc.

**Common patterns detected:**

- 1. Quick registration:** Easy and fast process of registration (i.e. becoming a new user) by shortening the registration process and the hassles it causes for users through requiring only the most essential information about the user, but still manages to protect the website from outsiders.

Below two examples are shown. (Figure 11) shows quick registration of [Facebook](https://www.facebook.com/)<sup>2</sup> and (Figure 12) shows the quick registration of [Myspace](http://www.myspace.com/)<sup>3</sup>.

(Figure 11) Quick Registration, Facebook

<sup>2</sup> <https://www.facebook.com/>

<sup>3</sup> <http://www.myspace.com/>

The screenshot shows the Myspace registration page. At the top, it says "Sign up in less than 60 seconds." and "You already have an account? Log In". Below this are three steps: "1 I want to register", "2 Put your profile up to date", and "3 Adds contacts and interests". The "I want to register" step is active. It includes a "Type of account" section with radio buttons for "Staff", "Musician", "Actor", and "Director". There are input fields for "First name", "Last name", "E-mail", and "Password". A "Date of birth" section has dropdown menus for "Month", "Day", and "Year". A "Sex" section has radio buttons for "Boy" and "Daughter". Below this is a CAPTCHA image showing the text "XBTWSTJ". There is a "Refresh" button and a text box for entering the CAPTCHA. At the bottom, there is a "Free registration" button and a link to the terms of use and privacy policy.

(Figure 12) Quick Registration, Myspace

**When to use:**

- Website is open for growth and wants to attract more users faster.
- When it is desired to protect the personal information of users or certain functionalities of the website.
- When user starts the full registration process, and cancels it in the middle. The reason for this cancelling can be the fact that the full registration is too time consuming or too many personal questions are asked.

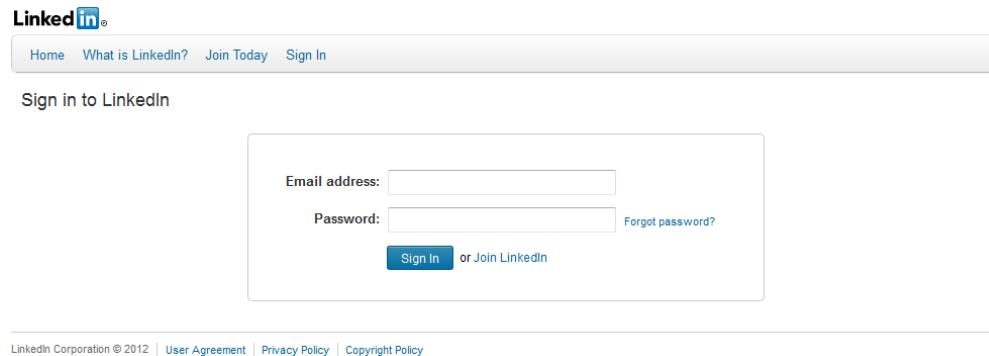
**Problems:**

- May cause lack of trust and commitment to the system due to user's lack of knowledge regarding the system.
- Automatic random spam registration to the system using machines (BOTS).  
Solution: protect the registration to the website using captcha<sup>4</sup>.

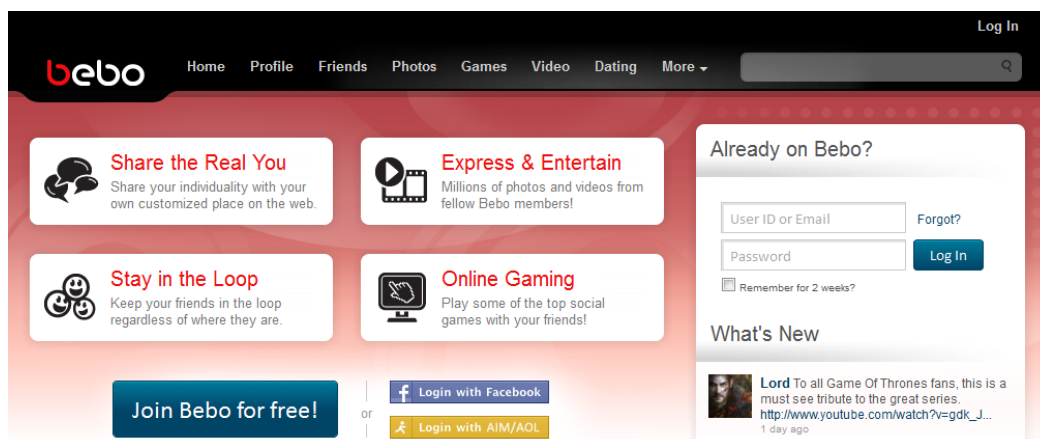
<sup>4</sup> Captcha is a type of challenge-response test used to ensure that the response is given by a person.

**2. Login:** a mean to force users to identify themselves when entering the system to protect the system against outsiders and to provide certain system functionalities to known users.

(Figure 13) shows the login of [LinkedIn](http://www.linkedin.com/)<sup>5</sup> and (Figure 14) the login of [Bebo](http://www.bebo.com/)<sup>6</sup>.



(Figure 13) Login, LinkedIn



(Figure 14) Login, Bebo

**When to use:**

- When users frequently return to a site that uses large amount of data about or belonging to the user, it is convenient to have users specify that information once and reuse it each time they visit the site.
- When it is desired to restrict certain features of the website only to registered users, or a group of registered users.

<sup>5</sup> <http://www.linkedin.com/>

<sup>6</sup> <http://www.bebo.com/>

3. **Open ID login:** a mean for identifying users based on already existing personal information and credentials from different social networking websites or services. Examples of popular “Open ID” login options include Facebook, Yahoo, Gmail, etc.

(Figure 15) shows the Open ID login for [Hi5](http://www.hi5.com/)<sup>7</sup>.



(Figure 15) Open ID Login, Hi5

**When to use:**

- When one wants to attract new users without having them to register to the system but wants to provide some security/privacy.
- When one want to help users maintain single user credential information for various websites and services (universal profile).

**Problems:**

- Users may not trust the system or find it not credible enough to give away their credentials for other websites.

Solution: this problem is rarely seen anymore since most browsers provide and maintain cookies and take care of this issue or to use a “secure API authorization<sup>8</sup>” protocol.

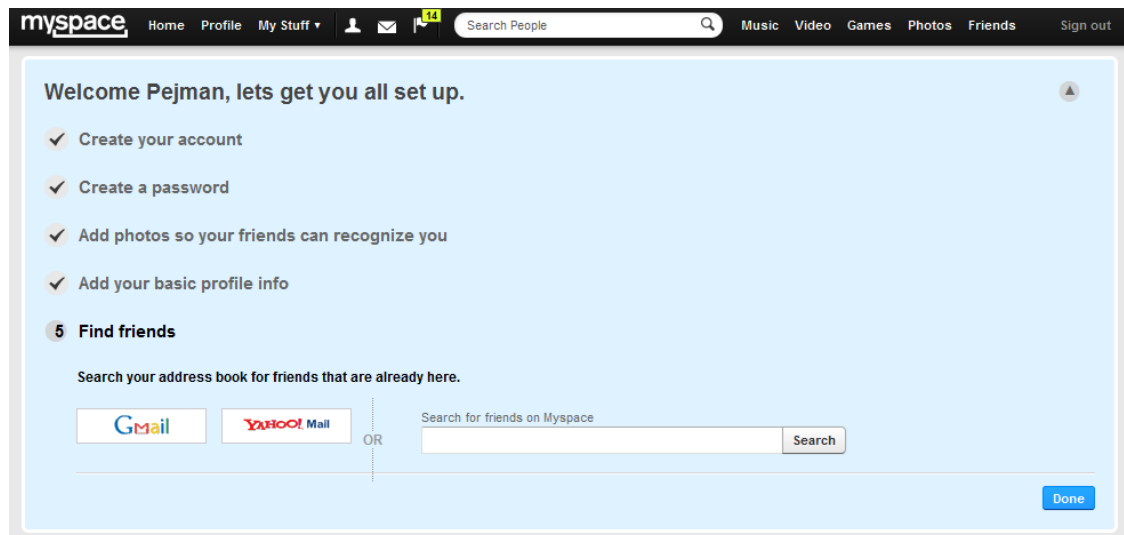
---

<sup>7</sup> <http://www.hi5.com/>

<sup>8</sup> <http://oauth.net/>

4. **Welcome area:** is an area represented to the user usually just after the initial registration to the system, to provide certain useful information such as “people you might know”, “import contact list” and etc.

(Figure 16) shows the welcome are of [Myspace](http://www.myspace.com/)<sup>9</sup>.



(Figure 16) Welcome Area, Myspace

#### When to use:

- To add basic profile information that was not part of the “quick registration” process.
- To add information (such as friends/contacts) to the user’s profile faster through e.g., e-mails contact list.
- To declare the “rights” the user has and the rules and regulations of the community.

#### Problems:

- Can cause user mistrust when requiring a lot of mandatory personal information and requiring access permission to e-mail contact information.  
Solution: only make those steps and fields mandatory that are quite essential for the profile creation.

<sup>9</sup> <http://www.myspace.com/>

5. **User profile:** create a virtual representation of the user's "self" that is seen and shared across interactions. It acts as a virtual identity and shows the personalities, skills and possibly other elements (depending on the application) regarding the user.

Below, (Figure 17) shows an example of user profile from [Facebook](https://www.facebook.com/)<sup>10</sup> and (Figure 18) shows user profile from [LinkedIn](http://www.linkedin.com/)<sup>11</sup>.

The image shows a screenshot of Mark Zuckerberg's Facebook profile. The profile includes a cover photo, a profile picture, and a bio. The bio states: "Founder and CEO at Facebook · Studied Computer Science at Harvard University · Lives in Palo Alto, California · Knows English, Mandarin Chinese · From Dobbs Ferry, New York · Born on May 14, 1984". The "Work and Education" section lists his employers: Facebook (Founder and CEO), Harvard University (Computer Science · Psychology), and Phillips Exeter Academy (Class of 2002 · Classics). The "Philosophy" section lists favorite quotations: "Fortune favors the bold." (Virgil, Aeneid X.284) and "All children are artists. The problem is how to remain an artist once you grow up." (Pablo Picasso). The "Sports" section lists favorite sports: Tennis and Fencing. The right sidebar contains sponsored ads for SmartWater Technology Ltd, Wiki For Technical Teams, TechNet Newsletter, and a Dutch advertisement for Ford Focus.

(Figure 17) User Profile, Facebook

<sup>10</sup> <https://www.facebook.com/>

<sup>11</sup> <http://www.linkedin.com/>

**pejman sajjadi**  
Student at Vrije Universiteit Brussel  
Brussels Area, Belgium | Computer Software

**Past** IT support at AIMS Co.

**Education** Vrije Universiteit Brussel  
Multimedia University

**Connections** 6 connections

**Websites** Company Website

**Public Profile** <http://be.linkedin.com/pub/pejman-sajjadi/42/124/536>

**Experience**

**IT support**  
**AIMS Co.**   
Industrial Automation industry  
July 2009 – October 2009 (4 months)  
system maintainer and developer

**Skills**

Information Systems Development | IT Management | Information Management  
C++ | Java | Computer Repair | Network Architecture | IT Audit

**Education**

**Vrije Universiteit Brussel**  
master of computer science, web & information systems  
2010 – 2012 (expected)

**Multimedia University**  
bachelor of information technology, information technology management  
2005 – 2009

**Additional Information**

**Websites:** • Company Website

**Interests:** human computer interaction, design patterns, cinematography

**pejman's Activity**

**pejman sajjadi** now has a birthday listed: September 6  
View pejman sajjadi's personal information • Update your personal information • 3 hours ago

**pejman sajjadi** has an updated profile (Industry, Headline, Education)  
Like • Comment • 3 hours ago

**pejman sajjadi** is now following Vrije Universiteit Brussel.  
4 hours ago

**pejman's Connections (6)**

**Massoud Devarian**  
Customer Project Manager at ST-Ericsson

**mafer solorzano**  
Research Assistant en ESPOL

**Thiago Mendonça**  
Extreme Blue Intern at International Business Machines

(Figure 18) User Profile, LinkedIn

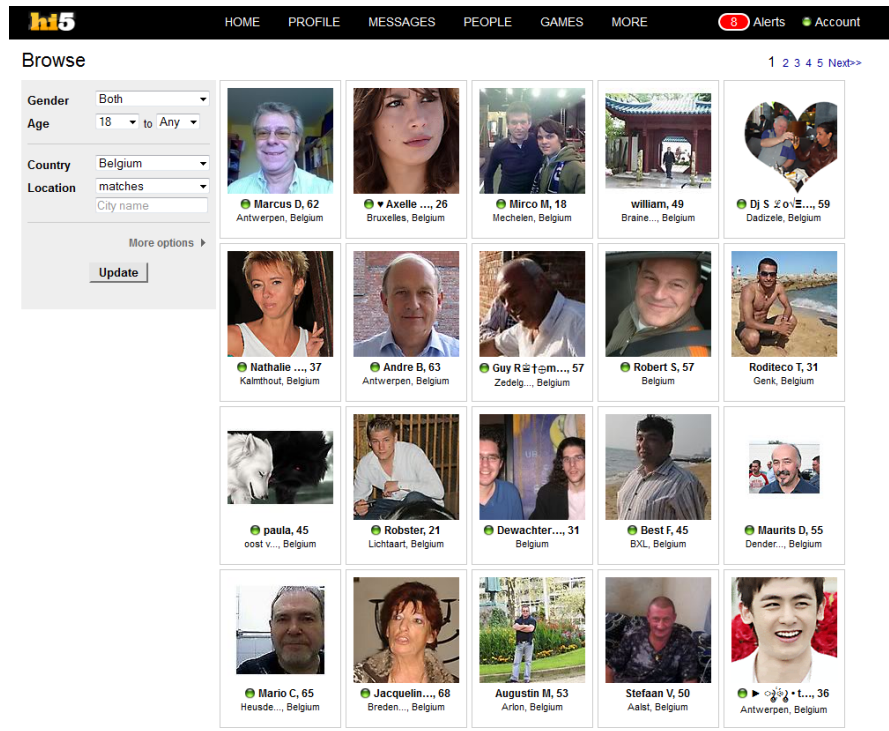
**When to use:**

- When users need to have a virtual image of themselves that includes their personal information, interests etc. to be found and interacted with by other users.
- When users have to be identified by others for their contribution or participation in the website.
- When user performs certain interactions with the system and the history of these interactions needs to be viewed by the user in a form of report.
- When suggestions based on the profile information has to be made to the user. Suggestions could be based on user interests, groups associated with, etc.

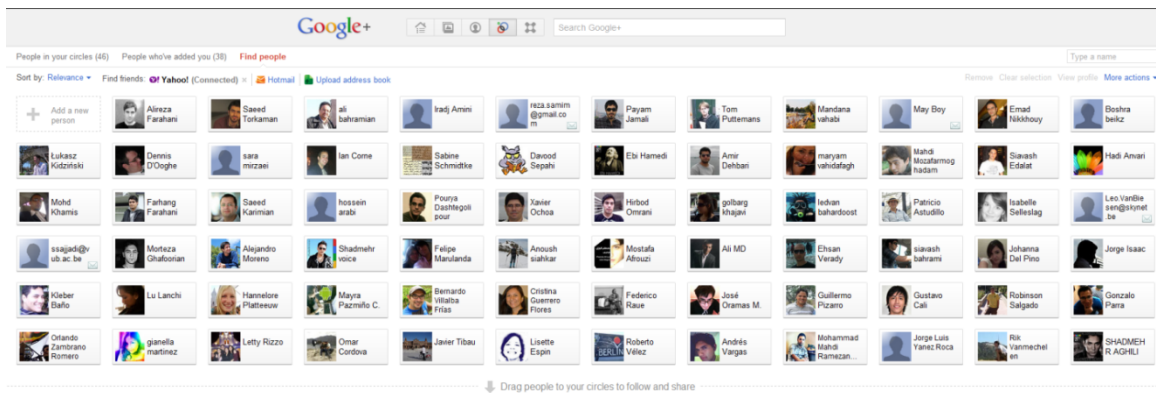


6. **User list:** provide a list of people who are using the services of the community.

Below you can see examples of user list from [Hi5](http://www.hi5.com/)<sup>12</sup> in (Figure 19) and from [Google+](https://plus.google.com/)<sup>13</sup> in (Figure 20).



(Figure 19) User List, Hi5



(Figure 20) User List, Google+

<sup>12</sup> <http://www.hi5.com/>

<sup>13</sup> <https://plus.google.com/>

**When to use:**

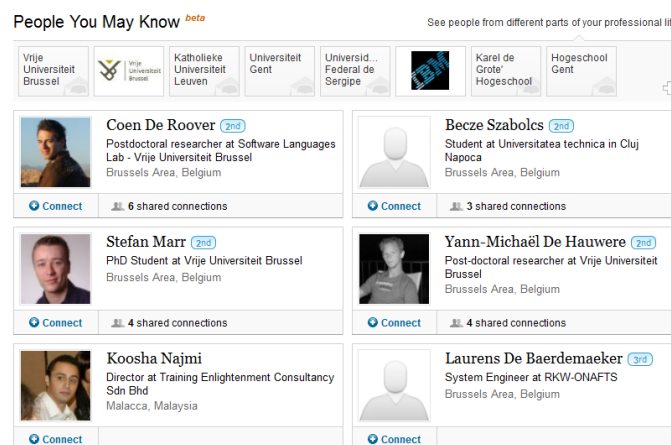
- To bring people in contact with each other.
- When it is difficult to know and remember who is a member of the community (as there are too many members, which is the case most of the times).
- When the user should be able to find more information about a person.

**Problems:**

- People must be searchable.  
Solution: provide one or more search functions.
- Privacy issues.  
Solution: Balance the amount of information that is publicly available about a particular user.

**7. Find friends (people you may know):** provides suggestions for finding friends/contacts, the suggestions are usually made based on certain algorithms based on mutual friends/contacts, interests, and so on.

Below you can see an example of find friends in (Figure 21) taken from [LinkedIn](https://www.linkedin.com)<sup>14</sup>.



(Figure 21) Find Friends, LinkedIn

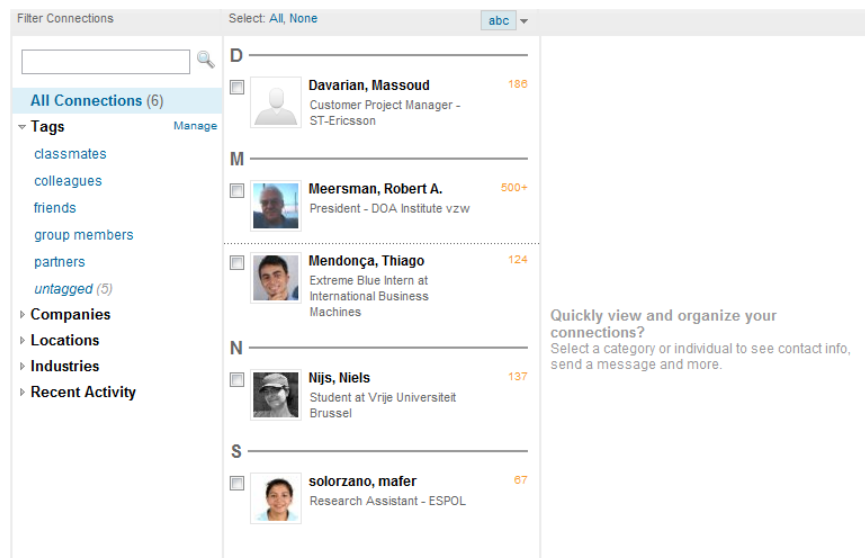
<sup>14</sup> <http://www.linkedin.com/>

**When to use:**

- To help people extending their network
- When you want to motivate the users to use the website by providing easier ways to find people with similar interests.

**8. Friends list (contact list):** provide a list of friends/contacts of the user.

Below you can see an example of friends list in (Figure 22) taken from [LinkedIn](http://www.linkedin.com/)<sup>15</sup>.



(Figure 22) Friends List, LinkedIn

**When to use:**

- When is desired to show the list of people with whom the user is associated and can interact at a different social level.

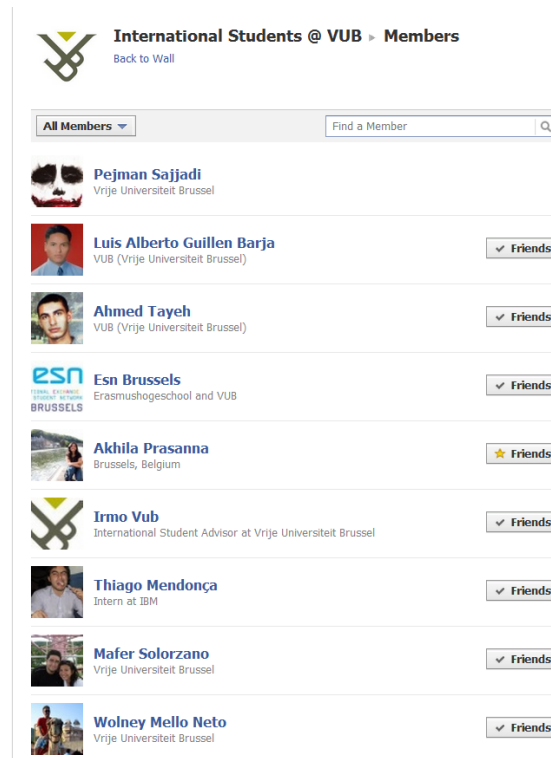
**Problems:**

- List may be long.  
Solution: provide search function.

<sup>15</sup> <http://www.linkedin.com/>

9. **Grouping:** allows the user to create and maintain groups within the community and interact with them on a special basis.

An example of grouping can be seen in (Figure 23) from [Facebook](https://www.facebook.com/)<sup>16</sup>.



(Figure 23) Grouping, Facebook

#### When to use:

- When there is a need to send out messages or notifications to a specific group of users.
- When interaction should be limited to a specific group of users.

#### Problems:

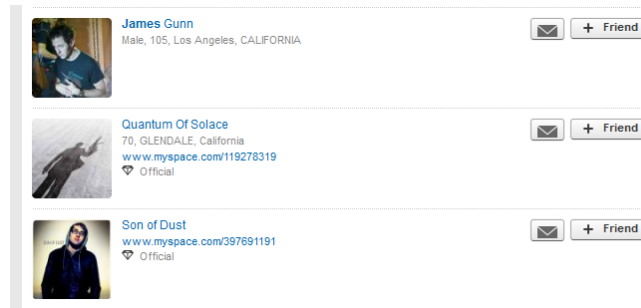
- Groups can create strong borders within the community.
- Group moderation is needed.

Solution: make users moderators of the groups and allow more than one moderator and allow the moderator to give privileges to other users within the same group.

<sup>16</sup> <https://www.facebook.com/>

**10. Invitation:** allows users to send a request for interaction.

An example of invitation is given in (Figure 24) from [Myspace](http://www.myspace.com/)<sup>17</sup>.



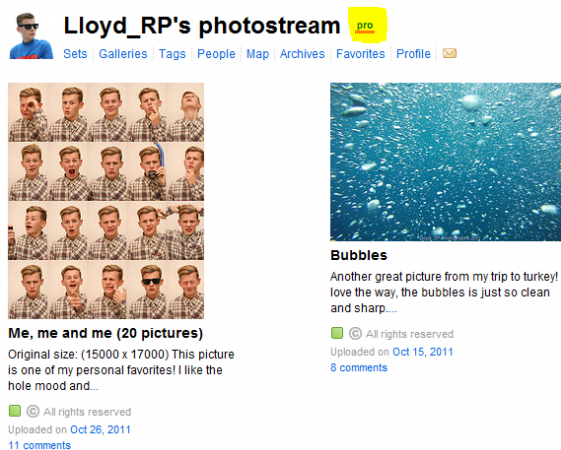
(Figure 24) Invitation, Myspace

**When to use:**

- When it is desired to establish a form of request/reply introduction between the users of the community to give the freedom of friendship choice to the users.

**11. Reputation:** a feature indicating that not all users are equal based on various criteria which might include: number of follower, posts, etc.

An example of reputation is shown in (Figure 25) which is taken from [Flickr](http://www.flickr.com/)<sup>18</sup>.



(Figure 25) Reputation, Flickr

<sup>17</sup> <http://www.myspace.com/>

<sup>18</sup> <http://www.flickr.com/>

**When to use:**

- When is desired to show different user levels.
- To motivate user to reach higher user levels.

**12. Poll:** to quickly test the user’s opinion on a certain matter.

An example of poll is given in (Figure 26) taken from [Facebook](#)<sup>19</sup>.



(Figure 26) Poll, Facebook

**When to use:**

- When it is desired to know the opinion of users regarding a matter.
- When is needed to have a statistical results regarding people’s opinion on a matter.
- The features such as a poll make it more fun for people to use the site by expressing their opinions and see the results and the opinions of the others.

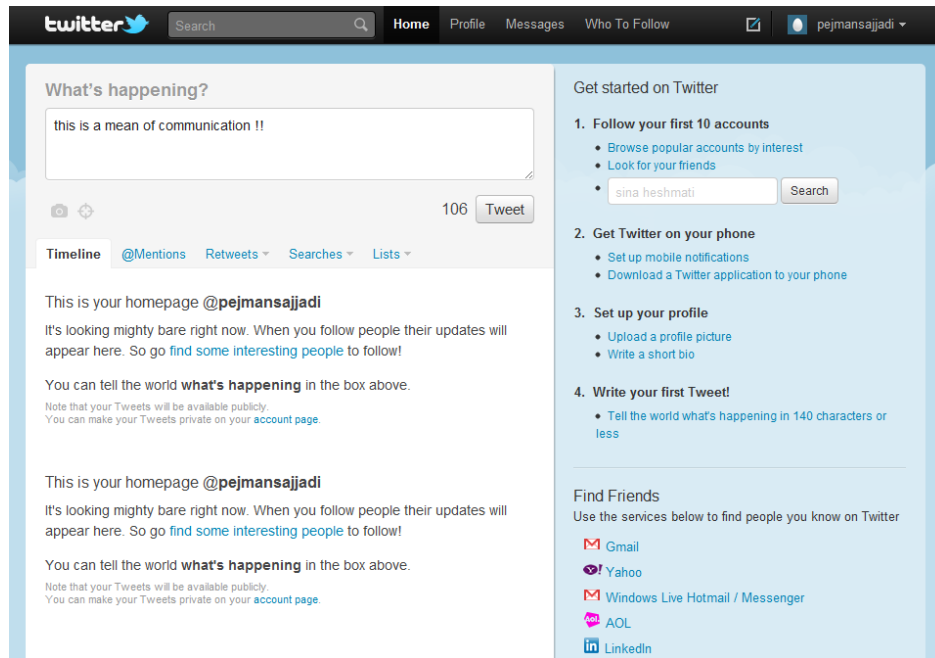
**Problems:**

- Different forms of answering methods (single/multiple answers) may be required.  
Solution: provide different methods of answering (radio buttons and checkboxes) for the creator.

<sup>19</sup> <https://www.facebook.com/>

**13. Communication:** to support the conversations flow within the community; the communication can take place in various ways, including synchronous and asynchronous. Each of them is considered to be a separate pattern.

An example of communication is shown in (Figure 27) taken from [Twitter](http://twitter.com/)<sup>20</sup>.



(Figure 27) Communication, Twitter

#### When to use:

- When there is a need for people to share ideas and have a conversation whether in a synchronous or asynchronous fashion.

#### Problems:

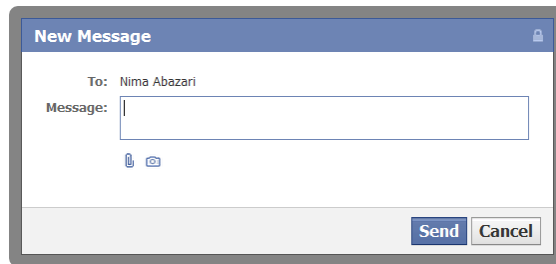
- Privacy issues.

Solution: make the conversation visible only to certain users or groups of users.

<sup>20</sup> <http://twitter.com/>

**14. Messaging:** provides a mean of asynchronous communication with users of the community. In some social networking websites, this function is provided both for users who are considered to be friends and those who are not.

An example of messaging is shown in (Figure 28) taken from [Facebook](#)<sup>21</sup>.



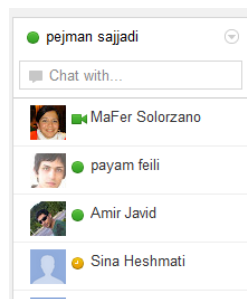
(Figure 28) Messaging, Facebook

**When to use:**

- When it is needed to be able to send a personal message to a single or multiple users in an asynchronous fashion.
- When is desired to send an attachment to certain user or users of the community.

**15. Chat:** allows users to communicate synchronously. This may include simple text based chat or more complex including video chats or group chats.

An example of chat is shown in (Figure 29) from [Google+](#)<sup>22</sup>.



(Figure 29) Chat, Google+

<sup>21</sup> <https://www.facebook.com/>

<sup>22</sup> <https://plus.google.com/>



**When to use:**

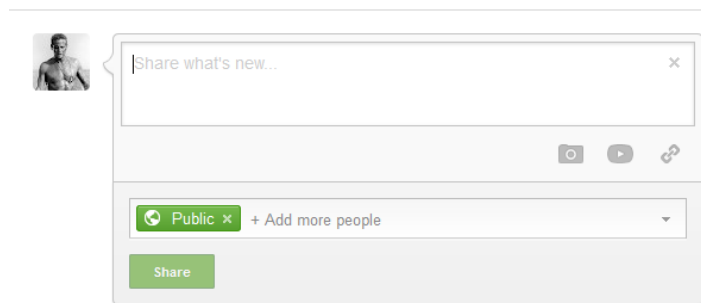
- In situations where real-time chatting as part of the social network is a useful mean of communication. Some famous social networking websites do not include such features in their system because it is felt to be out of context.

**Problem:**

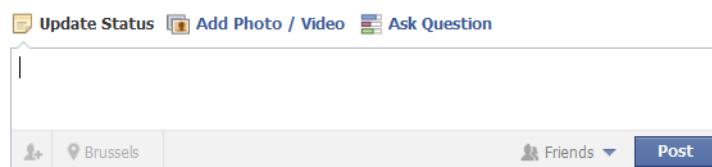
- Show the status of the users.  
Solution: must make a distinction between online and offline users.
- Must be able to deliver messages to the intended destination regardless of user status.  
Solution: must be able to convert a synchronous message to a user that is not available at the moment to an offline message.

**16. Add content:** provides mean to add content to the social network by the participants. The content that can be added to the website may include text, video, images, etc.

Examples of add content are shown in (Figure 30) from [Google+](https://plus.google.com/)<sup>23</sup> and (Figure 31) from [Facebook](https://www.facebook.com/)<sup>24</sup>.



(Figure 30) Add Content, Google+



(Figure 31) Add Content, Facebook

<sup>23</sup> <https://plus.google.com/>

<sup>24</sup> <https://www.facebook.com/>

**When to use:**

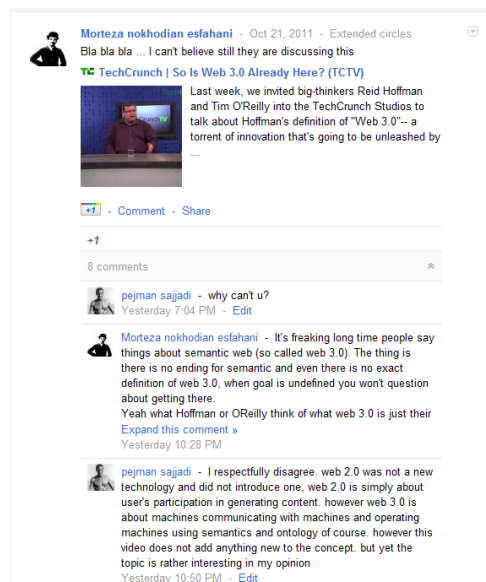
- User participation in adding content to a website is part of the ideology of Web 2.0. It's nowadays a key ingredient for the success of a social web site.

**Problems:**

- Privacy issues.  
Solution: provide the option for the user to restrict the content of the posts he or she makes to specific people, groups of people.
- User must be able to embed different forms of content including pictures, videos and so on.  
Solution: provide means to add different types of content easily.

**17. Comment:** provides a mean to communicate or conduct a discussion on a specific topic with multiple users. Comments are mostly related with posts made by users. There is the possibility to comment on a comment as well.

Examples of comment are given in (Figure 32) from [Google+](https://plus.google.com/)<sup>25</sup> and (Figure 33) from [Facebook](https://www.facebook.com/)<sup>26</sup>.



(Figure 32) Comment, Google+

<sup>25</sup> <https://plus.google.com/>

<sup>26</sup> <https://www.facebook.com/>



(Figure 33) Comment, Facebook

**When to use:**

- When users are interested to acquire other's comments and opinions on their posts.

**Problems:**

- Managing comments.

Solution: make the creator of the post the manager of the comment, he or she would have the privilege to delete comments added by others on his/hers post.

**18. Like & share buttons:** the like button provides a way to express ones feelings toward a certain post. The share button makes it possible to share a post made by another user on behalf of your own, so a whole new group of audience would be able to view it.

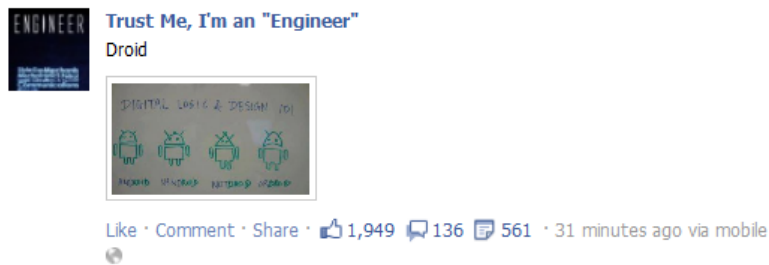
Examples of like & share button are shown in (Figure 34) taken from [Google+](https://plus.google.com/)<sup>27</sup> and (Figure 35) taken from [Facebook](https://www.facebook.com/)<sup>28</sup>.

<sup>27</sup> <https://plus.google.com/>

<sup>28</sup> <https://www.facebook.com/>



(Figure 34) Like & Share, Google+



(Figure 35) Like & Share, Facebook

**When to use:**

- When one wants to indicate the popularity of a post the “like” button can be used.
- When it is desired to make the adding of content process faster and less troublesome, the share button can be used to share a post directly when saw.

**19. Events and RSVP:** users of the social network website can have the ability to create events for different occasions. The created event can be open, which means it is open to the public and all can respond to it. Or it can be only visible to certain people or groups of people. There is usually the functionality to invite others to attend the event and participate in it. Invitations are replied using a so-called “RSVP”. Different options for RSVP can be provided as well, like “attending, not attending, maybe”.

Examples of events and RSVP are shown in (Figure 36) and (Figure 37) from [LinkedIn](http://www.linkedin.com/)<sup>29</sup> and (Figure 38) and (Figure 39) from [Facebook](https://www.facebook.com/)<sup>30</sup>.

Create an Event on LinkedIn Step 1 of 3

Name:

When:  8:00 AM  America - Los Angeles Time  
Add end time

This is a virtual event


Venue:  e.g. Cityplace Conference Center, Dallas  
Add street address

Logo:  Upload logo image (optional)   
PNG, JPEG, or JPG; max size 1 MB. Note: Image will be resized to fit 60x60 pixels.

or

(Figure 36) Events, LinkedIn

Events Home » CroWE 2012



### CroWE 2012

July 23, 2012 at 8:00 AM - July 27, 2012 at 5:00 PM  
 Berlin, Germany

<http://crowe.ethz.ch/>

1st International Workshop on Crowdsourced Web Engineering  
 Paper Submission Deadline: 18 May 2012

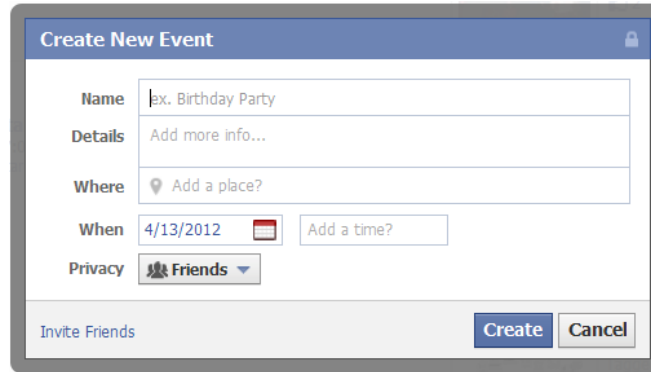
Crowdsourcing techniques have been proposed to address different aspects of web engineering ranging from the generation of content to the design and adaptation of web sites. At the same time, many...

[Show more...](#)

(Figure 37) RSVP, LinkedIn

<sup>29</sup> <http://www.linkedin.com/>

<sup>30</sup> <https://www.facebook.com/>



(Figure 38) Event, Facebook



(Figure 39) RSVP, Facebook

**When to use:**

- When it is desire to send invitations for events to people.
- When one wants to inform a large number of users about an event with its details in an efficient and fast way.

**Problems:**

- Privacy issues.

Solution: must provide restrictions on who can see and respond to the event.

- Differentiating between users based on their response.  
Solution: must show the list of people who have responded in groups categorized based on their response.

**20. Search:** In general, a search function provides the means to search for specific content throughout the entire website for the sole reason of providing an easy way to locate an item, section, object and so on. In the context of social networking website, a search provides an easy way to look for people and pages, or perhaps in some social networking websites like Facebook, even for its applications.

Example of search is shown in (Figure 40) taken from [Facebook](https://www.facebook.com/)<sup>31</sup>.



(Figure 40) Search, Facebook

#### When to use:

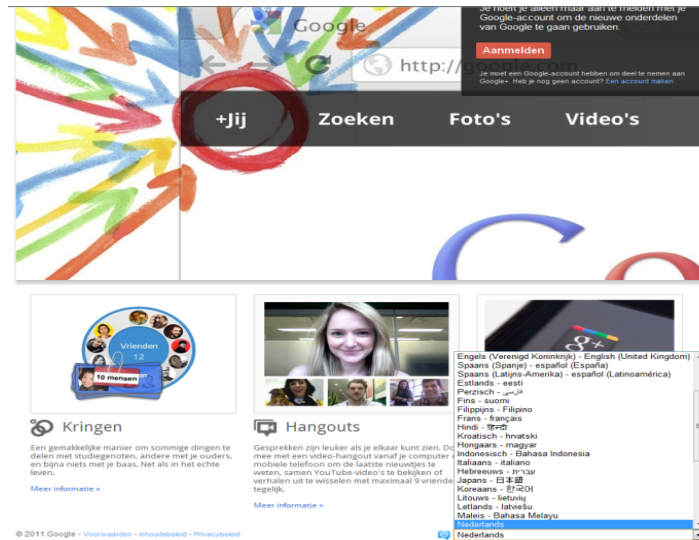
- When is desired to provide the means to locate specific content faster.
- When the amount of information on the website is too large to be navigated.

**21. Language selection:** perhaps one of the recent used features in some social networking websites nowadays is the language selection. Since the website has users from different geographical regions, sometimes it is more effective and useful to localize the website based on visitor's geographical region. This way more users could be attracted to the website.

Example of language selection is shown in (Figure 41), taken from [Google+](https://plus.google.com/)<sup>32</sup>.

<sup>31</sup> <https://www.facebook.com/>

<sup>32</sup> <https://plus.google.com/>



(Figure 41) Language Selection, Google+

**When to use:**

- When visitors with different language backgrounds visit the website on a regular basis.
- When it is desired to localize the content based on the visitor's local region.

**Problems:**

- May introduce extra work for the developers and designers.
- In some cases translation may result in ambiguity and confusion.
- May introduce inconsistency of information between different language selections for the same website and confusion to the users.

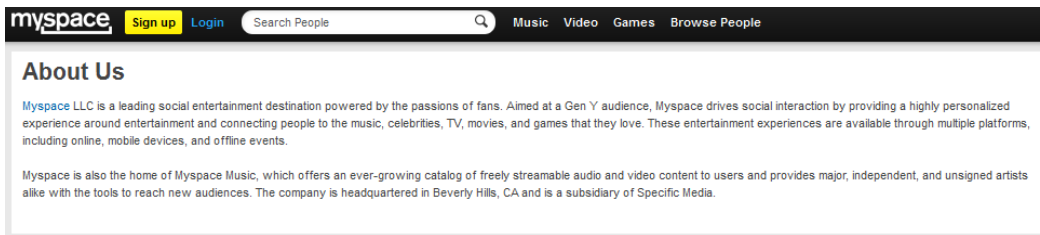
Solution: make sure the general information provided by the website is consistent across different languages.

**22. About us:** a piece of text explaining the corporation/organization and usually their mission statement and their main purpose and goal. In some cases “about us” is divided into various categories (e.g. who we are? What we do? And so on).

Example of about us is shown in (Figure 42) from [Myspace](http://www.myspace.com/)<sup>33</sup>.

<sup>33</sup> <http://www.myspace.com/>





(Figure 42) About Us, Myspace

**When to use:**

- When it is desire to show information about the individual, group or organization providing the services of the website.

**23. Branding:** logo and coloring of the website that provides the identification of the company/organization.

Example of branding is shown in (Figure 43) from [Facebook](https://www.facebook.com/)<sup>34</sup>.



(Figure 43) Branding, Facebook

**When to use:**

- Branding is about the company/organization's identification, it's an essential component of any website belonging to a corporation to indicate officially the owner of the website.

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<sup>34</sup> <https://www.facebook.com/>

### 4.1.2 News websites:

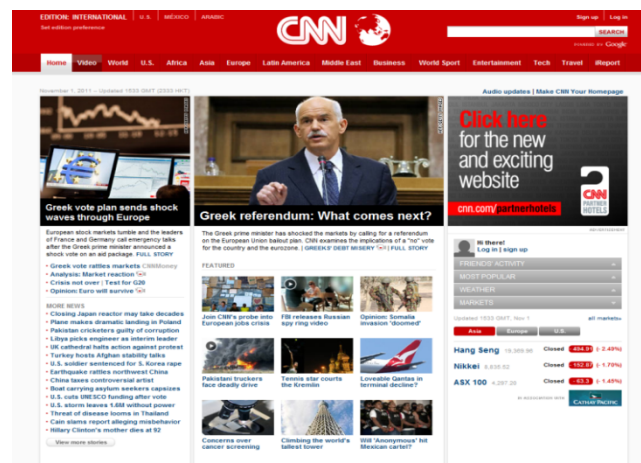
**Definition:** Users want to be informed about the latest news. These types of websites are usually aimed at providing daily news and are frequently updated. Some news websites provide additional features and functionalities as well, such as polls, comments, forums, online TV streaming, etc. The basic idea is normally to create a site with articles that belong to certain types and are accessible via their headline.

**Example:** BBC, CNN, Reuters, MSNBC news, etc.

**Common patterns detected:**

1. **News articles:** usually news websites are constructed based on articles; each “news” is an article in which its full text is accessible via the article’s headline, in the full text there is a timestamp that indicates how long ago the news was added. These articles are usually categorized into sections. The front-page shows a collection of headlines from all categories and usually there is 'featured' article section on the main page.

An example of news Articles is shown in (Figure 44) from [CNN](http://edition.cnn.com/)<sup>35</sup>.



(Figure 44) News Article, CNN

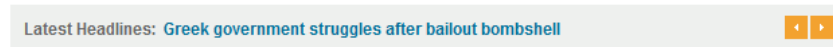
**When to use:**

- The genesis of a news website is the news articles it provides, it is the key feature of this genre of websites.

<sup>35</sup> <http://edition.cnn.com/>

**2. Latest news:** Menu showing the headlines of the latest news items in a chronological order.

Example of latest news is given in (Figure 45) from [CNN](#)<sup>36</sup> and in (Figure 46) from [BBC](#)<sup>37</sup>.



(Figure 45) Latest News, CNN



(Figure 46) Latest News, BBC

**When to use:**

- To show the latest updated of the site (i.e. news items) while the users are reading other contents of the website.
- When it is needed to show the latest news in an efficient way without consuming so much space.

**Problems:**

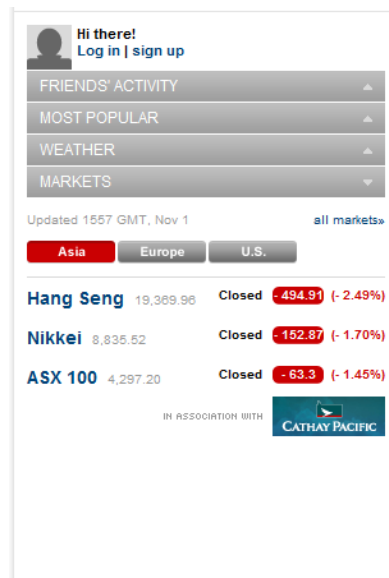
- Easy to be missed by users of the website.  
Solution: provide some sort of an animation (flipping between the news) to make it more distinguishable.
- Must be updated very rapidly.
- The animation must be controllable by users.  
Solution: provide next, previous, pause and play buttons for the section holding the news.

<sup>36</sup> <http://edition.cnn.com/>

<sup>37</sup> <http://www.bbc.co.uk/news/>

3. **News widgets:** while the website's home page provides the primary navigation means through different categories and sections, there maybe also a second navigation to access different categories of news including but not limited to stocks, videos, weather and so on. These widgets are usually represented in a box and occupy quite a small area.

Example of news widgets is shown in (Figure 47) from [Reuters](http://www.reuters.com/news)<sup>38</sup>.



(Figure 47) News Widget, Reuters

#### When to use:

- Useful in situations where the site holds massive amount of content with multiple sections and categories to provide a fast mean of navigation through common sections and categories.

#### Problems:

- Too many categories may appear as widgets not providing a clear overview anymore  
Solution: A great deal of care and precision has to be taken into account when designing such interfaces, so the user would not feel confused or lost.
- Cannot hold all the content of the website, needs to contain only a handful of selected items.

<sup>38</sup> <http://www.reuters.com/news>

4. **Related articles:** The news articles themselves are usually one piece of text and can contain images or videos. Below or besides the article there may be links to related articles such as article about the same subject.

Example of related articles is shown in (Figure 48) from [BBC](http://www.bbc.co.uk/news/)<sup>39</sup>.

The screenshot shows the BBC News website interface. The main article is titled "Greek PM Papandreou faces party revolt over bailout". To the right of the main article, there are several sections of related articles:

- Top Stories:** Includes "Cricketers guilty of betting scam", "Hackers' cut Palestinian network", "Japan MP drinks Fukushima water", "Anger grows over Bangkok floods", and "MF Global misused customer money".
- Features & Analysis:** Includes "What euro crisis?", "Murder in a time of war", "Day in pictures", and "Darker than fiction".
- Most Popular:** Lists "7 billion people and you: What's your number?" as the top item and "Greece PM faces party rebellion" as the second item.

Below the main article, there are also sections for "Global Economy", "Greece turmoil", and "Euro deal at a glance".

(Figure 48) Related Articles, BBC

#### When to uses:

- This form of pattern is usually used when certain news has a past or history, so the reader of the current article has easy access to the previous related articles, or in situations where other articles that are considered to be related based and recommended to the user.

<sup>39</sup> <http://www.bbc.co.uk/news/>

5. **Comment:** often news websites provide the functionality of commenting on the articles by users. The process of commenting varies from site to site; sometimes it requires registration and sometimes not. The genesis of a comment in this context is more or less the same as explained in comment design pattern in social networking.

Example of a comment can be seen in (Figure 49) from [Reuters](http://www.reuters.com/news)<sup>40</sup>.

The screenshot shows the Reuters website interface. At the top, there's a navigation bar with the Reuters logo, 'EDITION: U.S.', and links for 'My Account', 'My Cart', 'Portfolio', and 'Logout'. Below this is a search bar and a menu with categories like Home, Business, Markets, World, Politics, Technology, Opinion, Money, Life & Culture, Pictures, and Video. A red banner at the top of the main content area reads 'BREAKING NEWS: Nasdaq falls 3 percent, Dow and S&P 500 both down over 2.5 percent'. Below the banner is a sponsored section for 'FOR THE EXPERT VIEW ON FOREX' by Reuters FXPERT, sponsored by FXCM, with a 'Click here' button. The main article title is 'Wall St spirals lower after Greek referendum call'. Below the title, there are tabs for 'ARTICLE', 'COMMENTS (13)', and 'VIDEO'. The 'COMMENTS (13)' tab is active, showing a list of comments. The first comment is by 'Intriped' from Nov 01, 2011 8:07am EDT, with the text: 'Why are traders on wall street depending on Greece. It's as if though the world will come tumbling down if Greece has a headache. Would hate to see China start to crumble. I know its complicated but give me a break!'. The second comment is by 'marc5477' from Nov 01, 2011 7:23am EDT, with the text: '@Intriped The reason Greece is a big deal is because they had sold tons and tons of debt to other euro nations. Much more than they should have ever been allowed to sell because they clearly did not make enough internally to cover the interest payments. At the same time, several Euro countries are already struggling to make their own payments. If greece stops paying their debt, then those countries on the edge of default, might default due to not having enough enough income to cover their own debt. And so the house of cards comes crumbling down. The question is how deep does the rabbit hole go. Of course, there is always another solution. The euro nations COULD get together and agree to pay the greek debt. At the same time, they will probably throw greece out of the Euro naton and watch it turn into a 3rd world country. It really isnt that hard to do but I think that they are holding that card as a last ditch resort. They would rather greece paid their own debt.' The third comment is by 'Intriped' from Nov 01, 2011 8:07am EDT, with the text: 'Thanks marc5477, makes more sense to me now;-)'. Below the comments is a 'MOST POPULAR' section with a 'READ' sub-section listing three articles: 1. 'Greece faces meltdown after bailout vote bombshell' (11:58am EDT), 2. 'Wall St spirals lower after Greek referendum call' (10:58am EDT), and 3. 'WRAPUP 3-Greece faces meltdown after bailout vote bombshell'.

(Figure 49) Article Comment, Reuters

#### When to use:

- When the authors, publishers, or the owner of the website is interested in knowing the opinion of the readers regarding the content of the articles.
- To provide a discussion forum for the readers, to allow them to be more involved.

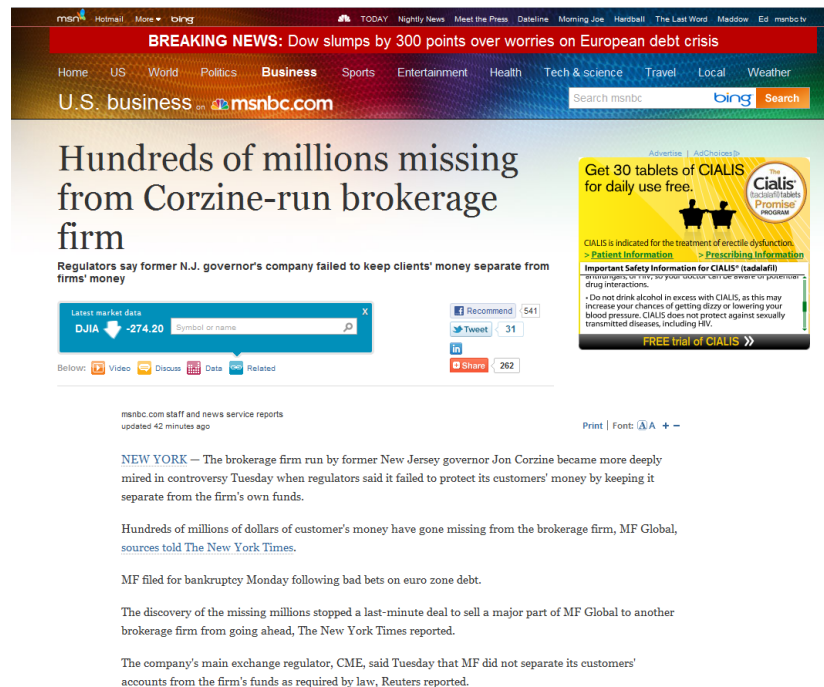
#### Problems:

- The requirement of being registered in order to be able to comment on an article can cause user frustration and thus, losing their motivation for commenting.

<sup>40</sup> <http://www.reuters.com/news>

6. **Like & share buttons:** Now a day’s most famous news websites provide means to sharing and “like” news article over the social networks like Facebook, twitter, google+. The difference with the share and like button pattern in a social networking website is that the share and like function works for multiple social networking.

Example of Like & share is shown in (Figure 50) from [MSNBC](http://www.msnbc.com)<sup>41</sup>.



(Figure 50) Share & Like, MSNBC

**When to use:**

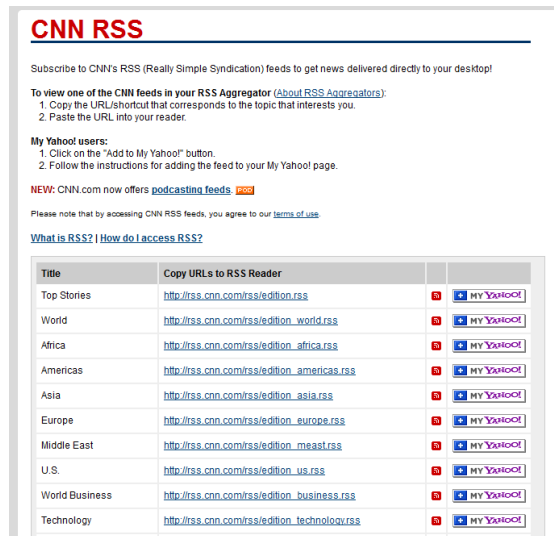
- Useful in situations when the owner of the website is aiming at attracting more readers and users of the services they provide.

7. **Really simple syndication (RSS):** provides the means to view the feed of that particular news website in different websites. The feed to be shown can be chosen from a specific category.

An example of RSS is shown in (Figure 51) from [CNN](http://edition.cnn.com/)<sup>42</sup>.

<sup>41</sup> <http://www.msnbc.msn.com/>

<sup>42</sup> <http://edition.cnn.com/>



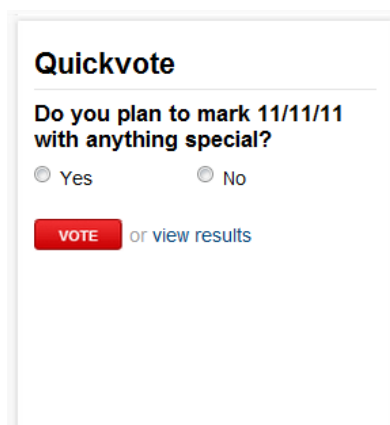
(Figure 51) RSS, CNN

**When to use:**

- To keep the users updated regarding the latest news and changes in their interested fields without the need to constantly consult the news website.

**8. Poll:** to quickly test the user’s opinion on a certain matter.

An example of poll is shown in (Figure 52) from [CBS news](http://www.cbsnews.com/)<sup>43</sup>.



(Figure 52) Poll, CBS News

<sup>43</sup> <http://www.cbsnews.com/>



**When to use:**

- When it is desired to know the opinion of users regarding a matter.
- When is needed to have a statistical results regarding people’s opinion on a matter.
- The features such as a poll make it more fun for people to use the site by expressing their opinions and see the results and the opinions of the others.

**Problems:**

- Different forms of answering methods (single/multiple answers) may be required.  
Solution: provide different methods of answering (radio buttons and checkboxes) for the creator.

9. **Search:** In general, a search function provides the means to search for specific content throughout the entire website for the sole reason of providing an easy way to locate an item, section of content, an object and so on. In the context of news website, a search provides an easy way to look for news articles, or some content in the website.

Example of search is shown in (Figure 53) from [VOA news](http://www.voanews.com/)<sup>44</sup>.



(Figure 53) Search, VOA News

**When to use:**

- When is desired to provide the means to locate specific content faster.
- When the amount of information on the website is too large to be navigated.

<sup>44</sup> <http://www.voanews.com/>

**10. Language & region selection:** perhaps one of the most important and widely used features in news websites now a days are the language and region selection. Since it is the mission of the website to inform many visitors from different geographical regions regarding the news, sometimes it is more effective and useful to localize the news website based on the visitor's geographical region. This way important local news in the native language of the visitor can be presented to the user.

An example of language & region selection is shown in (Figure 54) from [BBC](#)<sup>45</sup>.

BBC in your language »			
Spanish La muerte de Blake Mora complica el escenario en México	Arabic سورية: مقتل 22 في "جمعة تجعيد العضوية" مطبعا	Persian افزایش ارزش سهام جهانی بندبال تصویب طرح ریاضی ایتالیا	Russian Адвокат Бута ставит под сомнение объективность присяжных
More languages			
Azeri AZƏRBAYCAN	Bangla বাংলা	Burmese မြန်မာ	Chinese 中文網
French AFRIQUE	Hausa HAUSA	Hindi हिन्दी	Indonesian INDONESIA
Kinyarwanda GAHUZA	Kirundi KIRUNDI	Kyrgyz КЫРГЫЗ	Nepali नेपाली
Pashto پښتو	Portuguese BRASIL	Sinhala සිංහල	Somali SOMALI
Swahili SWAHILI	Tamil தமிழ்	Turkish TÜRKÇE	Ukrainian УКРАЇНСЬКА
Urdu اردو	Uzbek O'ZBEK	Vietnamese TIẾNG VIỆT	

(Figure 54) Language and Region Selection, BBC

#### When to use:

- When visitors with different language backgrounds visit the website on a regular basis.
- When it is desired to localize the news shown based on the visitor's local region.

#### Problems:

- May introduce extra work for the developers and designers.
- In some cases translation may result in ambiguity and confusion.
- May introduce inconsistency of information between different country selections for the same website, and confusion for the visitors.

Solution: make sure the general information provided by the website is consistent across different languages.

<sup>45</sup> <http://www.bbc.co.uk/worldservice/languages/index.shtml>

**11. About us:** a piece of text explaining the corporation/organization and usually their mission statement and their main purpose and goal. In some cases “about us” is divided into various categories (e.g., who we are? What we do? And so on).

An example of about us is given in (Figure 55) from [CNN](#)<sup>46</sup>.



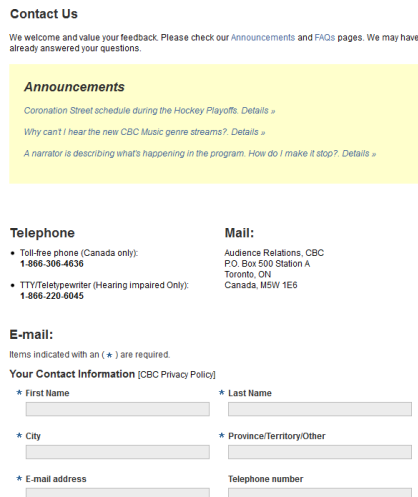
(Figure 55) About Us, CNN

**When to use:**

- When it is desire to show information about the individual, group or organization providing the services of the website.

**12. Contact us:** some text providing the corporation/organization’s contact information; this contact information could be localized at the language and country selection step, or it could be global.

An example of contact us is given in (Figure 56) from [CBC News](#)<sup>47</sup>.



(Figure 56) Contact Us, CBC News

<sup>46</sup> <http://edition.cnn.com/about/>

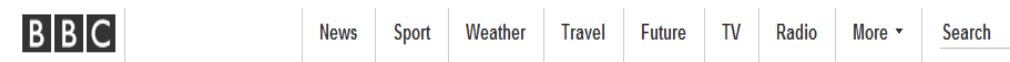
<sup>47</sup> <http://www.cbc.ca/contact/>

**When to use:**

- For gathering feedbacks for the users, or contacting the corporation/organization for any other purpose.

**13. Branding:** logo and coloring of the website that provides the identification of the company/organization.

An example of branding is shown in (Figure 57) from [BBC](http://www.bbc.co.uk/)<sup>48</sup>.



(Figure 57) branding, BBC

**When to use:**

- Branding is about the company/organization's identification; it's an essential component of any website belonging to a corporation to indicate officially the owner of the website.

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<sup>48</sup> <http://www.bbc.co.uk/>

### 4.1.3 E-commerce Websites

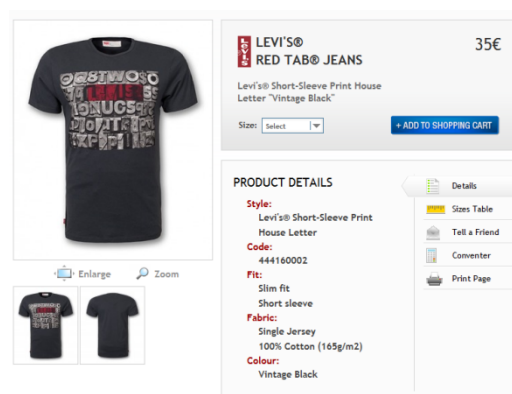
**Definition:** The idea is creating a virtual store where visitors can browse, chose and buy goods in one go. Auction websites belong to this category (Welie 2008). E-commerce websites can support online payment in different forms (bank transfer, credit cards, debit cards, etc.). They essentially imitate a real-life store; one can add items to a shopping basket and only decide to actually purchase them at the checkout step.

**Examples:** a few famous ones are: Amazon, ebay, Nike.

**Common patterns identified:**

1. **Product virtualization:** the main characteristic of an e-commerce website is to imitate a real store, the only difference is that is that since the e-commerce website provides a virtual representation of the products sold, there is no capability for the user to examine, feel, or touch the products before actually purchasing them. The idea of the product virtualization is to bring the virtual shopping experience closer to a real life experience so the customers would have a good feeling about buying the products. It is important to make sure that the customers know what exactly he is buying. In order to accomplish that, pictures or animations can be used to represent all aspects of the product. In some website, a 3D model of the product is provided so that people can inspect the product from different angles.

An example of product virtualization is given in (Figure 58) from [Levi's](http://eu.levi.com/en_BE/index.html)<sup>49</sup>.



(Figure 58) Product Virtualization, Levi's

<sup>49</sup> [http://eu.levi.com/en\\_BE/index.html](http://eu.levi.com/en_BE/index.html)

**When to use:**

- When it's necessary to show a virtual representation of the product with all of its aspects.
- Useful for certain products that can take different attributes (e.g. color, size).
- To increase trust, i.e. the user is pretty sure that the product will satisfy his expectations.

**Problems:**

- Certain types of products require more advanced visualizations (e.g., 3D view, magnification of details, flipping it around).

Solution: provide 3D representation for more expensive products (e.g. computers).

- User may still not be persuaded fully to purchase certain types of products because of the lack of physical touch (e.g. clothes).

Solution: provide full details of the products (in text), including a description of its material.

- 2. Registration:** To allow identifying the customers (for reasons of paying, or sending goods), users need to be able to register to the system. Registration leads to having a profile which will be explained as a separate pattern.

An example of registration is given in (Figure 59) from [Amazon](http://www.amazon.com/)<sup>50</sup>.

The screenshot shows the Amazon.com registration page. At the top left is the Amazon logo, and at the top right are links for 'Your Account' and 'Help'. The main content is a registration form with the following fields and labels:

- Registration** (Section Header)
- New to Amazon.com? Register Below.** (Text)
- My name is:** [Text Input Field]
- My e-mail address is:** [Text Input Field]
- Type it again:** [Text Input Field]
- My mobile phone number is:** [Text Input Field] (Optional)
- [Learn more](#) (Link)
- Protect your information with a password** (Section Header)
- This will be your only Amazon.com password. (Text)
- Enter a new password:** [Text Input Field]
- Type it again:** [Text Input Field]
- Create account** (Button)

At the bottom of the form, there are links for 'Conditions of Use' and 'Privacy Notice', and a copyright notice: '© 1996-2011, Amazon.com, Inc. or its affiliates'.

(Figure 59) Registration, Amazon

<sup>50</sup> <http://www.amazon.com/>

**When to use:**

- When identification of the user is necessary
- In combination with a login and/or a user profile.
- When it's necessary to keep track of user's transactions.

**Problems:**

- Might cause user irritation or distrust and thus reduce the number of users actual buying goods.  
Solution: user quick registration.
- Might attract BOTS to the system and increase the level of spam registration.  
Solution: user Captcha-like techniques.

**3. Login:** in some e-commerce websites users are allowed to login (after registration naturally) to personalize the page and to keep track of purchased items and to be able to use certain main features of the website (e.g. purchasing products).

An example of login is shown in (Figure 60) from [Amazon](#)<sup>51</sup>.

The screenshot shows the Amazon.com login interface. At the top left is the Amazon logo, and at the top right are links for 'Your Account | Help'. The main content area is titled 'Sign In' and asks 'What is your e-mail address?'. Below this is a text input field labeled 'My e-mail address is:'. The next question is 'Do you have an Amazon.com password?'. There are two radio button options: 'No, I am a new customer.' and 'Yes, I have a password:'. The 'Yes' option is selected. Below the 'Yes' option is a password input field and a link for 'Forgot your password?'. At the bottom of the form is a button that says 'Sign in using our secure server' with a lock icon. Below the form is a 'Sign In Help' section with links for 'Forgot your password? Get password help.' and 'Has your e-mail address changed? Update it here.'. At the very bottom, there is a footer with 'Conditions of Use Privacy Notice © 1996-2011. Amazon.com, Inc. or its affiliates'.

(Figure 60) Login, Amazon

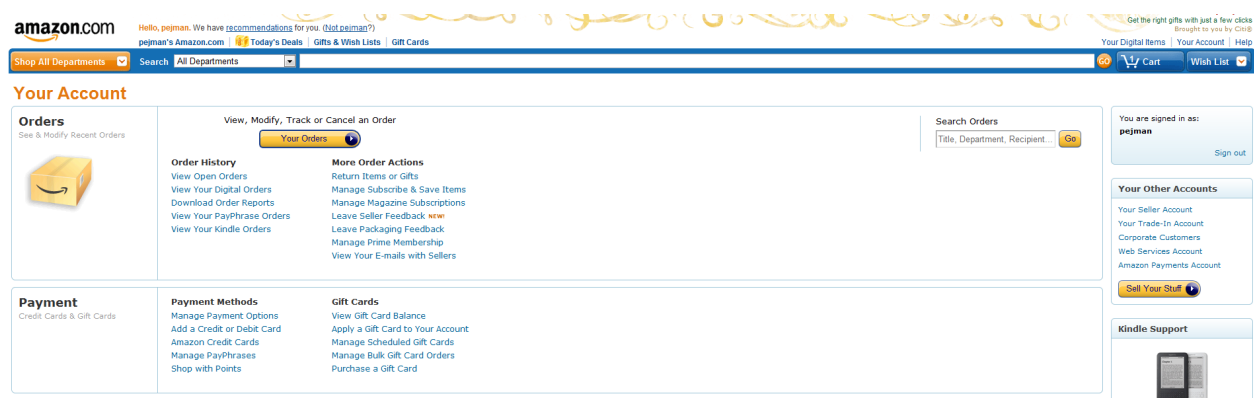
**When to use:**

- To avoid that users that buy regular goods on the website, need to enter their information over and over again.
- When system requires user registration to provide certain features.

<sup>51</sup> <http://www.amazon.com/>

4. **User profile:** for personalization and purchase processes (or simply to collect information about users), some e-commerce websites provide users with a profile.

An example of user profile is given in (Figure 61) from [Amazon](http://www.amazon.com/)<sup>52</sup>.



(Figure 61) User Profile, Amazon

#### When to use:

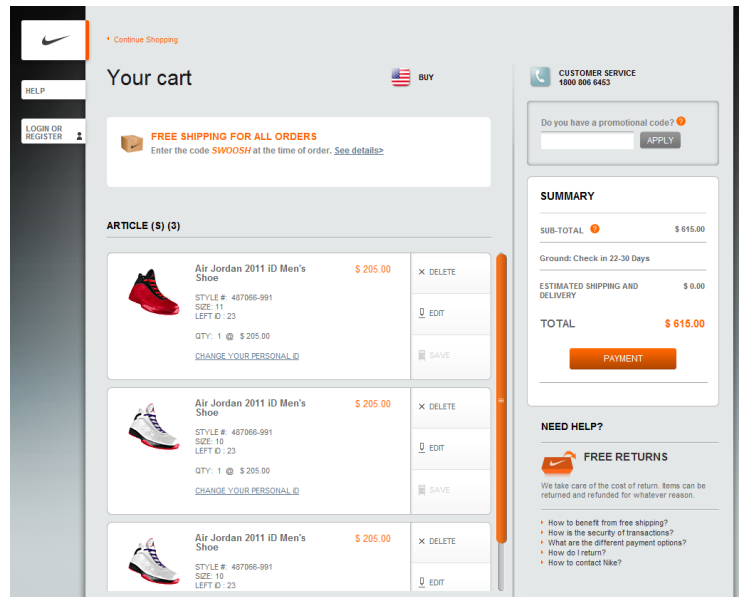
- When it is useful to maintain a history of user's purchases and provide reports to them.
- When the system wants to provide recommended products to the user based on their preferences.

5. **Shopping cart:** a shopping cart is a tool provided in e-commerce websites to assist the user with the purchasing process. It imitates the shopping basket of a real shop, it shows the items added to the cart, the total expenses are calculated in real time and is kept until the checkout point. It should provide an easy way to add items to the cart and remove from them and at the same time have an overview of the cart all the time. It should also provide "add item to the shopping cart" on all items on the website and also set the attributes of the product before adding them to the cart (e.g. color, number of items, etc.).

An example of shopping cart is shown in (Figure 62) from [Nike](http://www.nike.com/)<sup>53</sup>.

<sup>52</sup> <http://www.amazon.com/>





(Figure 62) Shopping Cart, Nike

**When to use:**

- Shopping carts are a key feature of e-commerce websites.

**Problems:**

- The state of the page and user's navigation should be changed after each item addition or deletion to and from the cart.

Solution: use technologies that allow this.

- The “add item to the cart” function should not overwhelm the overall interface of the website since it might lead to confusion in reading the page.

Solution: use “hover over item” functions to show/hide this feature.

- It should be possible to inspect the overall shopping cart contents and total expenses all the time while shopping.

Solution: use a widget that is always visible.

**6. Product category:** the different categories for the products sold on the website are shown for the ease of navigation and finding the desired products.

An example of product category is shown in (Figure 63) from [ebay](http://www.ebay.com/)<sup>54</sup>.

Catégories		
<a href="#">Art &amp; Antiquités</a>	<a href="#">Immobilier</a>	<a href="#">Musique &amp; Instruments</a>
<a href="#">Autos &amp; Motos</a>	<a href="#">Industrie &amp; Commerce</a>	<a href="#">Photo &amp; Cameras</a>
<a href="#">Bébé</a>	<a href="#">Informatique &amp; PDA</a>	<a href="#">Services</a>
<a href="#">Bijoux &amp; Montres</a>	<a href="#">Jeux, Jouets &amp; Modélisme</a>	<a href="#">Sports &amp; Vélos</a>
<a href="#">Bricolage &amp; Loisirs créatifs</a>	<a href="#">Jeux Vidéos &amp; PC</a>	<a href="#">Téléphonie</a>
<a href="#">Cartes Postales</a>	<a href="#">Livres &amp; BD</a>	<a href="#">Tickets &amp; Voyages</a>
<a href="#">Cinéma &amp; DVD</a>	<a href="#">Maison &amp; Jardin</a>	<a href="#">Timbres</a>
<a href="#">Collections</a>	<a href="#">Mode &amp; Accessoires</a>	<a href="#">TV, Audio &amp; Vidéo</a>
<a href="#">Cosmétiques &amp; Santé</a>	<a href="#">Monnaies</a>	<a href="#">Vin &amp; Gastronomie</a>
<a href="#">Voir toutes les catégories</a>		

(Figure 63) Product Category, ebay

**When to use:**

- When the system provides a wide range of products and the navigation process can be cumbersome.
- To classify products for different types of audience.

**Problems:**

- The categorization can be confusing to the user and thus locating the desired products can become a hard task.

Solution: categorize with meaningful names and generalize as little as possible.

<sup>54</sup> <http://www.ebay.com/>

7. **User services:** Some e-commerce websites provide certain services to their users after and before the products have been purchase (e.g., shipment tracking; how to return the products; calculation of shipment cost, etc.).

An example of user services is shown in (Figure 64) from [Amazon](http://www.amazon.com)<sup>55</sup>.

A vertical list of user service links from Amazon. The links are: 'Let Us Help You' (orange), 'Shipping Rates & Policies' (blue), 'Amazon Prime' (orange), 'Returns Are Easy' (blue), 'Manage Your Kindle' (blue), and 'Help' (blue).

Let Us Help You  
Shipping Rates & Policies  
Amazon Prime  
Returns Are Easy  
Manage Your Kindle  
Help

(Figure 64) User Services, Amazon

**When to use:**

- When the system provides shipment of purchases.
- When the system provides means of returning the purchased products.

**Problems:**

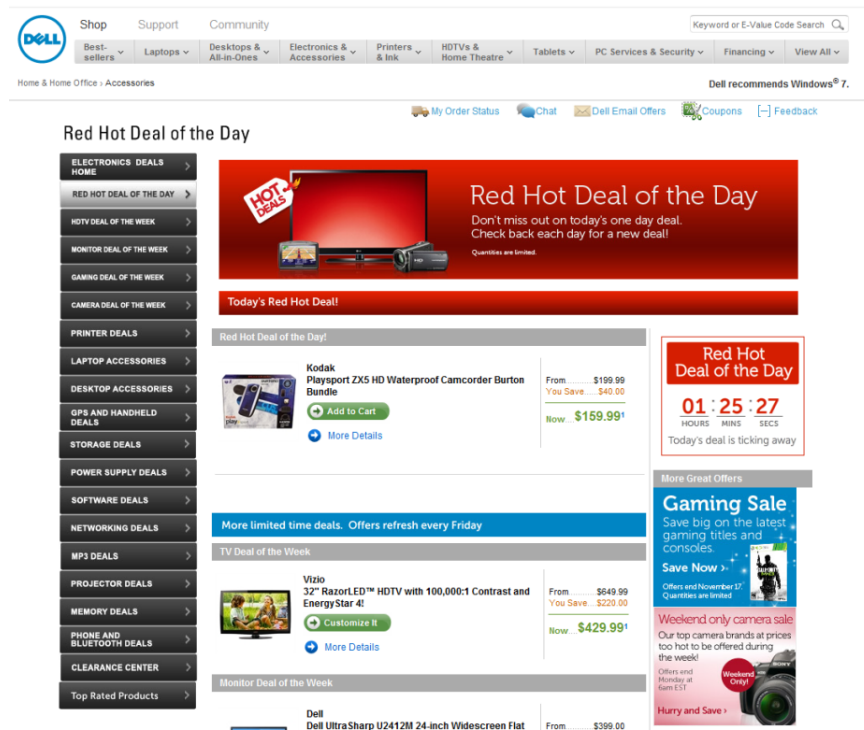
- Users might be forced to user shipping services of certain companies.  
Solution: provide a wide variety of shipment service providers.

---

<sup>55</sup> <http://www.amazon.com>

8. **Shopping experience:** in order for an e-commerce websites to be successful, it should make its products as visible as possible; as a matter of fact it should put the products under the customer’s nose all the time. Most e-commerce websites provide features such as “hot lists”, “popular products” and so on to bring products under the attention of the user and create a better shopping experience.

An example of shopping experience is shown in (Figure 65) from [Dell](http://www.dell.com/)<sup>56</sup>.



(Figure 65) Shopping Experience, Dell

When to use:

- To promote products more effectively.

9. **Product comparison:** for a better shopping experience usually the visitor is given the possibility to compare products based on different specifications. This makes it easier for the visitors to select what they want by seeing different products at the same time.

<sup>56</sup> <http://www.dell.com/>

An example of product comparison is shown in (Figure 66) from [Apple](#)<sup>57</sup>.

Kies uw MacBook Pro.

13-inch: 2,4 GHz	13-inch: 2,8 GHz	15-inch: 2,2 GHz	15-inch: 2,4 GHz	17-inch: 2,4 GHz
2,4-GHz dual-core Intel Core i5 4 GB, 1333 MHz 500 GB, 5400 rpm <sup>1</sup> Intel HD Graphics 3000 Ingebouwde batterij (7 uur) <sup>2</sup>	2,8-GHz dual-core Intel Core i7 4 GB, 1333 MHz 750 GB, 5400 rpm <sup>1</sup> Intel HD Graphics 3000 Ingebouwde batterij (7 uur) <sup>2</sup>	2,2-GHz quad-core Intel Core i7 4 GB, 1333 MHz 500 GB, 5400 rpm <sup>1</sup> Intel HD Graphics 3000 AMD Radeon HD 6750M met 512 MB GDDR5 Ingebouwde batterij (7 uur) <sup>2</sup>	2,4-GHz quad-core Intel Core i7 4 GB, 1333 MHz 750 GB, 5400-rpm <sup>1</sup> Intel HD Graphics 3000 AMD Radeon HD 6770M met 1 GB GDDR5 Ingebouwde batterij (7 uur) <sup>2</sup>	2,4-GHz quad-core Intel Core i7 4 GB, 1333 MHz 750 GB, 5400-rpm <sup>1</sup> Intel HD Graphics 3000 AMD Radeon HD 6770M met 1 GB GDDR5 Ingebouwde batterij (7 uur) <sup>2</sup>
Op voorraad Gratis geleverd 1.199,00 €	Op voorraad Gratis geleverd 1.499,00 €	Op voorraad Gratis geleverd 1.799,00 €	Op voorraad Gratis geleverd 2.199,00 €	Op voorraad Gratis geleverd 2.499,00 €
Selecteer	Selecteer	Selecteer	Selecteer	Selecteer

(Figure 66) Product Comparison, Apple

#### When to use:

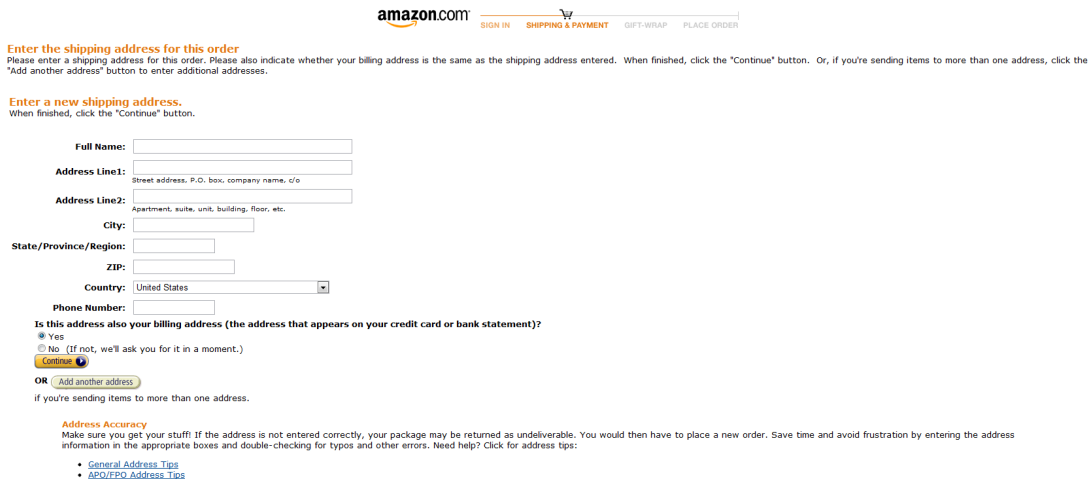
- For products that have similar characteristics (e.g. computers).
- When products have a long list of similar attributes.
- For providing a better shopping experience by enabling the users to compare products before purchasing them.

**10. Checkout:** checkout is actually a part of the shopping cart functionality, but it is worthy to mention it as a separate pattern, since during checkout the user is required to enter the shipping address, select the payment method, etc. This information is usually not part of the registration process for logical reasons; firstly, the registration should be a quick one, so the user should not be overwhelmed with a lot of fields to fill in. Secondly, the shipping address may be different each time the user makes a purchase. E-commerce website usually provide various payment methods (e.g. credit cards, bank transfer, PayPal, etc.) to serve all kinds of users.

Example of checkout is shown in (Figure 67) and (Figure 68) from [Amazon](#)<sup>58</sup>.

<sup>57</sup> <http://www.apple.com/>

<sup>58</sup> <http://www.amazon.com>



amazon.com | SIGN IN | SHIPPING & PAYMENT | GIFT-WRAP | PLACE ORDER

**Enter the shipping address for this order.**  
Please enter a shipping address for this order. Please also indicate whether your billing address is the same as the shipping address entered. When finished, click the "Continue" button. Or, if you're sending items to more than one address, click the "Add another address" button to enter additional addresses.

**Enter a new shipping address.**  
When finished, click the "Continue" button.

Full Name:

Address Line 1:   
Street address, P.O. box, company name, c/o

Address Line 2:   
Apartment, suite, unit, building, floor, etc.

City:

State/Province/Region:

ZIP:

Country:

Phone Number:

**Is this address also your billing address (the address that appears on your credit card or bank statement)?**

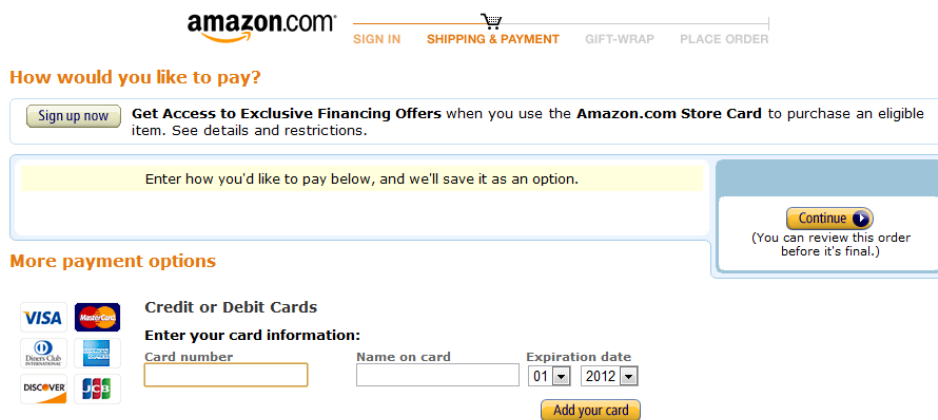
Yes  
 No (If not, we'll ask you for it in a moment.)

OR   
if you're sending items to more than one address.

**Address Accuracy**  
Make sure you get your stuff! If the address is not entered correctly, your package may be returned as undeliverable. You would then have to place a new order. Save time and avoid frustration by entering the address information in the appropriate boxes and double-checking for typos and other errors. Need help? Click for address tips:

- [General Address Tips](#)
- [APO/FPO Address Tips](#)

(Figure 67) Checkout, Amazon



amazon.com | SIGN IN | SHIPPING & PAYMENT | GIFT-WRAP | PLACE ORDER

**How would you like to pay?**

**Get Access to Exclusive Financing Offers** when you use the **Amazon.com Store Card** to purchase an eligible item. See details and restrictions.

Enter how you'd like to pay below, and we'll save it as an option.

(You can review this order before it's final.)

**More payment options**

**Credit or Debit Cards**

Enter your card information:

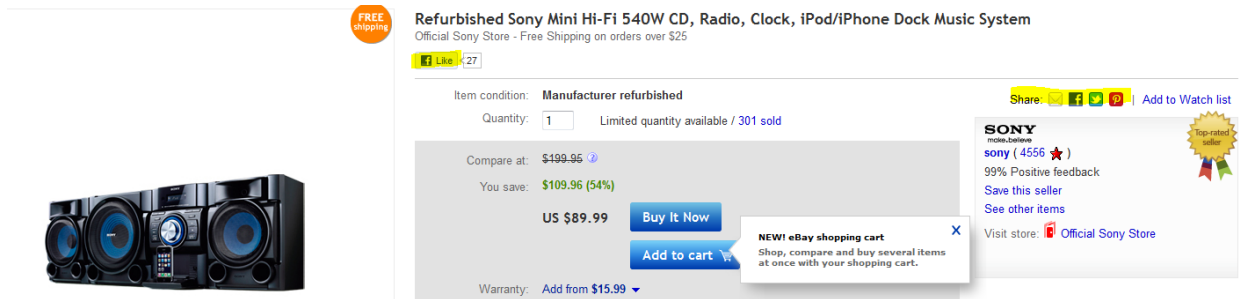
(Figure 68) Checkout, Amazon

**When to use:**

- As mentioned before checkout is part of the shopping cart and is an essential component of any e-commerce website, it is mandatory to exist.

**11. Like & share buttons:** The like button provides a way to express ones feelings toward a certain product over a social network. The share button makes it possible to share information regarding a product over famous social networking websites, so a whole new group of audience would be able to view it.

Example of Like & share button in e-commerce websites is shown in (Figure 69) from [ebay](http://www.ebay.com/)<sup>59</sup>.



(Figure 69) Like & Share, ebay

**When to use:**

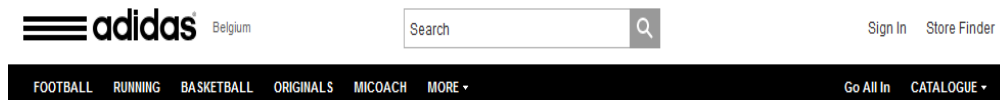
- When one wants to indicate the popularity of a post the “like” button can be used.
- When it is desired to make the adding of content process faster and less troublesome, the share button can be used to share a post directly when saw.

**12. Search:** In general search function provides the means to search for specific content throughout the entire website for the sole reason of providing an easy way to locate an item, section of a content, object and so on. In the context of e-commerce website, search provides an easy way to look for a particular product, pages, or perhaps even more in the website.

An example of search is shown in (Figure 70) from [Addidas](http://www.adidas.be/)<sup>60</sup>.

<sup>59</sup> <http://www.ebay.com/>

<sup>60</sup> <http://www.adidas.be/>



(Figure 70) Search, Addidas

**When to use:**

- When is desired to provide the means to locate specific content faster.
- When the amount of information on the website is too much to be navigated one by one.

**13. Language & region selection:** one of the features in e-commerce websites is the language and region selection. Since it is the mission of the website to service many visitors from different geographical regions, sometimes it is more effective and useful to localize the e-commerce website based on a group of visitor's geographical region. This way prices and local promotions are shown in a more meaningful way to the local visitor.

An example of language & region selection is shown in (Figure 71) from [Timberland](http://www.timberland.com/)<sup>61</sup>.



(Figure 71) Language &amp; Region Selection, Timberland

<sup>61</sup> <http://www.timberland.com/>



**When to use:**

- When visitors with different language backgrounds visit the website on a regular basis.
- When it is desired to localize the content shown based on the visitor's local region.

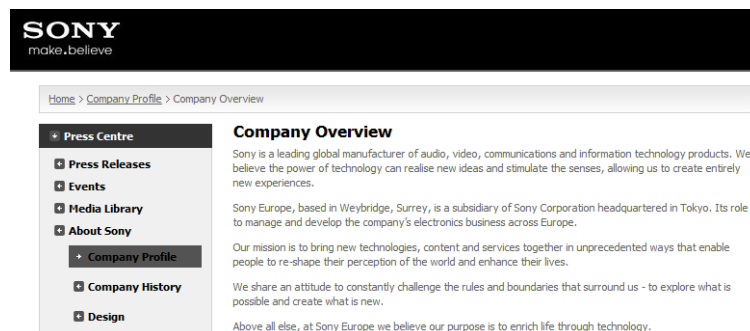
**Problems:**

- May introduce extra work for the developers and designers.
- In some cases translation may result in ambiguity and confusion.
- May introduce inconsistency of information between different country selections for the same website. And further, confusion for the visitors.

Solution: make sure the general information provided by the website is consistent across different languages.

**14. About us:** a piece of text explaining the corporation/organization and usually their mission statement and their main purpose and goal. In some cases “about us” is divided into various categories (e.g., who we are? What we do? And so on).

An example of about us is shown in (Figure 72) from [Sony](#)<sup>62</sup>.



(Figure 72) About Us, Sony

**When to use:**

- When it is desired to show information about the individual, group or organization providing the services of the website.

<sup>62</sup> <http://presscentre.sony.eu/content/detail.aspx?NewsAreaId=29&ReleaseID=4486>

**15. Contact us:** some text providing the corporation/organization's contact information; this contact information could be localized at the language and country selection step, or it could be global.

An example of contact us is shown in (Figure 73) from [Sony](#)<sup>63</sup>.



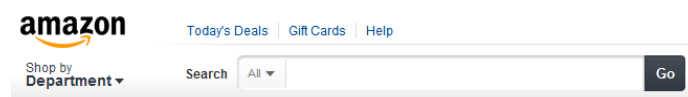
(Figure 73) Contact Us, Sony

**When to use:**

- For gathering feedbacks for the users, or contacting the corporation/organization for any other purpose.

**16. Branding:** logo and coloring of the website that provides the identification of the company/organization.

Example of branding is given in (Figure 74) from [Amazon](#)<sup>64</sup>.



(Figure 74) Branding, Amazon

**When to use:**

- Branding is about the company/organization's identification; it's an essential component of any website belonging to a corporation to indicate officially the owner of the website.

<sup>63</sup> <http://presscentre.sony.eu/content/detail.aspx?ReleaseID=98&NewsAreaId=30>

<sup>64</sup> <http://www.amazon.com>

#### 4.1.4 Corporate Websites

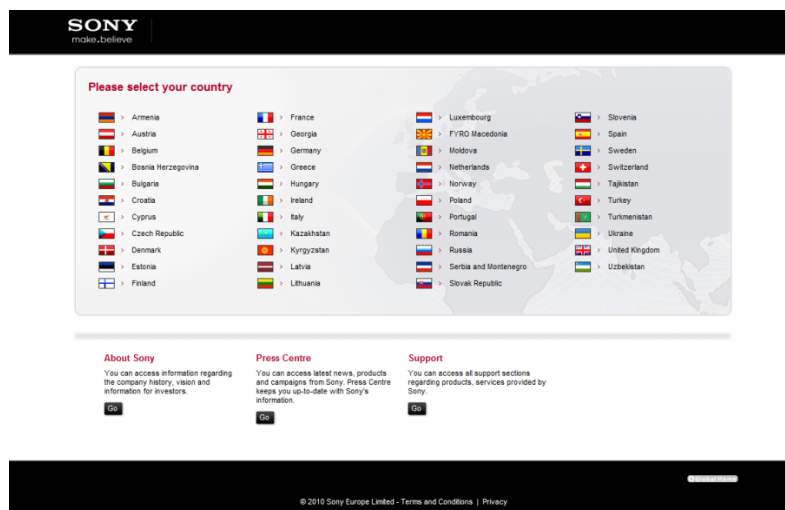
**Definition:** These types of websites are normally aimed for companies and corporations who want to market themselves in the cyber world for current and prospective users. (It could be possible that some corporation don't have users but supporters like UNICEF). The basic idea behind most of this websites is to structure information for different kind of visitors. These websites act as an intermediary communication mean between the organization and the visitors regarding marketing purposes, online support, or simply providing information regarding the organization. It is highly probable that these websites are combined with "e-commerce" as well to support more online marketing.

**Examples:** Unicef, Sony, Apple, DHL, etc.

#### Common patterns detected:

**1. Language & region selection:** perhaps one of the most important and widely used features in corporate websites in the language selection. Since it is the mission of the website to represent the company or organization in the cyber world, and most famous and well known companies don't get limited on their visitors based on a geographic region and country borders, it is usually desired to have the website in multiple languages for visitor all around the world.

An example of language & region selection is shown in (Figure 75) from [Sony](#)<sup>65</sup>.



(Figure 75) Language & Region Selection, Sony

<sup>65</sup> [http://www.sony-europe.com/pages/europe/sony\\_europe.html](http://www.sony-europe.com/pages/europe/sony_europe.html)

**When to use:**

- When the corporation is international, and it has visitors with different language backgrounds on a regular basis.
- When for marketing purposes, it is desired to show prices based on the visitor's local region.
- For providing information regarding local branches and support centers (online and offline) in a particular region.
- Localize the information presented to the user based on the geographical region he or she is in (e.g. Promotions).

**Problems:**

- May introduce extra work for the developers and designers.
- In some cases translation may result in ambiguity and confusion.
- May introduce inconsistency of information between different country selections for the same corporation website. And further, confusion for the visitors.

Solution: make sure the general information provided by the website is consistent across different languages.

**2. Search:** In general search function provides the means to search for specific content throughout the entire website for the sole reason of providing an easy way to locate an item, section of a content, object and so on.

An example of search is shown in (Figure 76) from [CERN](#)<sup>66</sup>.



(Figure 76) Search, CERN

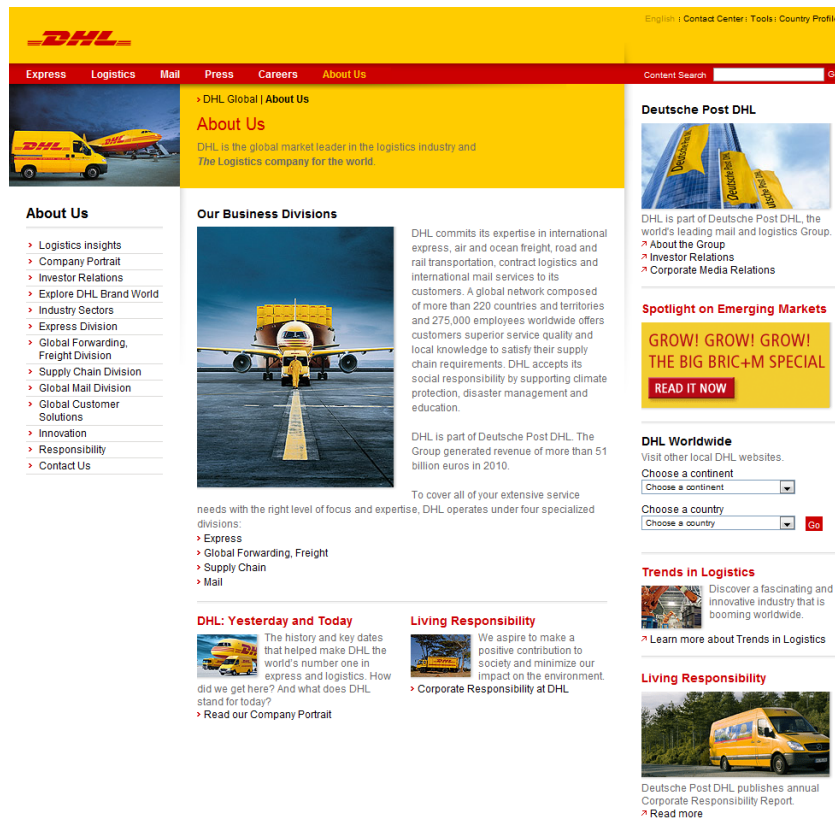
**When to use:**

- When is desired to provide the means to locate specific content faster.
- When the amount of information on the website is too much to be navigated one by one.

<sup>66</sup> <http://public.web.cern.ch/public/>

3. **About us:** a piece of text explaining the corporation/organization and usually their mission statement and their main purpose and goal. In some cases “about us” is divided into various categories (e.g., who we are? What we do? And so on).

An example of about us is shown in (Figure 77) from [DHL](http://www.dhl.be/en/about_us.html)<sup>67</sup>.



(Figure 77) About Us, DHL

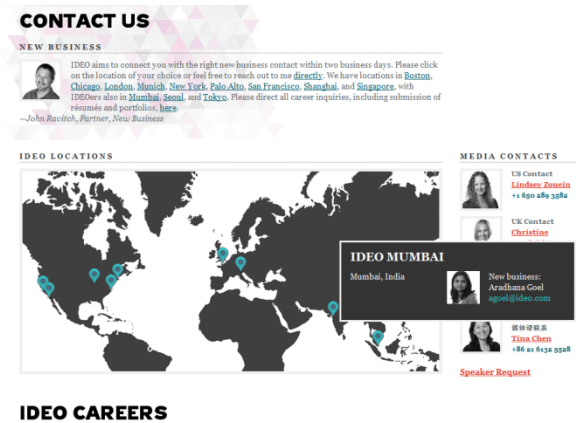
**When to use:**

- When it is desire to show information about the individual, group or organization providing the services of the website.

<sup>67</sup> [http://www.dhl.be/en/about\\_us.html](http://www.dhl.be/en/about_us.html)

- Contact us:** some text providing the corporation/organization’s contact information; this contact information could be localized at the language and country selection step, or it could be global.

An example of contact us is shown in (Figure78) from [IDEO](http://www.ideo.com/contact/)<sup>68</sup>.



(Figure 78) Contact Us, IDEO

**When to use:**

- For gathering feedbacks for the users, or contacting the corporation/organization for any other purpose.

- Branding:** the Company’s logo and colors is considered to be a main asset of the company, it is its identity. However, since many visuals are not designed for online use, they need to adapt. The home page of the corporate site plays an important role in establishing the recognition function of the corporate identity and the first impression the website will have on its visitors. The home page must make it clear what kind of company this website presents (e.g. bookshop, news website, etc.).

Examples of branding are shown in (Figure 79) from [Unicef](http://www.unicef.org/)<sup>69</sup> and (Figure 80) from [Sony](http://www.sony.net/)<sup>70</sup>.

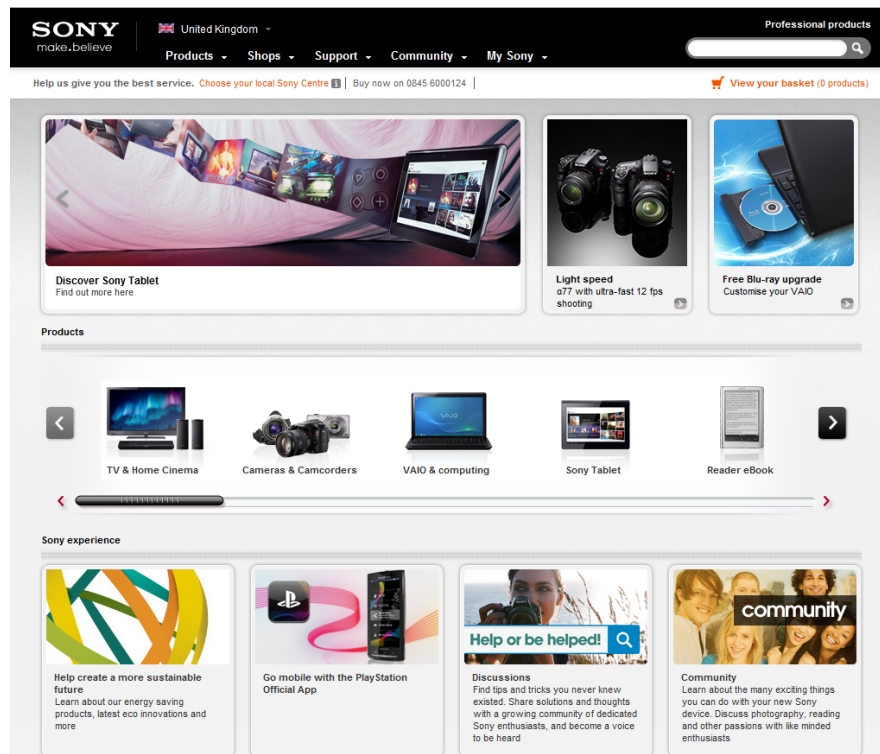
<sup>68</sup> <http://www.ideo.com/contact/>

<sup>69</sup> <http://www.unicef.org/>

<sup>70</sup> <http://www.sony.net/>



(Figure 79) Branding, Unicef



(Figure 80) Branding, Sony

**When to use:**

- Branding is about the company/organization's identification; it's an essential component of any website belonging to a corporation to indicate officially the owner of the website.

**Extra notes on corporate websites:**

A corporate website is constructed around the information about the corporation that is mostly needed. The most important and useful information is usually provided on the home page, and other information is usually easily accessible. Thus, most visitors will find what they are looking for with minimum amount of effort. There are other patterns that can be used in corporate website depending on the company and the type of functionality desired to achieve. They could potentially be as follow:

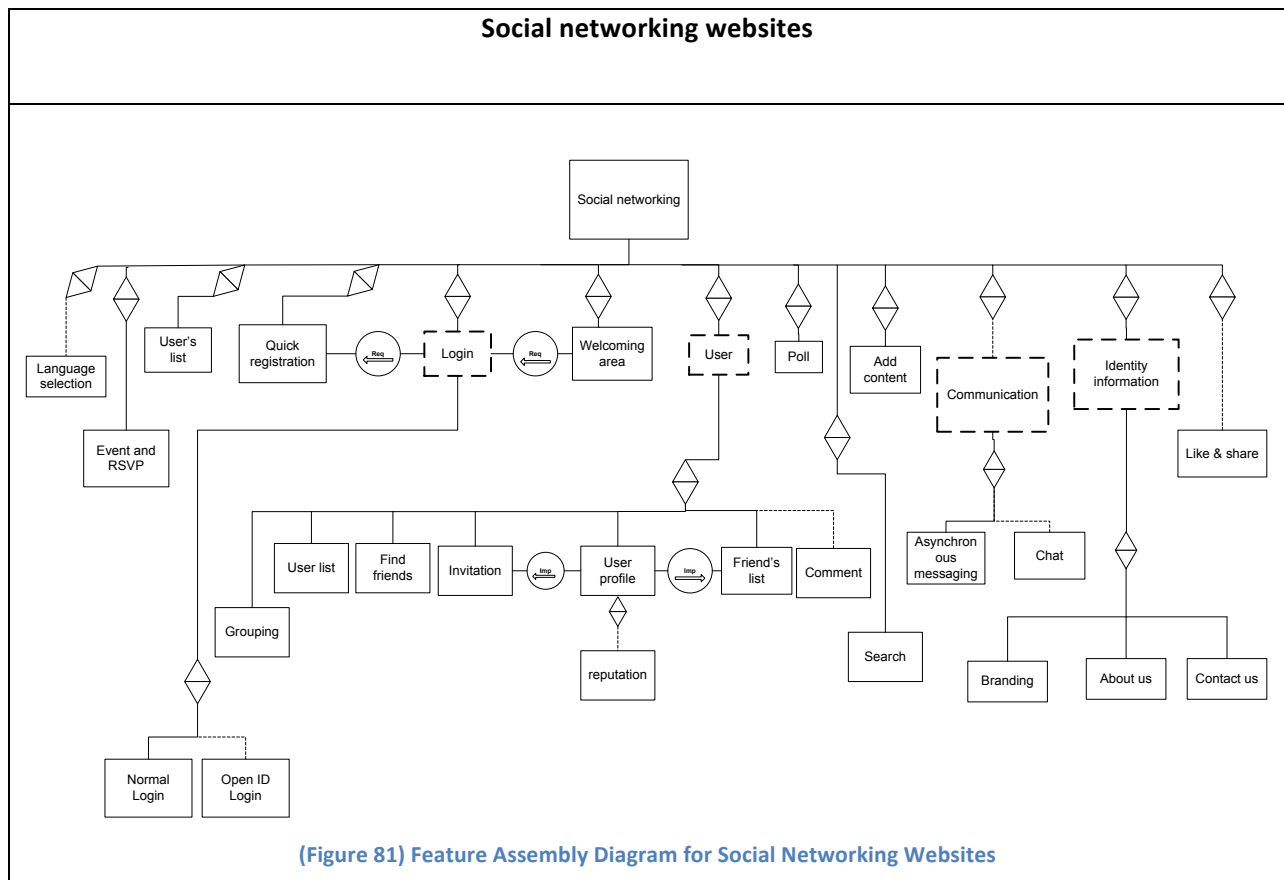
- Latest news about the company
- Press releases
- Customer support
- Job opportunities
- Search
- E-commerce

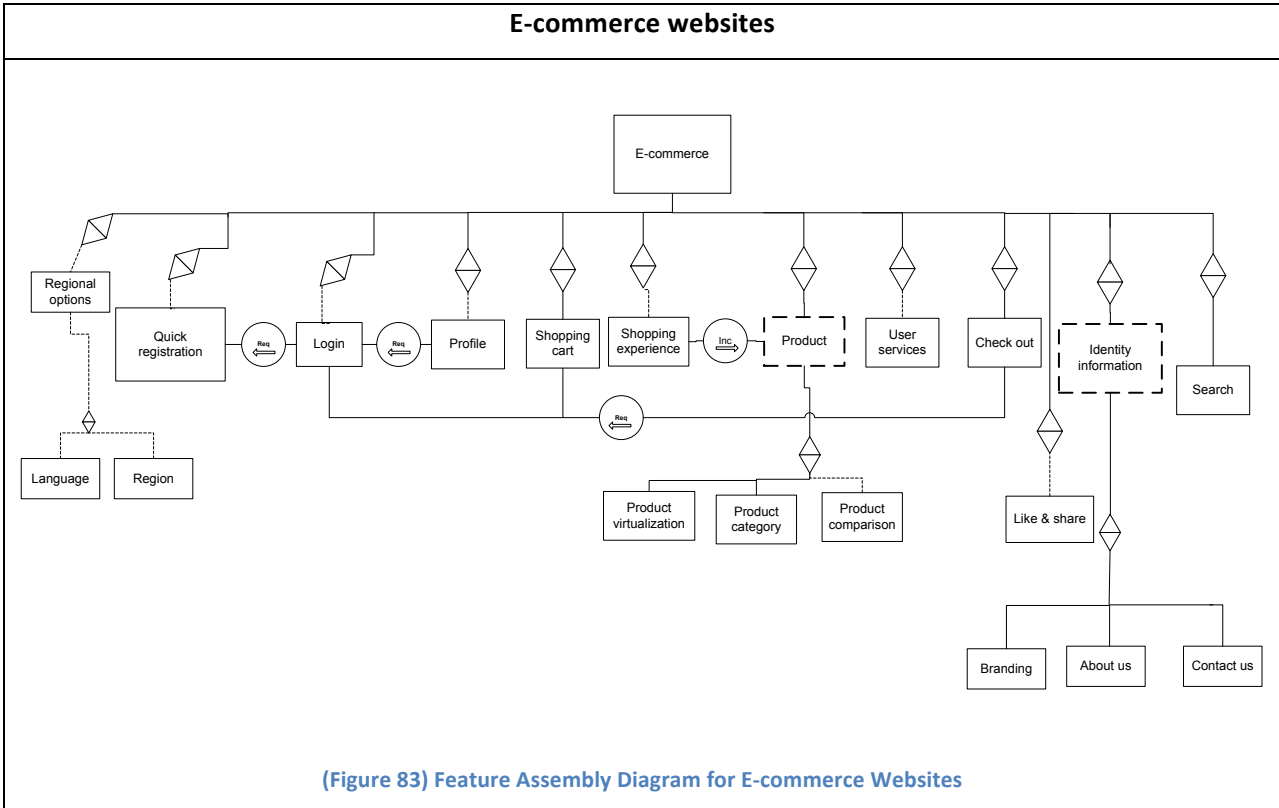
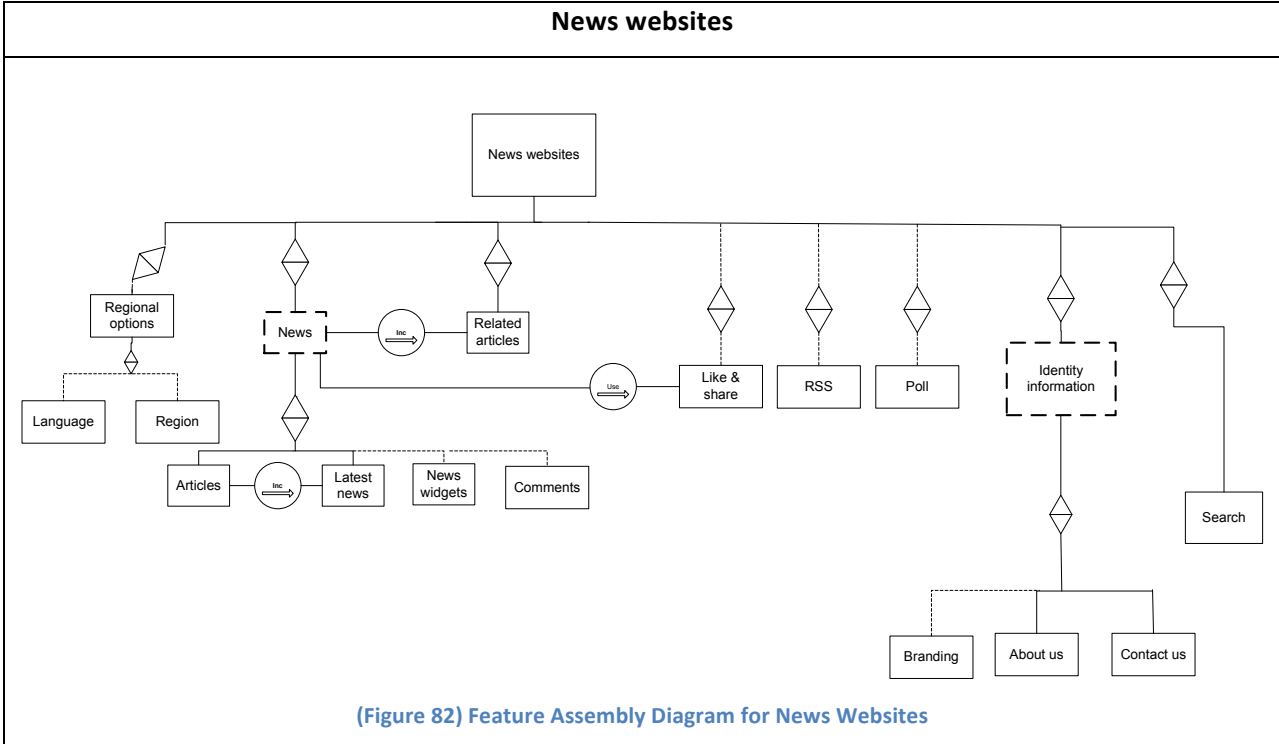
Every site type has its primary objectives that can be realized by offering a number of services. For example, an e-commerce site is primarily intended to sell products and therefore it will provide shopping services. However, secondary objectives may be considered leading to additional services including community-building (between buyers) or information gathering (about the products). Interaction designers need to balance these services and create a consistent user experiences for the entire site.

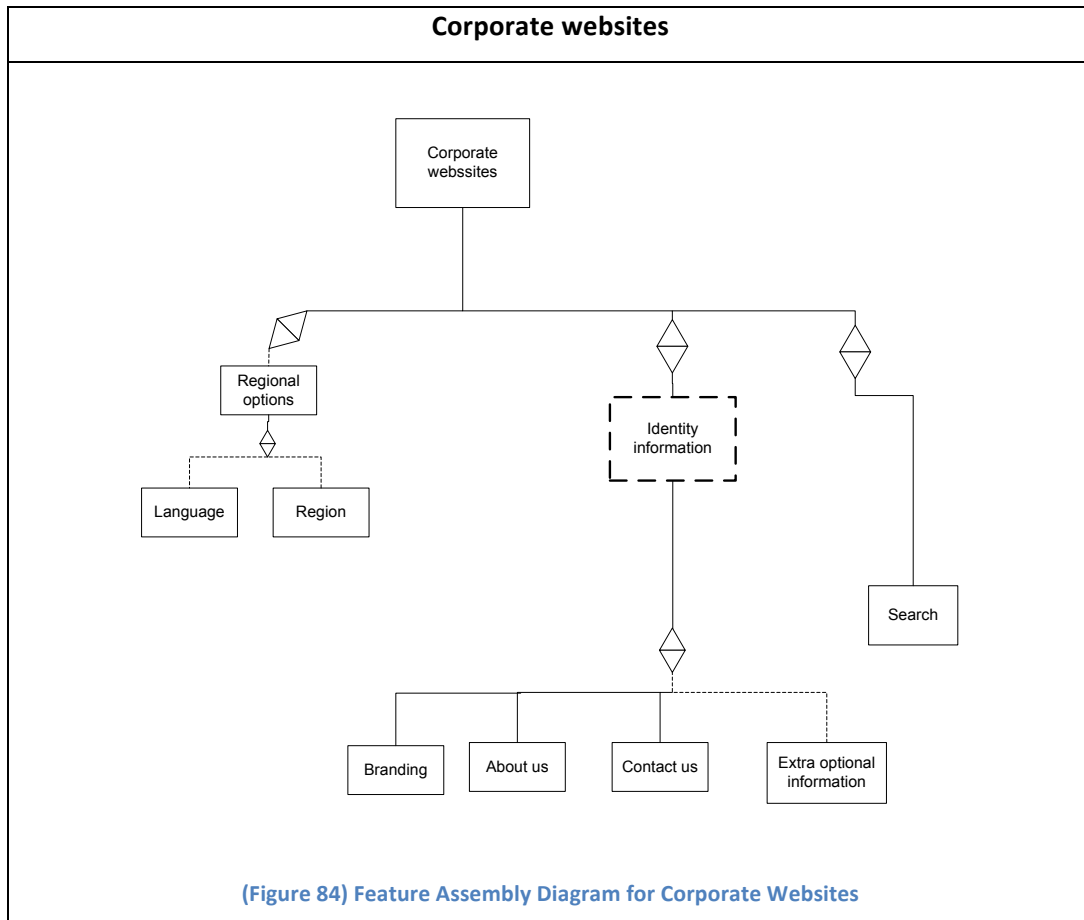


## 4.2 Feature Assembly Diagrams for Website Genres

The Feature Assembly diagrams created for the website genres provided in section 4.1 are shown here. Take note that the patterns with the same name are identical; however, a more specialized description of the same pattern was given in the previous section based on the context of its usage. The decision on declaring a pattern to be mandatory or optional is a rather subjective matter, however we used the rule that a pattern is defined mandatory if it exists and has been detected in most of the website with the genre. A mandatory pattern is connected to the website genre via a solid line while an optional one is connected via a dashed line.







### 4.3 Anti-Design Patterns and Dark Patterns

To continue this chapter, and for informational purposes, a list of so-called “anti-patterns” will be given and discussed. These patterns are design patterns that are considered to be bad solutions for known problems; nevertheless they are being used widely because of a lot of “copy” behavior that exists among website developers. The idea is to provide them as general knowledge and educate designers and developers to avoid them in the future. The anti-patterns that will be mentioned in this section can belong to many different website genres, depending on the requirement of that particular website.

Even though the definition of an anti-pattern refers to classes of commonly reused bad solutions to problems, and of course these bad solutions can be identified more easily in less known websites than the more famous ones, most of them are deliberately designed that way. And since there is this attitude of following the famous websites blindly to attract the same level of hype, these deliberate bad

solutions are spread sometimes without the designer noticing them. These solutions are often designed deliberately to attract more users (customers), create a rich database, and of course earn more money. These classes of deliberated bad solutions are referred to as “dark pattern”. When we talk about “bad design”, we generally mean solutions that are created by mistake; these are known as anti-design patterns. “Dark Patterns” are different, they are not mistakes, they are carefully crafted with a solid understanding of human psychology, and they do not have the user’s interests in mind (Dark Pattern 2011). These dark patterns are unethical and not only they should not be used, but enough public awareness should be made so that popular websites would cease using them as well. “Dark patterns” could be related to any type of website as we are going to see below.

### **4.3.1 Anti-Design Patterns**

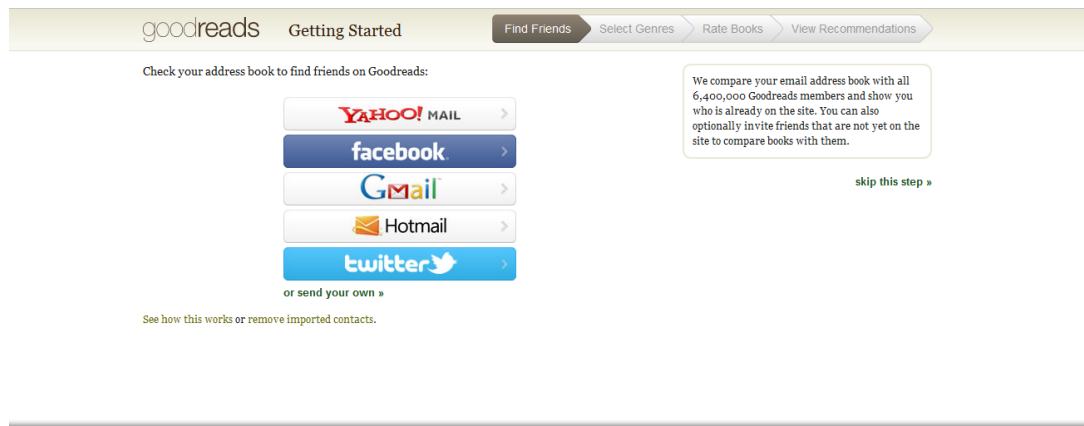
#### ***4.3.1.1 Spamming contacts***

This pattern is widely used by social networking websites, in which they recommend the user at some stage of their profile completion to import the contact address information of their email account in order to find friends and see who is using the community already. However in most cases, this information (contact list) is abused by the system, it is used to spam the people in the address book with invitations based on the implicit permission the user has given when allowing access to his email contact list. This could be potentially very annoying for the people in the contact list.

This pattern is used by so many social networking websites that at some stage new users start to create a new email address just for registering to the social network so they would not have to be worried about their contact list being spammed. As one can logically deduce, this pattern can also cause fast spreading of viruses and Trojans through emails as well. Thus it is fair to assume that giving away your email contact list information in different websites is not a very safe move.

A solution to this problem would be to use “social networking portability”, which means that instead of re-entering your address book information each time you plan to sign up for a new social network, you should be able to “import” or rather “subscribe” to your profile information. Therefore personal information, privacy setting, etc. will be imported instead of re-entered. Therefore, there will be no need to give access to your address book each time in different websites. (Social Network Anti-patterns 2010)

An example of a website that followed this anti-pattern until 2010 is [Goodreads](http://www.goodreads.com/)<sup>71</sup>; a social community for rating and recommending books to your friends, shown in (Figure 85).



(Figure 85) Anti-Design Pattern, Spamming Contact, Goodreads

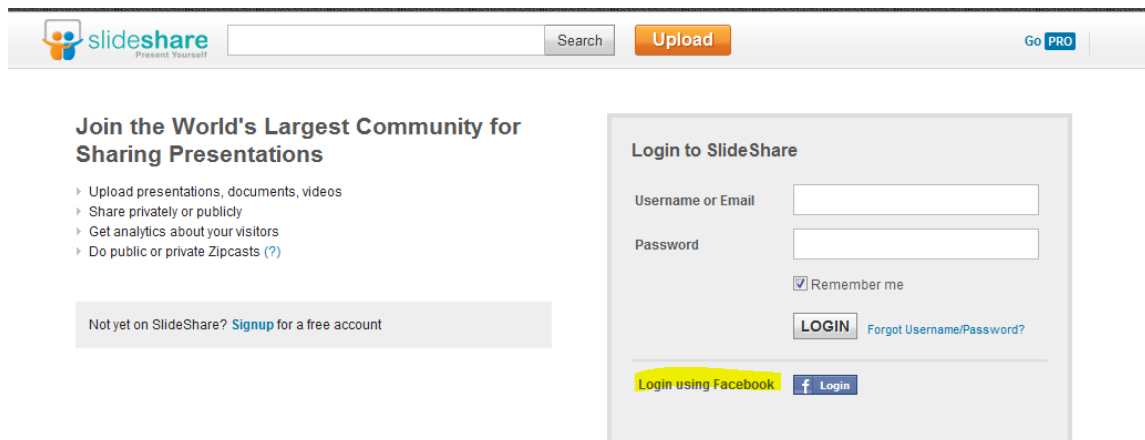
#### 4.3.1.2 Entering Other Website Credentials into another Website (Open ID)

Giving away the login credentials of a website to another one is not a very good idea. There is no guarantee that the new website will treat your private information with care. The websites that ask for access information of other systems (e.g., gmail, facebook) to be used in their own, are promoting a very dangerous habit since this method is commonly used by phishing websites. Users will assume that it is safe to give away their access information to other websites whereas it is very dangerous and should be dealt with cautiously, considering the number of phishing sites out there. Designers and developers should not use import support for sites that do not offer a secure API authentication like “OAuth” and if it is necessary to use such service, use site specific proprietary API which depends on OAuth (e.g., Google address book API). (Social Network Anti-patterns 2010)

As an example, Facebook connection boxes that are being used even more frequently than before can be potentially harmful when the website using them is not well known. When users are surfing in other websites, there is a possibility that such windows appear to encourage users to enter their email address and password into something visually resembling (but not genuine) a Facebook popup window

<sup>71</sup> <http://www.goodreads.com/>

to either login with their Facebook account into the website, or give access to the application on the website to their personal information from Facebook. This means that any malicious site can have this pop-up or a login button with Facebook sign on it saying "Login with Facebook Connect", and then display an identically styled virtual popup, and a novice user, who thinks is entering his/her information in a Facebook user interface, will simply enter their email address and password and becomes a victim of phishing. An example of Open ID login is shown in (Figure 86), however; the website employing it has a great reputation and is known not to be a phishing website.



(Figure 86) Anti-Design Pattern, Entering Other Website Credentials into another Website, [SlideShare](http://www.slideshare.net/)<sup>72</sup>

#### 4.3.1.3 Cargo Cult

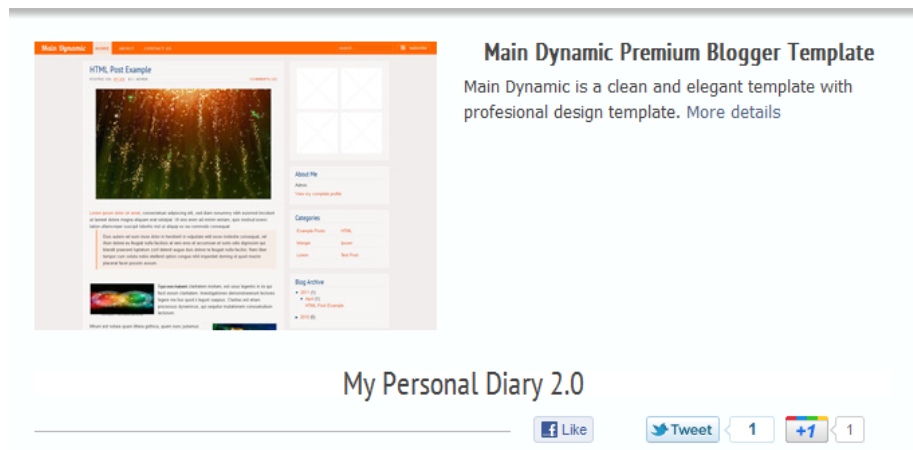
This anti-pattern is used to indicate the imitation of superficial features of successful websites and application without actually considering their usefulness. As an example consider the “share” button or “like on Facebook” or “+1” that is being used widely nowadays, almost at every website that has some piece of text whether it’s an article, personal blogs, etc. Even though this feature might sound interesting, one should actually think about the usefulness of such function before providing it; e.g., is it really necessary to be able to post everything everywhere?

<sup>72</sup> <http://www.slideshare.net/>



(Figure 87) Anti-Design Pattern, Cargo Cult, Blogger Template

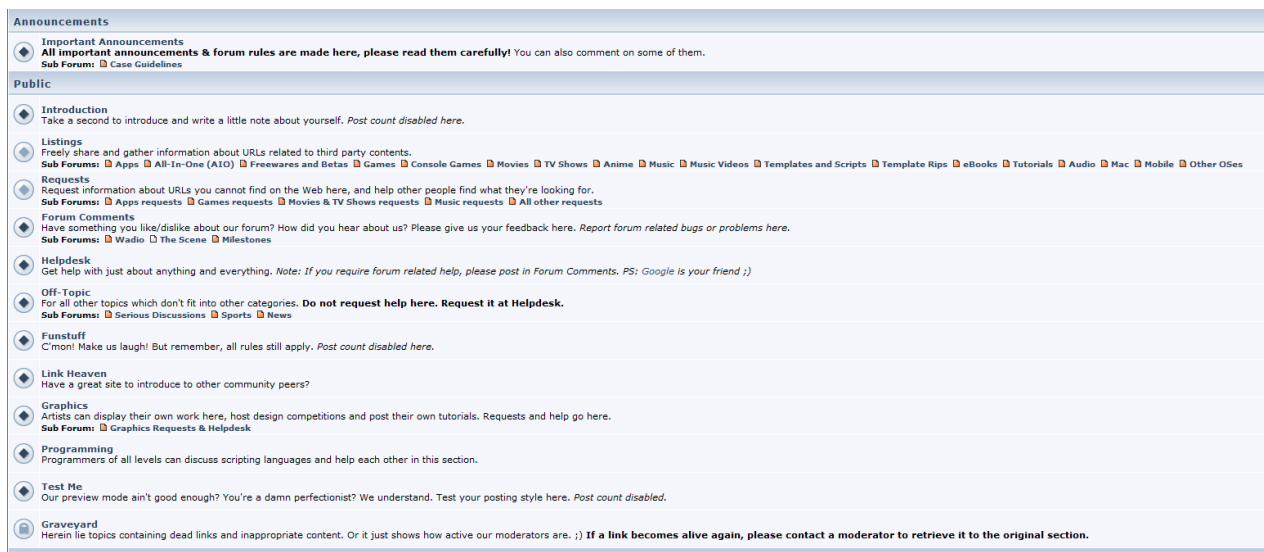
(Figure 87) shows on how many different social networking websites the information on this website is shareable. And (Figure 88) shows the notion of “like” button available for three social networking websites.



(Figure 88) Anti-design pattern, Cargo cult, Templates

#### 4.3.1.4 Potemkin Village

This anti-pattern refers to providing an overly elaborate set of empty community discussion areas or other collaborative spaces, in anticipation of having a large population of users rather than growing organically in response to their needs. (Crumlish 2009)



(Figure 89) Anti-Design Pattern, Potemkin Village, Forumw



### 4.3.2 Dark Patterns

The followings are few examples of “dark patterns” taken form (darkpatterns.org).

#### 4.3.2.1 Bait and Switch

The idea of the “Bait and Switch” dark patterns is to attract audience by providing false promises and then switching to a different policy once the website has gained the planned advantages of having the desired level of audience. To mention an example of “Bait and Switch” one can refer to [Scribd](#)<sup>73</sup>. When it was launched, it was advertised to be the "YouTube for documents". It was supposed to be completely free of charge with unlimited capacity for users to upload and view documents. The website was supposed to earn revenue only through displaying advertisements. As shocking as it was, suddenly in September 2010, Scribe.com put a considerable amount of user uploads behind a paywall. After a wide negative public reaction to the sudden change in policy, Scribd posted an apology, and changed its user interface slightly to what they claim as "Clear opt-out" and "Proactive messaging", which means they provide users with a way to go around the payment, if they have the patience and the will to navigate through the site.

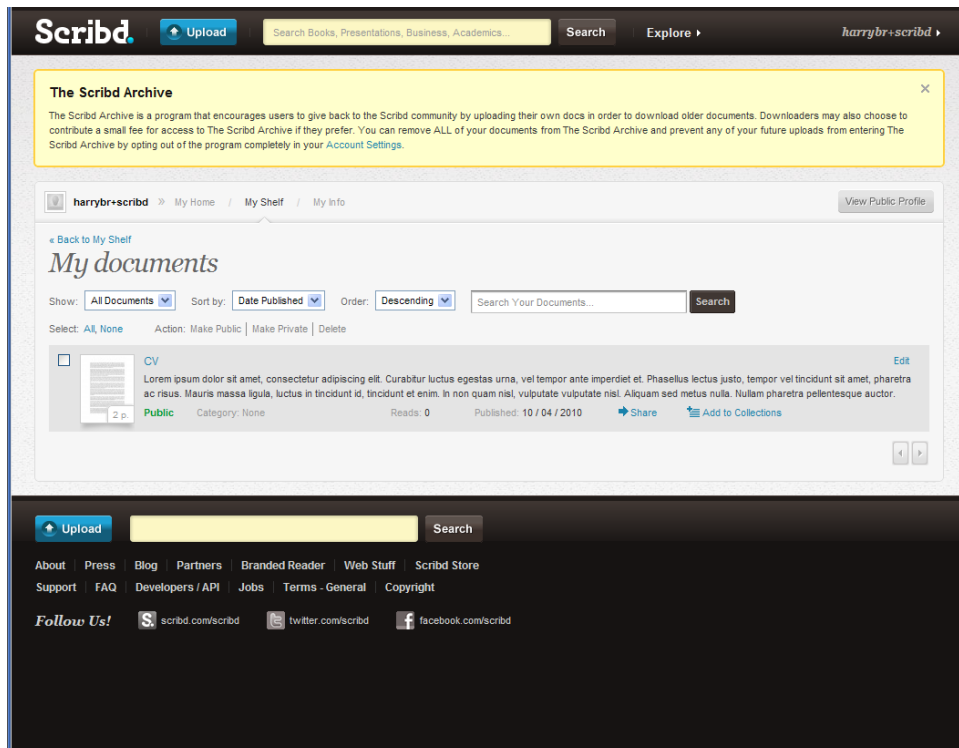
[Scribd](#) is a clear example of “Bait and Switch” pattern, since they began their operation with a different policy (“...upload your PDF, Word, and PowerPoint docs to share them with the world's largest community of readers.”) as advertised on the scribd.com homepage, and then change it after they acquired a rich database of user uploads.

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<sup>73</sup> <http://www.scribd.com/>



(Figure 90) Dark Pattern, Bait & Switch, Scribd (Dark Pattern 2011)



(Figure 91) Dark Pattern, Bait & Switch, Scribd (Dark Pattern 2011)

In (Figure 91) it is shown that at the end of the uploading procedure the users will be presented with a message which goes as follow:

*“The Scribd Archive is a program that encourages users to give back to the Scribd community by uploading their own docs in order to download older documents. Downloaders may also choose to contribute a small fee for access to The Scribd Archive if they prefer. You can remove ALL of your documents from The Scribd Archive and prevent any of your future uploads from entering The Scribd Archive by opting out of the program completely in your Account Settings.”* (Dark Pattern 2011).

When a new user attempts to download a file, he or she is asked to either upload a file first (thus increasing the size of the document library of scribd), or pay for access (Dark Pattern 2011).

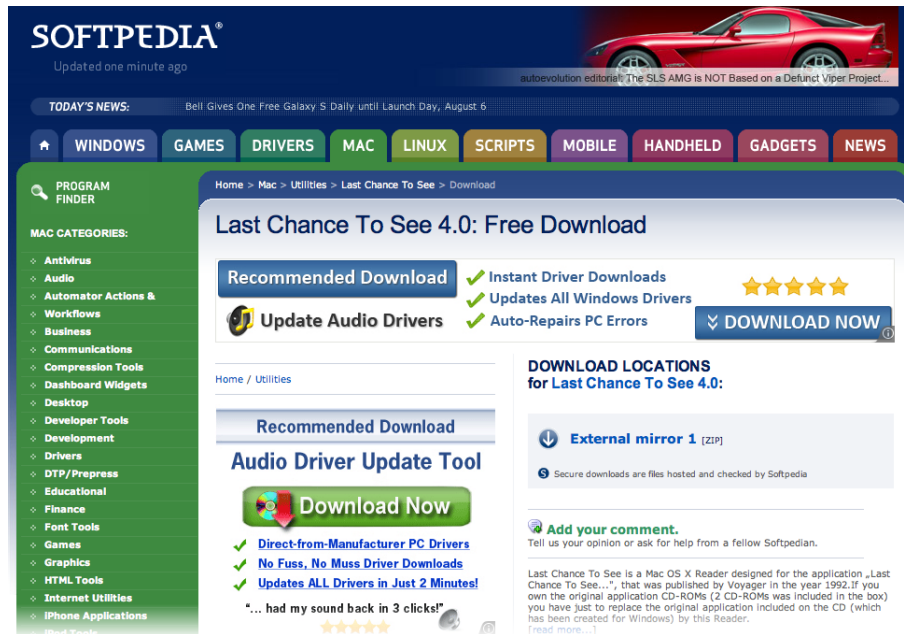
#### 4.3.2.2 Disguised Ads

Simply speaking, disguised advertisements refer to the kind of advertisements that are disguised as other kinds of content or navigation, in order to get users to click on them.

This dark pattern is being used by a massive amount of websites and there are tons of examples for it on the Web. To mention a famous website that uses this dark pattern, one can refer to Softpedia.com which is a free software download site. The page shown in (Figure 92), from [Softpedia](http://www.softpedia.com/)<sup>74</sup> is a download page of software taken on (26-July-2010). As it is quite apparent in the figure, there are a few download links available on this page. The question is: Can you figure out which one is the correct link to click to download the file? (Hint: It doesn't include the word 'download'!) (Dark Pattern 2011).

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<sup>74</sup> <http://www.softpedia.com/>

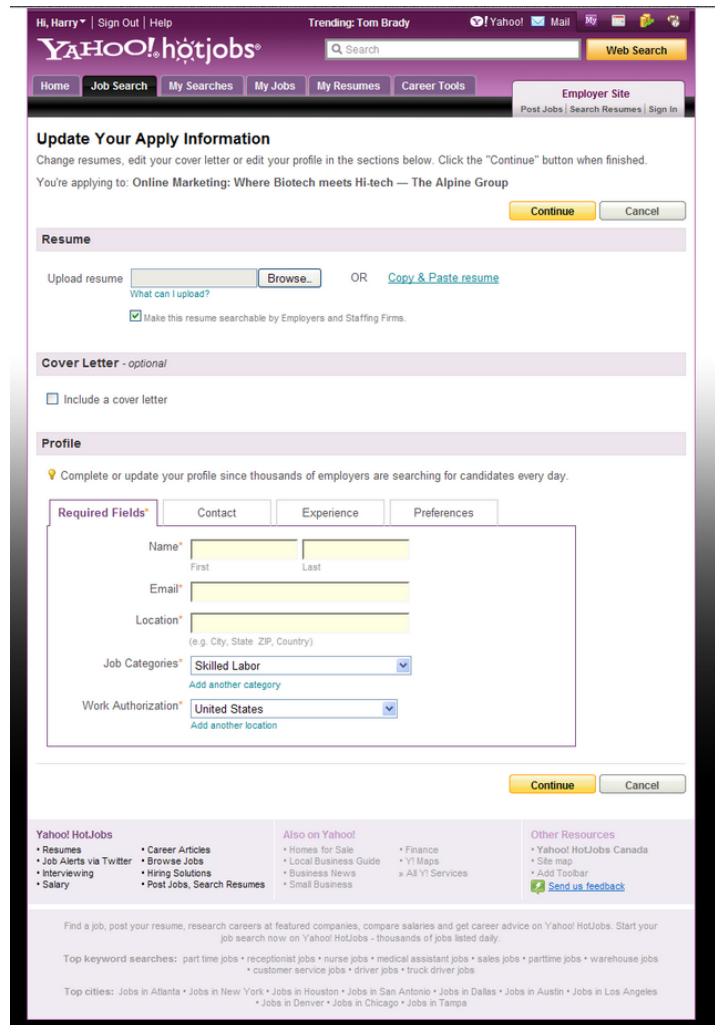


(Figure 92) Dark Pattern, Disguised Ads, Softpedia (Dark Pattern 2011)

#### 4.3.2.3 Forced Disclosure

The “Forced disclosure” dark pattern can be defined as “in return for the service provided, the website requires the user to disclose extensive personal information on the website completely irrelevant to the operation at hand”.

An example can be taken from “Yahoo Hotjobs” in which, when a user tries to apply for a job using Yahoo Hotjob's own application system, as shown in (Figure 93), they are required to provide profile information, including name, email, address, etc. This is not necessary at all, since the users are obliged to upload their resume.



(Figure 93) Dark Pattern, Forced Disclosure, Yahoo Hotjobs (Dark Pattern 2011)

By clicking on the "continue", all the entered profile information is automatically published, allowing headhunting website scan find this information. In order to make this private, the users have to take the initiative to go to "My Resumes" section, and then click "Make all of my resumes unsearchable". This is also an example of "privacy zuckerberg" named after Mark zuckerberg founder of Facebook (Dark Pattern 2011).

#### 4.3.2.4 Hidden Costs

This dark pattern is usually concerned with enforcing some kind of a cost on the user in a stealth mode; usually at the last steps of the checkout process of an e-commerce website (e.g. delivery charges, tax, etc.).

An example of this dark pattern is taken from [Hotels](#)<sup>75</sup> in late 2010. It is worth mentioning that, since that time, due to the changes of their policy probably, Hotels.com no longer employ the mentioned dark pattern. (Figure 94) represent a result sheet of a search query for specific type of rooms in a certain place, the price for each room is clearly stated in this list.

The screenshot shows the Hotels.com search results page for New York, New York, United States. The page includes a search filter sidebar on the left and a main results area on the right. The search filter sidebar contains sections for Name contains, Price (per room per night), Star rating, Guest rating, Location, and Accommodation type. The main results area shows 774 hotels, sorted by Best Sellers. The first two hotels listed are Hilton New York and Affinia Manhattan. The Hilton New York listing shows a Standard King room for 1 night, 1 room, 2 adults, priced at £187 per room per night. The Affinia Manhattan listing shows a Studio Suite 1 Queen Bed Non refundable for 1 night, 1 room, 2 adults, priced at £136 per room per night. The price for each room is clearly stated in the listing.

(Figure 94) Dark Pattern, Hidden Costs, Hotels (Dark Pattern 2011)

As mentioned before, the figure above clearly indicates the price for each room, now let's see what will happen when we attempt to make a reservation:

<sup>75</sup> <http://www.hotels.com/>

Hotels.com wake up happy

Sign In / Create Account Account Bookings Saved Hotels

Home Deals Travel Guides Customer Service Site Feedback

Prices displayed in: GBP

Booking: Hilton New York

Optional: Sign In

Sign In or Create an Account  
to get 1 free\* night for every 10 nights you stay! [Learn more](#) *Welcome Rewards*

**1. Room Details** Fields marked with \* are compulsory

Room 1 - Adults: 2, Children: 0

First Name \*  Please give us the name of one of the people staying in this room.

Last Name \*

Preferences  
King Bed Non Smoking

Please note that room preferences cannot be guaranteed.

**2. Payment Details** Fields marked with \* are compulsory

Title

First Name \*

Last Name \*

Card Type

Card Number \*

Security Code \*

Expiry date \*  
Expiry Month  Expiry Year

We keep all your personal information secure and encrypted. We won't share or sell your personal information. Read our [Privacy Policy](#) for full details.

**Your Booking Summary**

Hilton New York  
New York, US

Check in: 06/08/2010  
Check out: 07/08/2010

1 \* Standard King, Breakfast not included

Price per room per night	£187.41
1 night x 1 room	£187.41
Extra guest charges <input type="checkbox"/>	£18.80
Taxes & fees	£32.29
<b>Total</b>	<b>£238.50</b>

(including taxes & fees)

Apply a Discount Code

Only 1 discount or deal per booking

(Figure 95) Dark Pattern, Hidden Costs, Hotels (Dark Pattern 2011)

As it appears in (Figure 95), an extra £50 of unexpected fees (extra guest charges, taxes, etc.) has been added to the total cost (Dark Pattern 2011).

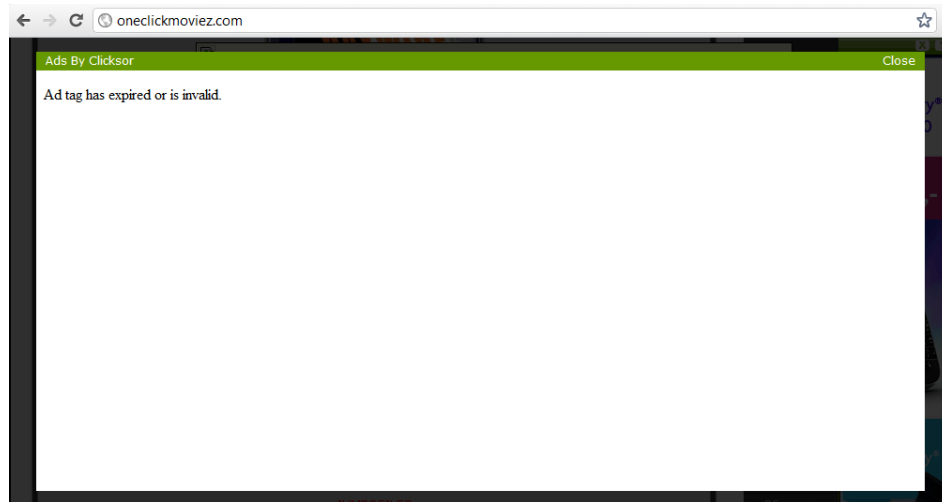
#### 4.3.2.5 Roach Motel

Simply speaking, a Roach Motel makes it quite easy for a user to get into a certain situation and extremely difficult to get out of it, once it is realized to be undesirable.

Not being able to unsubscribe from newsletter e-mails is a well-known example of this dark pattern. Although it is extremely easy to subscribe to newsletters in most websites that provide this feature, unsubscribing is rather cumbersome and frustrating. *"The CAN-SPAM rules (Can Spap Act n.d.) state that this practice is forbidden for emails that have a primary purpose to advertise or promote a commercial product or service. (Unfortunately, CAN-SPAM does not cover "transactional or relationship" messages.)"* (Dark Pattern 2011).

#### 4.3.2.6 Road Blocks

This dark pattern refers to suspending or interrupting the normal flow of a process usually at its last steps with an advertisement or some other type of screen. The mentioned pattern is mostly common in download and file hosting websites. The user has to click on the pop-up (advertisement) to be able to get back to the original state of the page and carry out the rest of the process.



(Figure 96) Dark Pattern, Road Blocks, [oneclickmoviez](http://oneclickmoviez.com/)<sup>76</sup>

#### 4.3.2.7 Sneak into Basket

In an attempt of a user to purchase a product, the website would sneak more items into the user's basket without them being aware, but only shown at the checkout step.

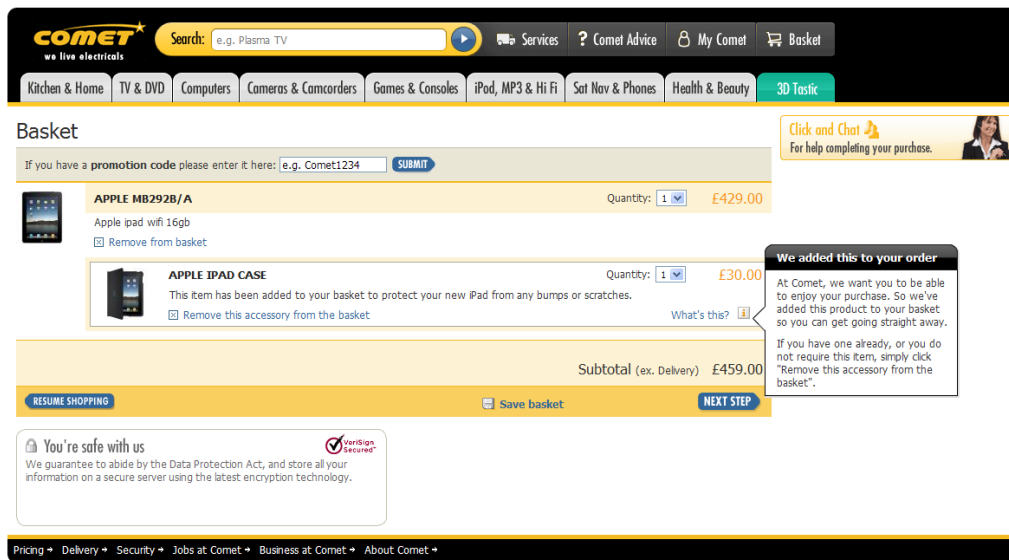
An example is found on [comet](http://www.comet.co.uk/)<sup>77</sup>. When trying to purchase an iPad on comet.co.uk, the website sneaks an iPad case into the basket, shown in (Figure 97). (Dark Pattern 2011)

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<sup>76</sup> <http://oneclickmoviez.com/>

<sup>77</sup> <http://www.comet.co.uk/>





(Figure 97) Dark pattern, Sneak into basket, Comet (Dark Pattern 2011)

#### 4.3.2.8 Trick Questions

In this dark pattern, the users are usually being presented with a simple question that at the first glance would look like a straight forward question but when read carefully, one would realized that the intension of the question is something entirely different. The reason that this dark pattern works, is that the users usually have the habit to scan the page quite quickly instead of reading it carefully.

An example can be found on [ryanair](http://www.ryanair.com/en)<sup>78</sup>; Ryan Air cleverly uses this dark pattern, shown in (Figure 98) and (Figure 99). What makes this pattern so interesting is that, it gives the owner of the website plausible right, to claim that the information is clearly stated in the website and thus there is no room for complains. In reality quite a good number of users get caught in this situation (Dark Pattern 2011).

<sup>78</sup> <http://www.ryanair.com/en>

Search » Select » Services » Payment » Itinerary

**Passenger Details - All passenger names must match those in the passport/accepted travel document**

1 | Title | First name | Last name |  |  |  |  | **0.00 GBP**

Beat the queues, buy priority boarding: Yes  No  **0.00 GBP**

Buy AXA travel insurance View policy benefits Please select a country of residence  **0.00 GBP**

If you do not wish to buy insurance select. **No Travel Insurance** in the drop down menu.

---

**SMS Confirmation**

Click Yes to receive a text message confirming your Reservation Number and flight details (Click for information)? Yes  No  **0.00 GBP**

Your mobile phone number will be entered on the following page and will only be used to send important flight information.

---

**Ryanair Approved Cabin Bag**

**Samsonite** Yes  No  **0.00 GBP**

The Samsonite Aspire cabin bag is available exclusively at Ryanair.com and is approved for carriage on Ryanair flights, subject to our cabin baggage weight and size restrictions detailed in the cabin bag specification below.

If you would like to purchase an approved Ryanair Cabin bag from Samsonite please click "Yes" (Cabin Bag specification)

**Free Delivery!**

---

**Sports Equipment/Musical Instruments/Infant Equipment**

Please check box if one or more passengers wishes to carry sports equipment, a musical instrument or infant equipment.

---

**Special Assistance**

Please check box to reserve special assistance at the airport for members of your party. Failure to prebook special assistance may result in the service being unavailable.

---

**Important - Please check box to continue**

I have read and accept Ryanair's Terms and Conditions of Travel and Website Terms of Use. All travel is offered in accordance with Ryanair's General Conditions of Carriage for Passengers and Baggage. I will advise Ryanair of any changes to my contact details including my email address to a local Ryanair reservations centre.

The e-mail address provided at the time of reservation will be used to notify passengers of any flight time changes, in response to general correspondence, or to send other important travel information. Evidence of e-mail dispatch will be accepted as evidence of receipt.

We offer SSL (Secure Socket Layer) technology to protect your personal information. **CONTINUE**

**Flights**

**Going Out:** 11/10/2010 10:30hrs  
East Midlands - Berlin

1 x Adult 10.99 GBP

Taxes/Fees 0.00 GBP

1 x Web Check in 5.00 GBP

**Coming Back:** 18/10/2010 13:45hrs  
Berlin - East Midlands

1 x Adult 16.99 GBP

Taxes/Fees 0.00 GBP

1 x Web Check in 5.00 GBP

---

**Total**

**Total Cost 37.98 GBP**  
Excluding administration fee (if applicable)

(Figure 98) Dark pattern, Trick question, Ryan air (Dark Pattern 2011)

**RYANAIR.COM**

Search » Select » Services » Payment » Itinerary

**Passenger Details - All passenger names must match those in the passport/accepted travel document**

1 | Title | First name | Last name |  |  |  |  | **0.00 GBP**

Beat the queues, buy priority boarding: Yes  No  **0.00 GBP**

Buy AXA travel insurance View policy benefits Please select a country of residence  **0.00 GBP**

If you do not wish to buy insurance select. **No Travel Insurance** Please select a country of residence  **0.00 GBP**

Please select a country of residence

- Austria
- Belgium
- Czech Republic
- Denmark
- Finland
- France
- Germany
- Hungary
- Ireland
- Italy
- Latvia
- Lithuania
- Malta
- Netherlands
- Norway
- Poland
- Portugal
- Romania

No Travel Insurance Required

**SMS Confirmation**

Click Yes to receive a text message confirming your Reservation Number and flight details (Click for information)? Yes  No  **0.00 GBP**

Your mobile phone number will be entered on the following page and will only be used to send important flight information.

---

**Ryanair Approved Cabin Bag**

**Samsonite** This is how you opt out! **0.00 GBP**

The Samsonite Aspire cabin bag is available exclusively at Ryanair.com and is approved for carriage on Ryanair flights, subject to our cabin baggage weight and size restrictions detailed in the cabin bag specification below.

If you would like to purchase an approved Ryanair Cabin bag from Samsonite please click "Yes" (Cabin Bag specification)

**Free Delivery!**

---

**Sports Equipment/Musical Instruments/Infant Equipment**

Please check box if one or more passengers wishes to carry sports equipment, a musical instrument or infant equipment.

---

**Special Assistance**

Please check box to reserve special assistance at the airport for members of your party. Failure to prebook special assistance may result in the service being unavailable.

---

**Important - Please check box to continue**

I have read and accept Ryanair's Terms and Conditions of Travel and Website Terms of Use. All travel is offered in accordance with Ryanair's General Conditions of Carriage for Passengers and Baggage. I will advise Ryanair of any changes to my contact details including my email address to a local Ryanair reservations centre.

The e-mail address provided at the time of reservation will be used to notify passengers of any flight time changes, in response to general correspondence, or to send other important travel information. Evidence of e-mail dispatch will be accepted as evidence of receipt.

**Flights**

**Going Out:** 18/07/2010 16:45hrs  
Aberdeen - Dublin

1 x Adult 79.99 GBP

1 x Web Check in 5.00 GBP

**Coming Back:** 29/07/2010 16:50hrs  
Dublin - Aberdeen

1 x Adult 29.99 GBP

Taxes/Fees 0.00 GBP

1 x Web Check in 5.00 GBP

---

**Total**

**Total Cost 151.94 GBP**  
Excluding administration fee (if applicable)

(Figure 99) Dark pattern, Trick question, Ryan air (Dark Pattern 2011)

## 4.4 Summary

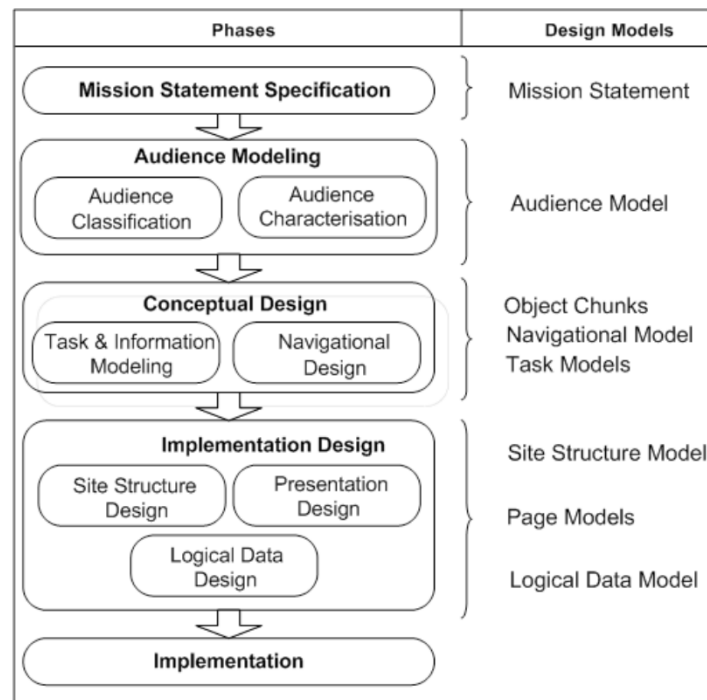
In this chapter the followings were accomplished.

Out of possibly more than forty genres of websites, four important ones were selected and the design patterns appearing in those genres were identified and described in detail. The applicability of these patterns was discussed and the possible problems that may rise from deploying these patterns and their possible solutions were mentioned. The Feature Assembly Modeling technique was used to provide an overview of how the patterns can be used in the different website genres, as well as to indicate their dependencies.

Furthermore, we provided a list of anti-patterns and dark patterns. Anti-patterns are bad practices that are designed and reuse by people that are not aware of the fact that these patterns are actually bad solutions. Dark patterns are worse; they actually are designed with bad intentions. However, as they are used a lot, and web developers are not always schooled well, they may also be copied by people not aware that it is actually a fraudulent practice.

## 5. Adapting WSDM to Deal with Website Genres

In WSDM, the design of a website is based on identifying in an early stage all the requirements of that system; next, these requirements are modeled in details during the task and information modeling phase; in the next step a navigational design for each of these tasks is made. In order to do so, several different modeling techniques (object role model, concurrent task trees, and navigational diagrams) are deployed to fully demonstrate in detail and at a rather low level how these tasks should work, how they should be accessed and what are the information models behind them.



(Figure 100) WSDM Phases

However, as it can be seen in (Figure 100), in none of the stages, the genre of the website to be designed and later implemented is specified. However, as we have seen that websites of one genre share a lot of commonalities (patterns), it may be beneficial to identify, in an early stage, the genre of the website and take this into consideration during the design. In order to do so, a new phase is deemed

necessary to be added after the “mission statement specification phase” as it can be seen in (Figure 100). Since in the “mission statement specification phase”, the exact mission and goal of the website needs to be specified (e.g., a simple advertising website, or a fully dynamic online shopping portal), the output of this phase could determine the genre of the website that is aimed to be created. As explained in chapter 4, each genre of website is itself in turn composed of various design patterns, and there exist some sort of relationships or dependencies between them. As an example, an e-commerce type of website is composed of the design patterns as shown below:



(Figure 101) E-commerce website patterns

The identification of this design patterns for each genre of website (which was the goal of the first phase of this thesis) will be used to ease the task of designing a website in the WSDM methodology. It is aimed to document in full, and maintain a regularly updated library of “website genres”, and the related “design patterns” so they can be directly referenced and reused in future designs.

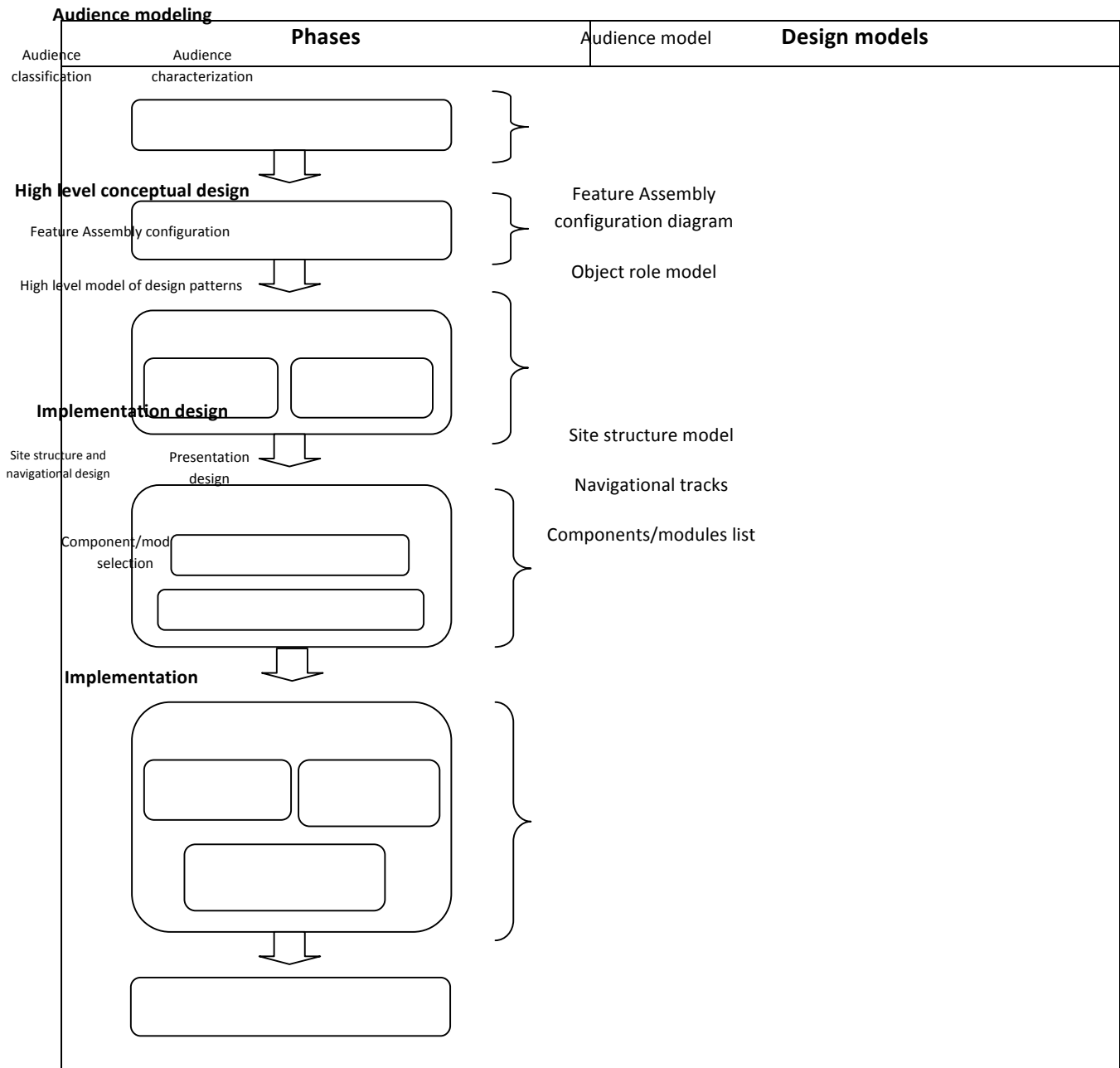
Designing a website based on its genre and the patterns related to that particular genre, is from a rather higher point of view compared to the traditional approach used in WSDM which identifies and models

all the tasks at the same level of detail. Before going into details about how we have adapted WSDM to deal with website genres and design patterns to WSDM, it is necessary to show the changes that need to be applied to the current version of WSDM to make it adaptable to the new ideas and goals.

To begin with, we have to first make a distinction between the different approaches developers use in order to build a new website. The concept of “Web Content Management System” (WCMS) has become quite popular over the past few years and several frameworks using various technologies have been developed to provide an environment for the developers to build their websites easier and faster. Since using a WCMS framework makes the development of websites quite fast and easy, they have gained a lot of popularity and importance among developers. However, using a WCMS framework to create a website (e.g. Joomla, Drupal, Ektron, Wordpress, etc) introduces some limitations too. For instance, the user of such frameworks can in general not implement something in exactly the way they wish, unless they actually develop (hard code) the module or component used to deliver the task. As an example, if a developer is using a WCMS and he or she wishes to create a login page, he or she must use the login functionality provided by the WCMS framework as a core component, or a third party modules or components developed for that particular WCMS. As the functionality provided is to be used as it is, it makes little sense to first model the functionality in detail (as it is done now in WSDM). Modeling all the tasks based on your perception of what they should do and how they should be accessed, and afterwards using predefined functionality of a WCMS framework to implement the design will result in inconsistencies between the design and the implementation. Therefore modeling in detail such a system using a methodology like WSDM is not a very practical choice. However, methodologies such as WSDM can still be used with some modifications applied to successfully handle these kinds of situations. Therefore in my opinion, it is best to create two slightly different versions of WSDM; one for WCMS based websites and one for the code-driven ones. In the latter case, the developer will use either a framework to implement the website (e.g. zend framework for PHP) or hardcore everything from scratch, but either way the task is performed completely manually. This means that the developers are in full control of how a task should be carried out with respect to the functionality and navigational design, thus creating a detailed model of the tasks is useful and practical in these situations.

Site Genre identification  
**5.1 WCMS-based WSDM version**

Site genre specification

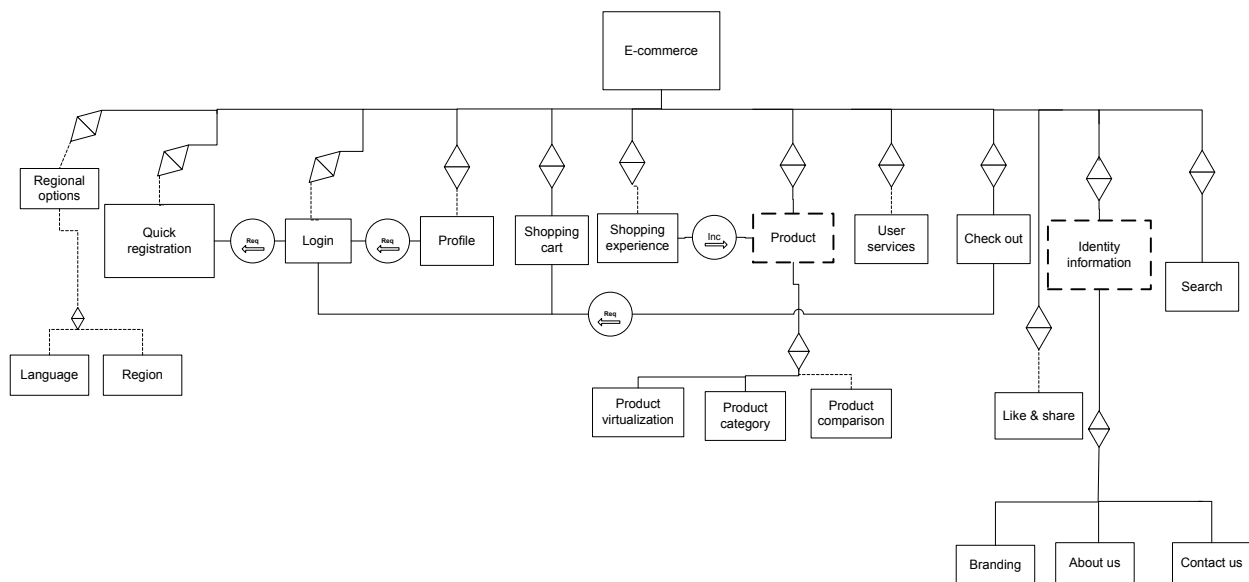


(Figure 102) WCMS-based WSDM version

This version of WSDM is slightly different from the traditional one; it is tailored to suit the designing needs of websites that will be developed using a WCMS framework. The first phase of this model is

exactly the same as in the traditional WSDM and is a vital and necessary phase, the “Mission statement specification” (De Troyer, Casteleyn & Plessers 2008).

The second phase in this WSDM version is new compared to the traditional WSDM; this phase is called “site genre identification”. This phase helps the designer to have an understanding, at an early stage, of what he or she has to actually model and design. It basically provides a framework with specified boundaries for the designer to begin his or her design within. Providing a specified and detailed path of thought for designers to follow, is in my opinion crucial in methodologies such as WSDM. And since the idea of having such a design methodology is to ease the job of the designers in determining what they need if they plan to create a system with particular requirements, establishing boundaries is not only beneficial but essential as well. Therefore by identifying the genre of website the user is aiming to design, which is obtained from the mission statement, the designer is given a well-defined framework of the necessary patterns for that particular genre of website, i.e. the Feature Assembly diagram for the given genre, in which some patterns are mandatory and some are not. However this approach does not mean that an e-commerce website for instance, is not allowed to have any even design patterns extra than those given in the Feature Assembly diagram. These diagrams are merely means to indicate the functionalities a website within a certain genre should provide. These known patterns for that particular website genre prove to be useful in future phases when the user uses them to determine what exactly the website should contain. Thus, the output of this stage identifies the Feature Assembly diagram to be used as starting point for the design.



(Figure 103) Feature Assembly Diagram for E-commerce Websites



The next phase in this version is called the “audience modeling” which is exactly the same phase as the one mentioned and used in the traditional WSDM (De Troyer, Casteleyn & Plessers 2008). In addition to what is already available in audience modeling, there is need to specify the relation between the design patterns and the audience classes. This relation needs to be explicitly mentioned so there would be no confusion in what pattern is used by which audience class. This can be done after listing all the requirements required for an audience class (done during audience classification). When the requirements are available, they can be mapped to certain patterns (a patterns may include several requirements), in this way providing information about which patterns need to be provide to which audience class(es). Note that it is possible that some requirements cannot be mapped on the available patterns.

The next phase in this WSDM version, after the audience modeling, is called “high level conceptual design”. As mentioned before, each website genre is associated with a list of design patters, organized in a Feature Assembly diagram. This model is pretty high level and only distinguishes between mandatory and optional patterns and expresses dependencies relationships between patterns (if any). Of course viewing a pattern as being either mandatory or optional is a rather subjective matter; however in our view, a pattern is deemed to be mandatory if it exists and has been detected in most of the website with the genre. The job of the designer in this stage is to determine which of the optional patterns he or she actually needs in the design. Thus the output of this stage will be a second version of the above diagram in which the user has selected the optional patterns he or she desires to exist in his or her design. Actually this is called a configuration diagram in the Feature Assembly Approach.

The next stage in this phase is called “high level model of design pattern”, in this stage several important specifications need to be made. First of all, since we will be working with a WCMS framework, we are talking about components and modules (or any other name used in the WCMS framework). As it is apparent from the Feature Assembly diagram, we have a list of patterns with possible relationships with each other. It is possible that a pattern, for instance shopping cart, could be implemented by a single component; however, there are patterns for which several component and modules needs to be combined and used together to completely carryout the required functionality. Furthermore some patterns are pretty straightforward and there is no need to design them in more details. For example, the login pattern is pretty straightforward and all WCMS frameworks provide this as a built in component, therefore modeling it even at a very abstract and high level is not very useful. On the other hand there are other design patterns that need to be modeled somehow in more detail. For instance

product comparison is a pattern, but its realization will vary from website to website. It is necessary to give a definition of the products and the criteria needed to be used for comparison. Thus a high level ORM diagram will be used to create models to specify the missing details. For instance, in the mentioned example, an ORM model is used to clarify what a product is and what attributes it has. Therefore, the outputs of this phase are: first, a Feature Assembly configuration diagram in which all required patterns are given; and secondly, an ORM diagram for the design patterns that require more detailed modeling. If some functionality is required that is not provided by any pattern in any genre, the functionality has to be analyzed properly, similar cases in which the functionality is applicable should be studied and lastly it should be documented as a new design pattern under the related specific website genre(s).

The next phase in this WSDM version is the “implementation design”; One may notice that the “conceptual design” phase which exists in the traditional WSDM methodology is no longer used in this version, the reason is simply because since the user is not in full control of the implementation, it is not necessary to model tasks in great detail. Having a higher level conceptual model which includes the design patterns that should be used in the website is good enough if the developer is aiming to use a WCMS in combination with pre-developed modules and components to develop the system. Hence, the “conceptual design” phase is omitted in this version. On the other hand in the “implementation design” phase, “site structure design” and “presentation design” are still used and relevant, however, the “logical data design” does no longer play a role since we are using a WCMS and the structure of the database is in general determined by the WCMS framework itself. The “navigational design” stage of the “conceptual design” phase of the original WSDM can be defined in combination with “site structure design” in the “implementation design” in this new WCMS-based WSDM version; this stage is called “site structure and navigational design”. In this stage both the structure of the website and the navigational tracks of each audience class are defined and then all audience tracks are combined into a basic conceptual navigation structure.

Furthermore a new stage has been added to this phase and that is the “component/module selection” in which the user has to go through the list of modules and components provided by the selected WCMS framework and choose the ones that will best suit the requirements defined in the early phases. It is assumed that at this stage the designer has made up his or her mind on what WCMS framework they intend to use. It is indeed possible to start analyzing a web content management system framework and realize that some required functionality cannot be realized by directly using a component or a module,

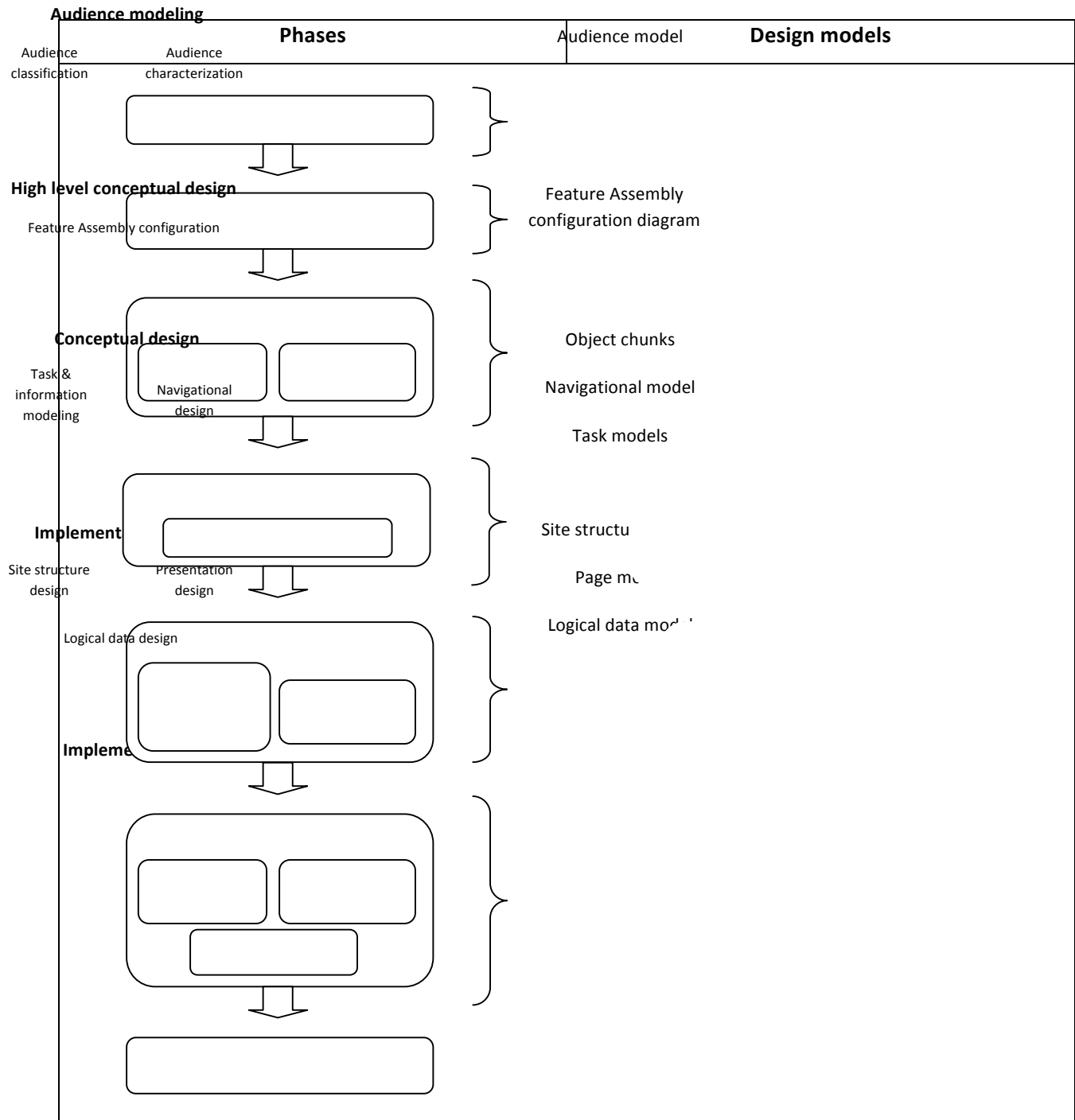
therefore choosing the right WCMS framework that best suits the genre of website to be designed is rather important. Furthermore, almost all web content management system frameworks are open source which means the developers and designers can add their own code to them. Therefore, it is always possible for a designer or developer to design and to develop their own module or component to carry out the exact functionality they need. If the aforementioned is the case, at the design stage the designer should indicate in detail how the desired component/module should be, similar to the way done in code-driven WSDM version. Naturally the resulting component/module, which is documented properly, can be captured as a design pattern and the implementation of it for that particular WCMS framework can be archived for future use by others.

The last phase of this version of WSDM is similar to the last phase in the traditional version, being the “implementation” with the difference that instead of hard coding the website, a WCSM will be used to create it.

Site genre identification

Site genre specification

## 5.2 Code-driven WSDM version



(Figure 104) Code-driven WSDM version

This version of WSDM is different than the previous one in the sense that it is aimed for developers who will actually hard code the website, so they are in full control of how the tasks will be realized and how

the navigation should look like. This version is quite similar to the traditional version of WSDM, the difference is that, in this version, the genre of the website and as a logical consequence the design patterns associated with the website genre is taken into account.

Similar to the previous version and to the traditional WSDM version, the mission statement is the essential first step, the next step is to identify the genre of the website to be created, and this decision is made based on the mission statement. After this phase, similar to the previous versions, the next phase is the audience modeling phase of which the description can be found in the documentation of WSDM (De Troyer, Casteleyn & Plessers 2008). The fourth phase, high level conceptual design, is similar to the WCMS-based version only in its first stage. The design patterns associated with the selected website genre need to be selected. Each design pattern can be considered as a high level conceptual design; it is high level because there is no detailed specification on how it should be implemented but at the same time it provides a well defined scope of what needs to be implemented. A high level model of particular design patterns using ORM is not used here anymore since there will be detailed design model for each functional requirement. The next phase is the “conceptual design”, this phase is exactly the same as the one used in the traditional version of WSDM and includes detailed modeling of tasks and navigation. This phase is best to be considered as “detailed conceptual design”. As the design patterns are only described at a high level, at this stage the designer has to specify them in detail. During conceptual design, each pattern needs to be modeled in detail. Note that there is the possibility that a design pattern includes more than one task. There are two possibilities at this stage, the designer can either use the existing low-level task pattern designs that already exist for certain patterns (e.g. login) (see the work of (Huyen 2010)), or they can create their own designs within the boundaries defined by the “site genre”. As an example, a pattern in an e-commerce website is the shopping cart. This pattern can be decomposed in several tasks that can be modeled in detail in the “detailed conceptual modeling” phase. Using either method, the designer is given a well-defined guideline that he can follow in order to design that particular website. The final two phases which are “Implementation design” and “implementation” are exactly the same as the ones in the traditional WSDM and the description of them can be found in the WSDM documentation (De Troyer, Casteleyn & Plessers 2008).

## 5.3 Case Study

In order to demonstrate the approach introduced, a case study will be elaborated in this section. Since the WCMS-based version of WSDM is most different from the original WSDM version, this version will be used for the case study. The results of this thesis has affected the “code-driven based” version of WSDM as well; however, by showing an example of the WCMS version, the newly added features that are common in both version will be perceived simultaneously. We will use the WSDM methodology to build an e-commerce website using a web content management system framework, Joomla. The different phases are elaborated in the following section.

### 5.3.1 Mission Statement Specification

The mission statement of the system to be modeled can be formulated follow:

“An interactive online book store to attract more customers by providing certain features such as: select, search, compare and purchase of books by its customers.”

#### **The purpose of the website is:**

- To promote selling of books online.
- To provide an easier mean to locate and purchase books through search and product comparison functions.
- To make is easier to manage a book store.

#### **The target audience is:**

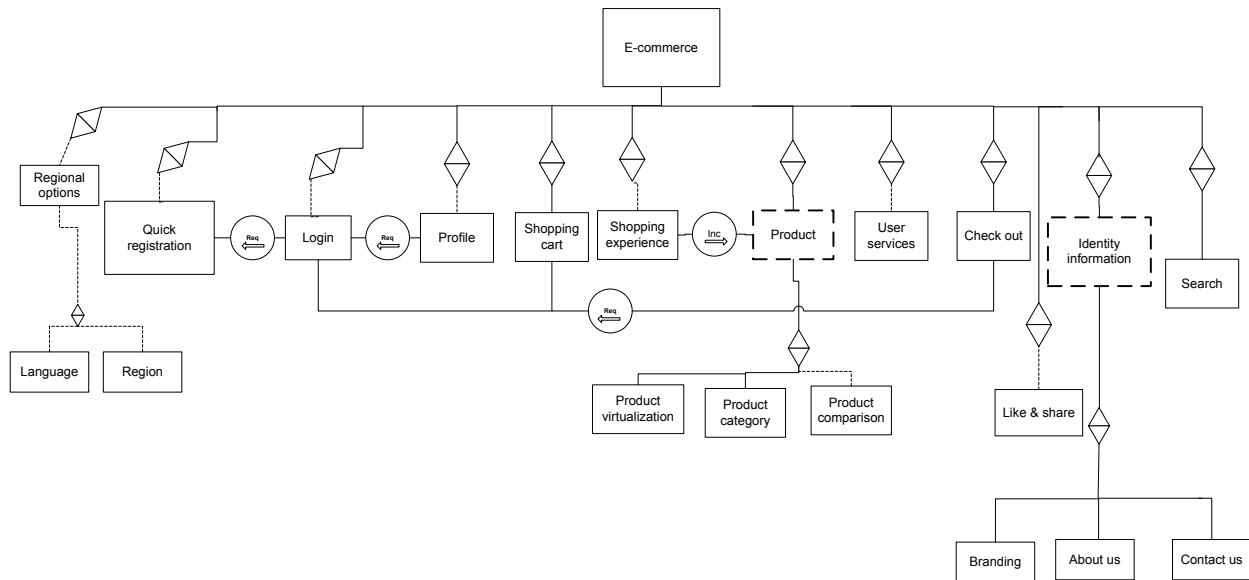
- Customers of online book store.
- Manager of online book store.
- Visitors of online book store.

#### **Subject of the website:**

- books information and details

### 5.3.2 Site Genre

Based on the mission statement, the mentioned website is recognized to be an “e-commerce website”, since it has to provide shopping experience for its users. And like any other e-commerce website, it is also partly informational since it provides information about the product it sells. Therefore, the corresponding Feature Assembly diagram for e-commerce web genre can be selected.



(Figure 105) Feature Assembly Diagram for E-commerce

### 5.3.3 Audience Modeling

This phase is similar as in the original WSDM version. The audience classes are based on the requirements of the different users of the system. Note that the requirements of the web site administrator are not considered in this version of WSDM, since we are modeling this website to be created using a WCMS and WCMS frameworks always include an administrator and its permission levels are defined. Therefore, there is no need to specify these requirements.

**Activities:**

The following activities are identified for the online book store:

- ❖ Provide book information.
- ❖ Provide online shopping experience.
- ❖ Manage books.
- ❖ Provide reports.
- ❖ Provide product comparison.
- ❖ Provide product identification.
- ❖ Manage user profiles.

Informational and functional requirements for each audience class are identified as follow:

**Class Customer:**

Refers to users who are customers of the system, in addition to being able to view all the information regarding books they are registered to the system for the purpose of purchasing books. In addition to that they have the capability to update their user profiles and have an overview of their previous purchases.

<i>Informational requirements</i>	<i>Functional requirements</i>
<ul style="list-style-type: none"> <li>• Detailed books' information</li> <li>• Product comparison</li> <li>• History orders' information</li> <li>• Customer's profile information</li> </ul>	<ul style="list-style-type: none"> <li>• Register</li> <li>• Login</li> <li>• Create customer profile</li> <li>• Change his/her profile information</li> <li>• Search book</li> <li>• Add a book to the shopping cart</li> <li>• Check out</li> </ul>

*Navigational requirement: easy and flexible ways to find books*



**Class Visitor:**

Refers to the class of users who are merely just visitor, they can view information regarding books, but they are not registered to the system, or have no intention to do so in order to purchase books.

<i>Informational requirements</i>	<i>Functional requirements</i>
<ul style="list-style-type: none"> <li>• Detailed books' information</li> <li>• Product comparison</li> </ul>	<ul style="list-style-type: none"> <li>• Search book</li> </ul>

*Navigational requirement: easy and flexible ways to find books*

**Class Stock Manager:**

Refers to the managers of the system, of course they are registered users of the system and in addition to that, they have the capability to manage books which include adding new one, or editing existing ones.

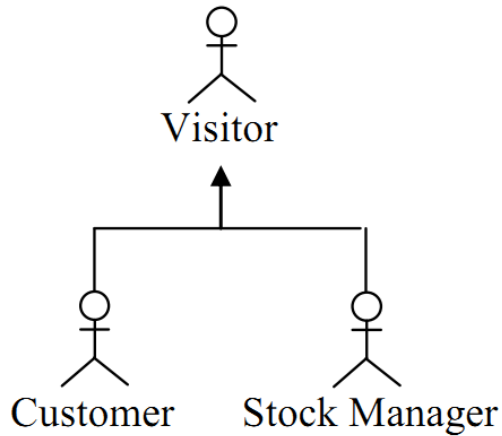
<i>Informational requirements</i>	<i>Functional requirements</i>
<ul style="list-style-type: none"> <li>• Book information</li> <li>• Book category information</li> <li>• Information about customers</li> <li>• Information about books</li> <li>• Information about sales</li> </ul>	<ul style="list-style-type: none"> <li>• Login</li> <li>• Create book category.</li> <li>• Create new book.</li> <li>• Manage book categories.</li> <li>• Manage orders</li> </ul>

*Navigational requirement: easy and flexible ways to find and manage books*

As one can easily see, the functional requirements for each audience class can be mapped easily to the design patterns for the website genre at hand.

**Audience class hierarchy:**

The following diagram presents the audience class hierarchy of the website. Based on the requirements formulated for the audience classes defined, the three classes of users are formed into a hierarchy as follow:



(Figure 106) audience hierarchy

**Audience class characterization:**

**Class Visitor:**

<b>Visitor</b>	
Type of user	Direct
Experience level (task knowledge)	From beginner to competent user
Application familiarity	Novice
Learning style	Read then do
Frequency of use	-
Use	Optional
Existing computer experience/skill	Advanced beginner

**Class Customer:**

<b>Customer</b>	
Type of user	Direct
Experience level (task knowledge)	From beginner to competent user
Application familiarity	Novice
Learning style	Read then do
Frequency of use	-
Use	Optional
Existing computer experience/skill	Advanced beginner

**Class Manager:**

<b>Manager</b>	
Type of user	Direct
Experience level (task knowledge)	Competent user
Application familiarity	Expert
Frequency of use	Frequently (daily basis)
Use	Mandatory
Existing computer experience/skill	Advanced

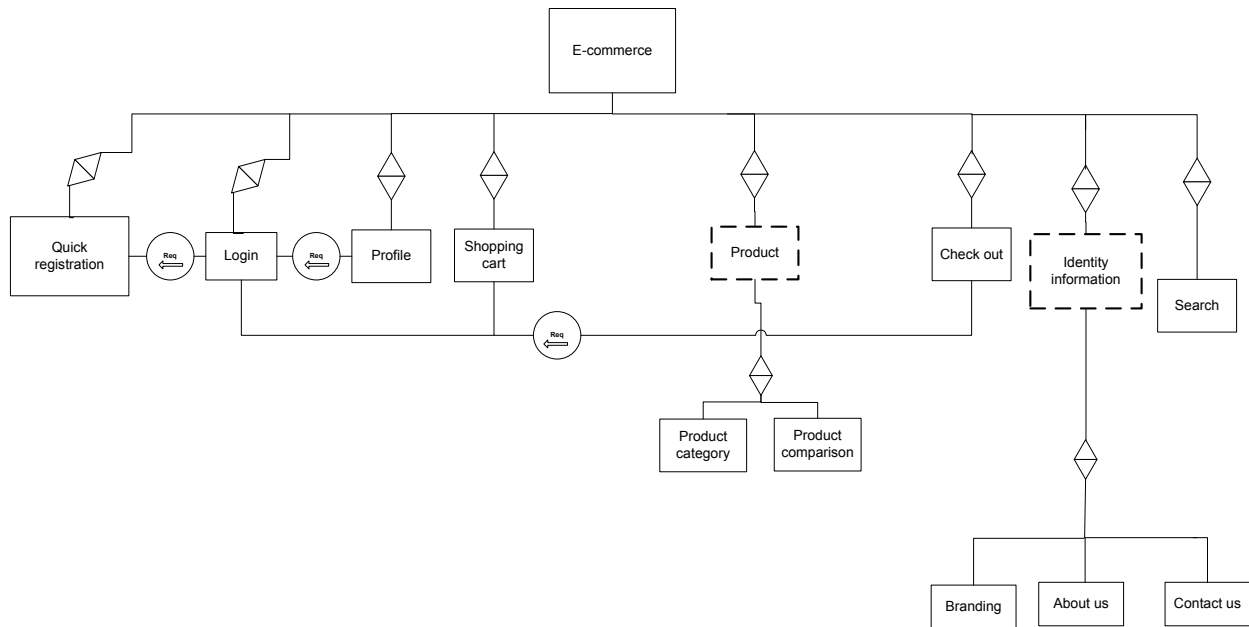
**5.3.4 High level conceptual design**

In this phase, a high level conceptual model of the system should be provided; since we will use a WCMS, we only need to create a high level model of the design patterns that will be used in the system.

**Feature Assembly configuration diagram:**

The first step of this phase is to use the Feature Assembly diagram available for the selected website genre; see (Figure 105).

The output of this phase is the Feature Assembly configuration diagram. This is derived from the Feature Assembly diagram in which the developer has identified all the patterns that he or she wants to be existed in the system. This diagram is given in (Figure 107).



(Figure 107) modified assembly modeling diagram, E-commerce

### High level models of design patterns:

As it was mentioned before in the description of this version of WSDM, we will provide a high level conceptual model of some of the design patterns identified in the previous steps. It is worth mentioning that not all design patterns need to be modeled.

As an example, assuming the designer of our e-commerce system chooses “[Joomla](http://www.joomla.org/)<sup>79</sup>” as the WCMS framework to be used. Certain patterns such as “register”, “login” and “identity information” are provided by default. Of course in the Joomla components and modules database there are tons of others providing the same functionalities perhaps with small differences, but the main requirements

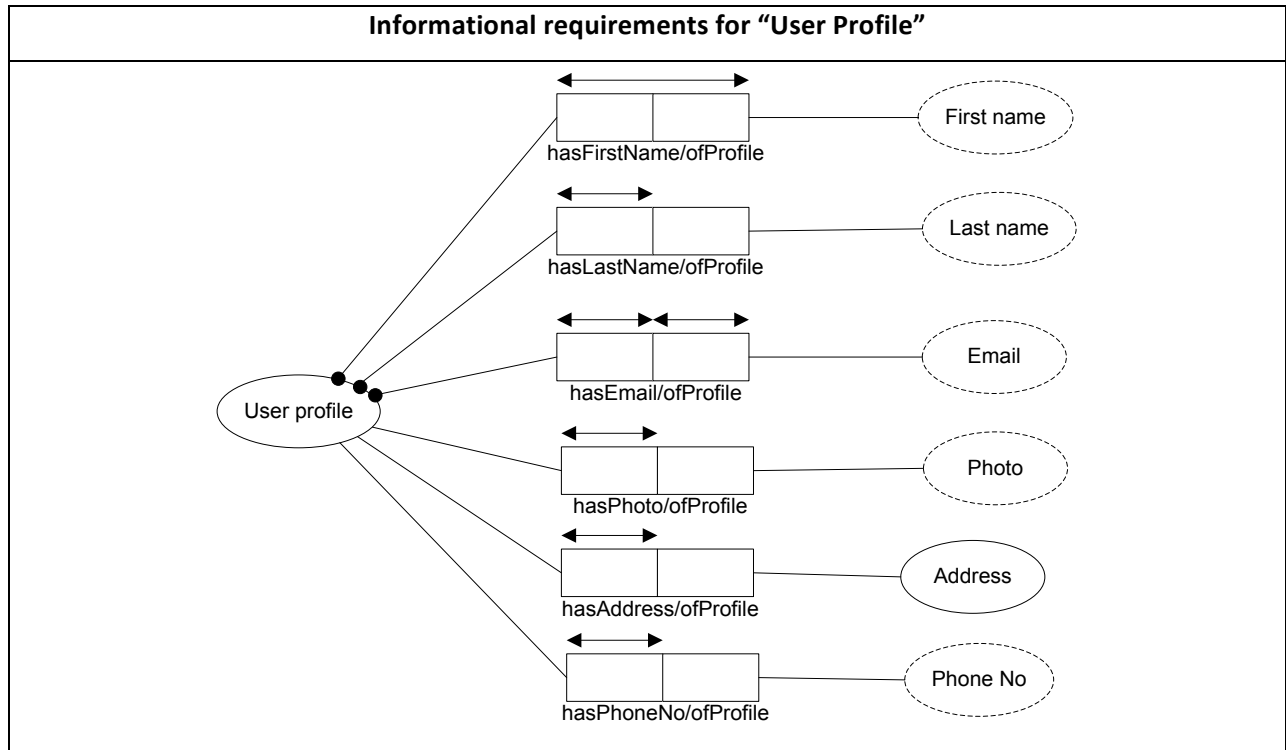
<sup>79</sup> <http://www.joomla.org/>

needed for these patterns are already there. Components like “shopping carts” are also quite standard which means that the core functionalities required for such components is something well known and there is not much room for vast differences. Thus modeling his pattern into more details is not needed. One should always keep in mind that this judgment is rather subjective and for some cases, as an example “register”, somebody else might find it necessary to model the pattern into more detail to specify explicitly all the requirements needed in the registration form.

However, certain design patterns need to be (at least at a high level) modeled to avoid having any ambiguity or confusion during implementation. Among those, one can refer to “product category”, “product comparison”, and “profile”. The reason for this is that, for instance one should know in more detail, the attributes he or she desires to have in the user profile. Even though, WCMS frameworks provides various user management components that help creating user profiles, it should be explicitly mentioned what attributes of a user are needed. For “product comparison” the actual product of the system which is in this case “book” need to be modeled so that it is explicitly mentioned what attributes this product actually have and based on which ones of those attributes a comparison is to be done. The models in this section are not to be confused with object chunks, both are created using object role models (ORM) but here the objective is to represent the requirements of a particular pattern at a very high level and to basically show the structure of the key component of that pattern.

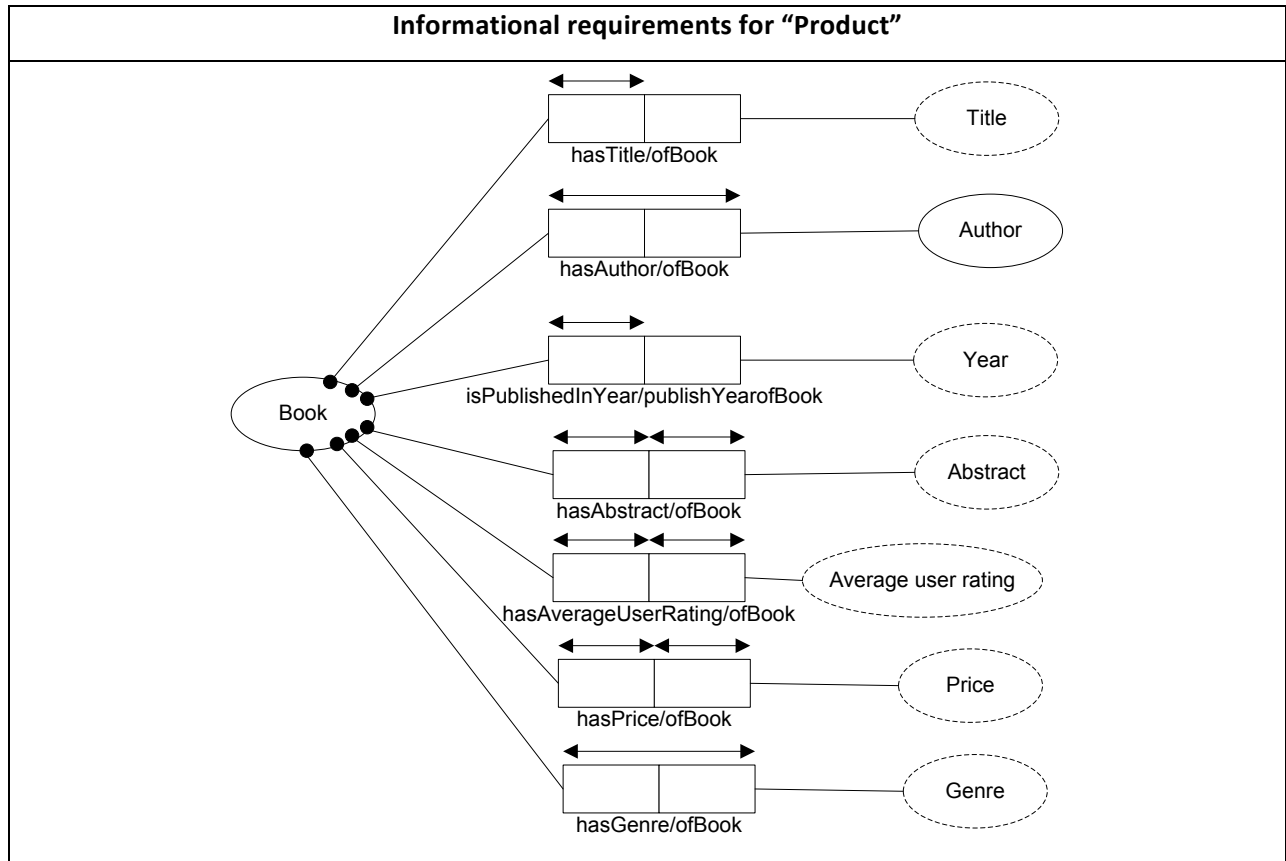
As a result, several high level models were created as follows:

User Profile: represent the attributes required for the user profile



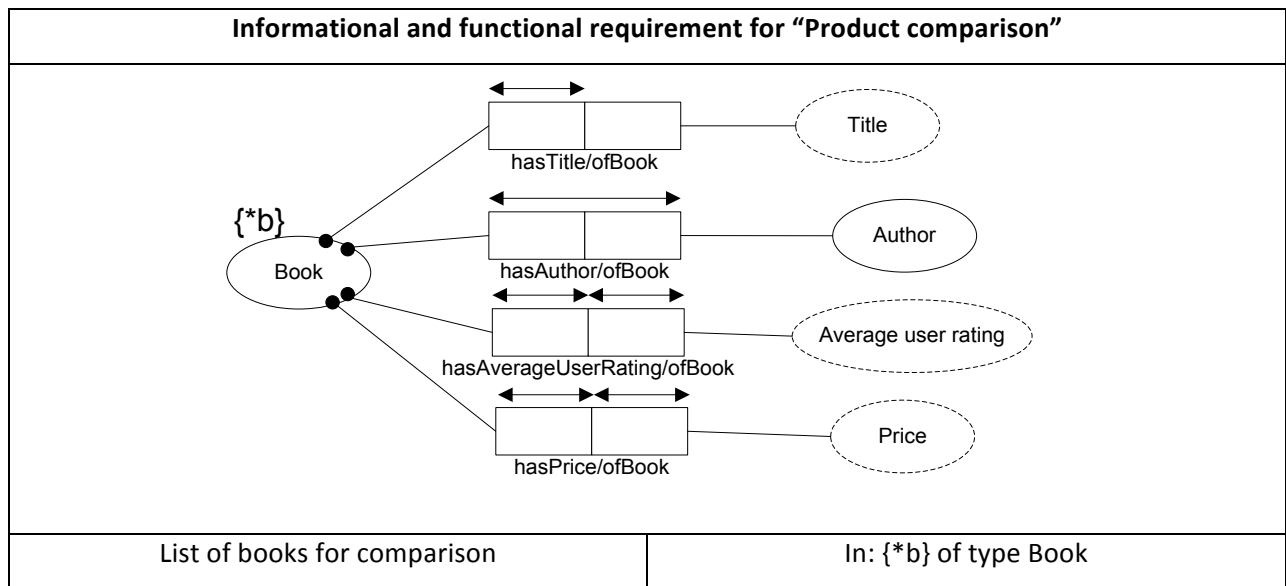
(Figure 108) ORM Diagram for User Profile

Product: represents the attributes of the product of the system



(Figure 109) ORM Diagram for Product

Product comparison: represents the criteria to be used when comparing two or more books.



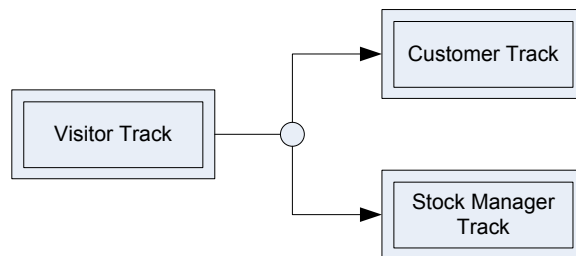
(Figure 110) ORM Diagram for Product Comparison

The mentioned diagrams are examples of how these high level models for design patterns look like.

### 5.3.5 Implementation Design

#### 5.3.5.1 Site Structure and Navigational Design

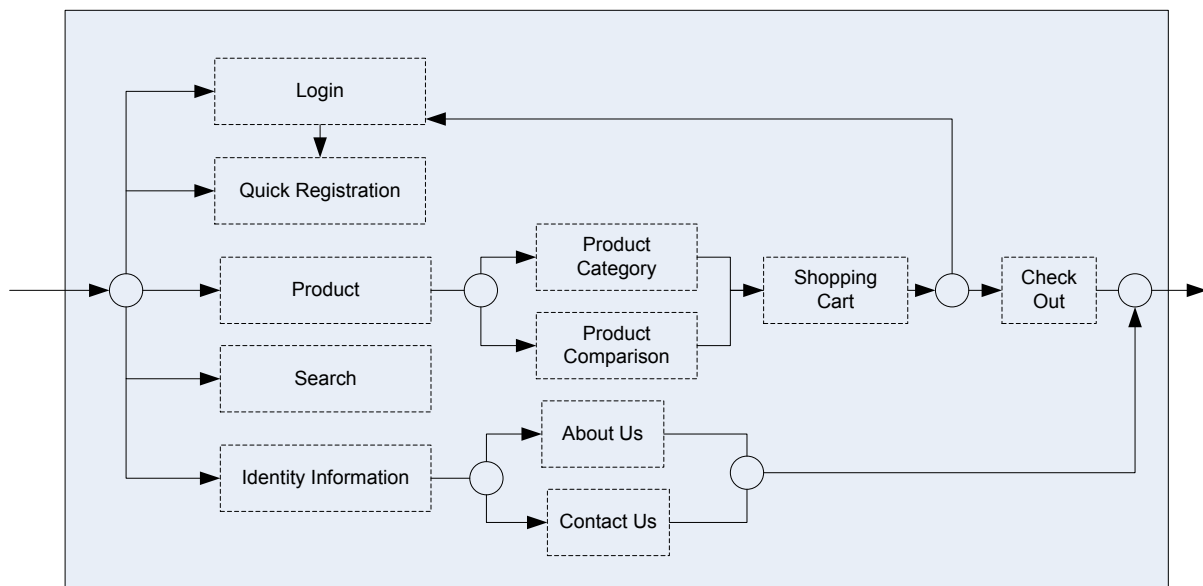
The conceptual structure model would be as follow:



(Figure 111) Conceptual Structure Model

The navigational track for each audience class is defined in terms of the design patterns as follow:

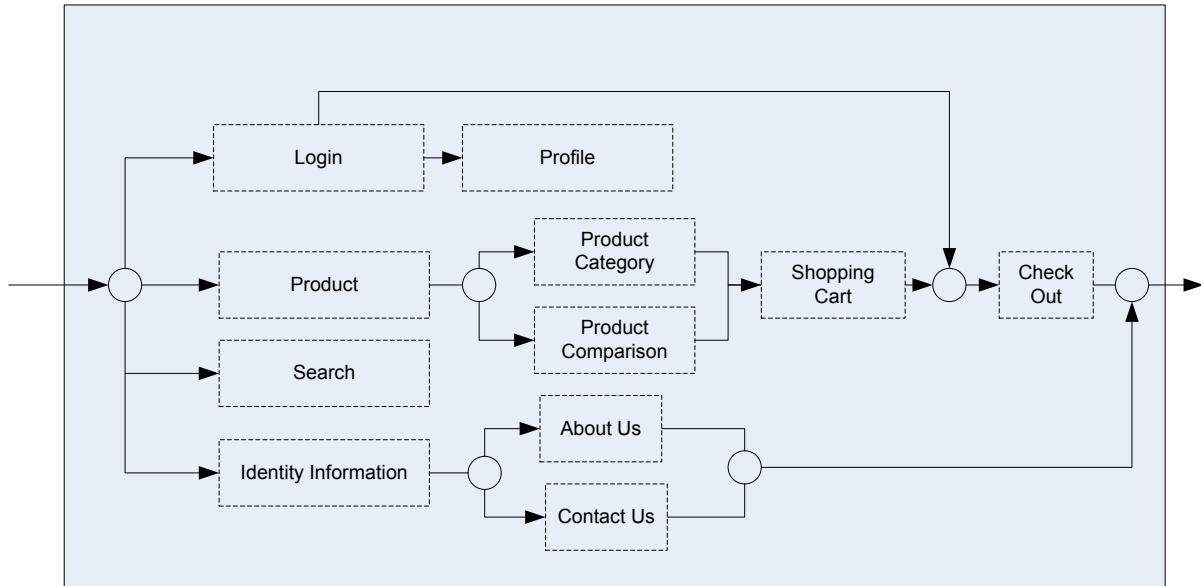
Visitor's track:



(Figure 112) Navigational Track for Visitor

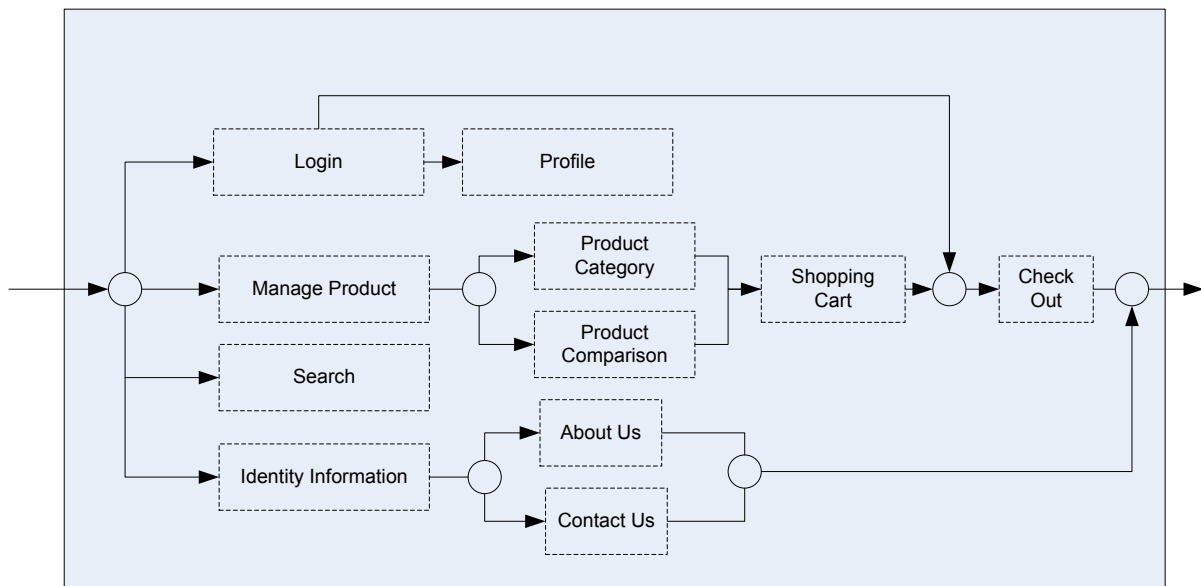


Customer's track:



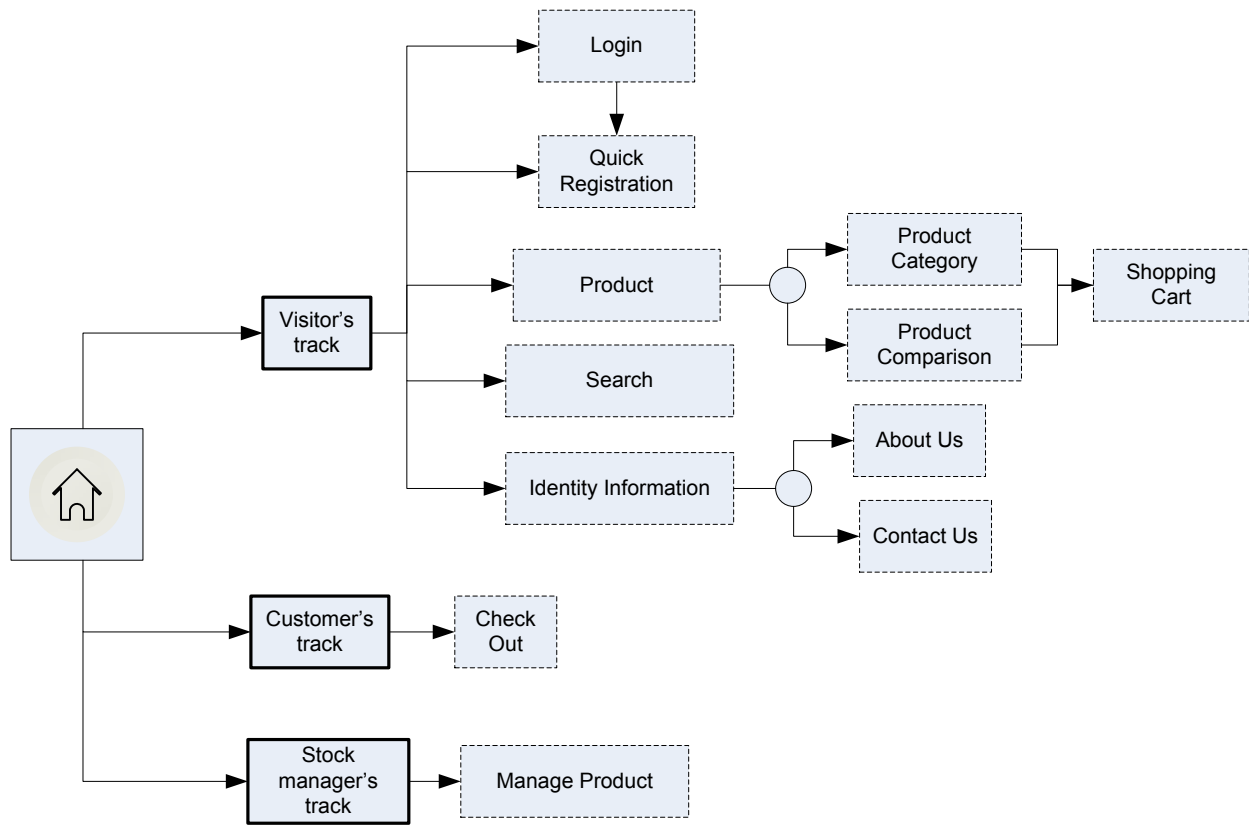
(Figure 113) Navigational Track for Customer

Stock manager's track:



(Figure 114) Navigational Track for Stock manager

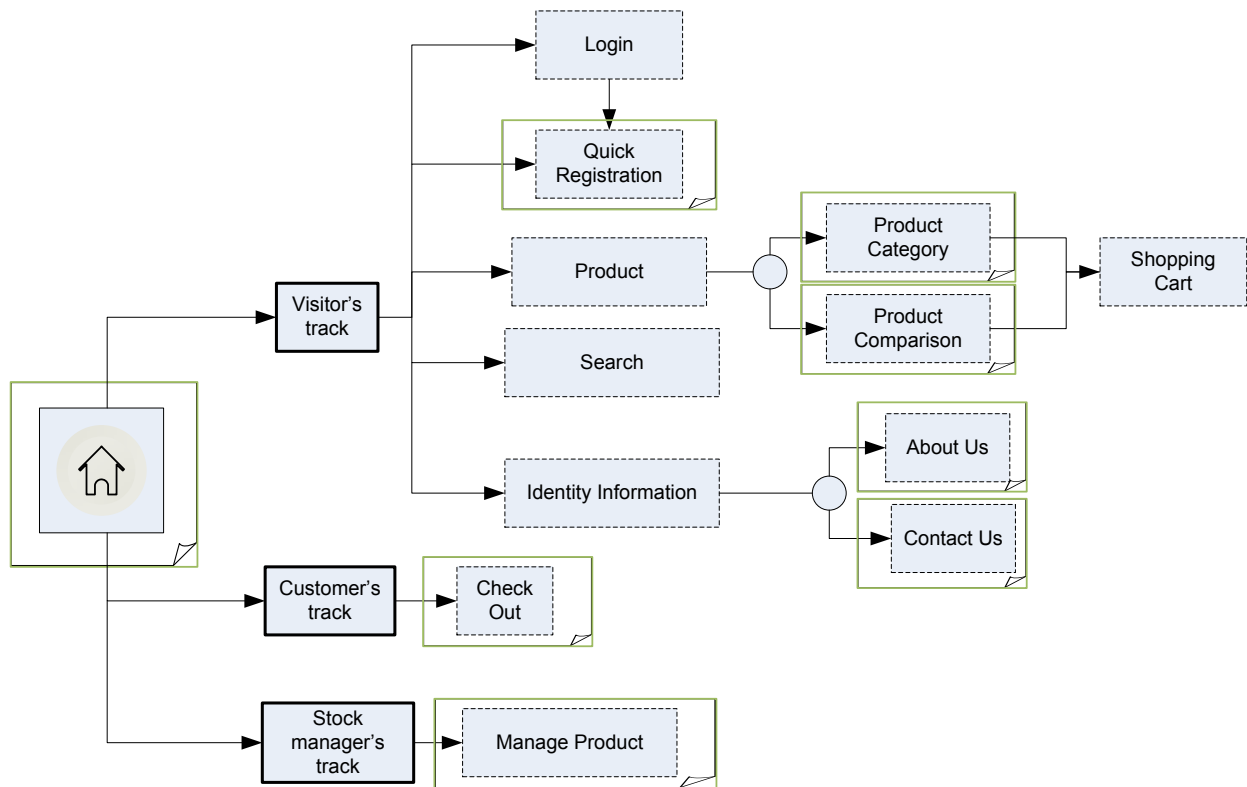
Navigation Structure Design:



(Figure 115) Navigation Structure Design

Based on the traditional definition of the “site structure design”, the designer decides how the components from the navigational model will be grouped into pages. We consider design patterns as components, and will show how the structure of our website would be, based on the design patterns the website employs for each audience class.

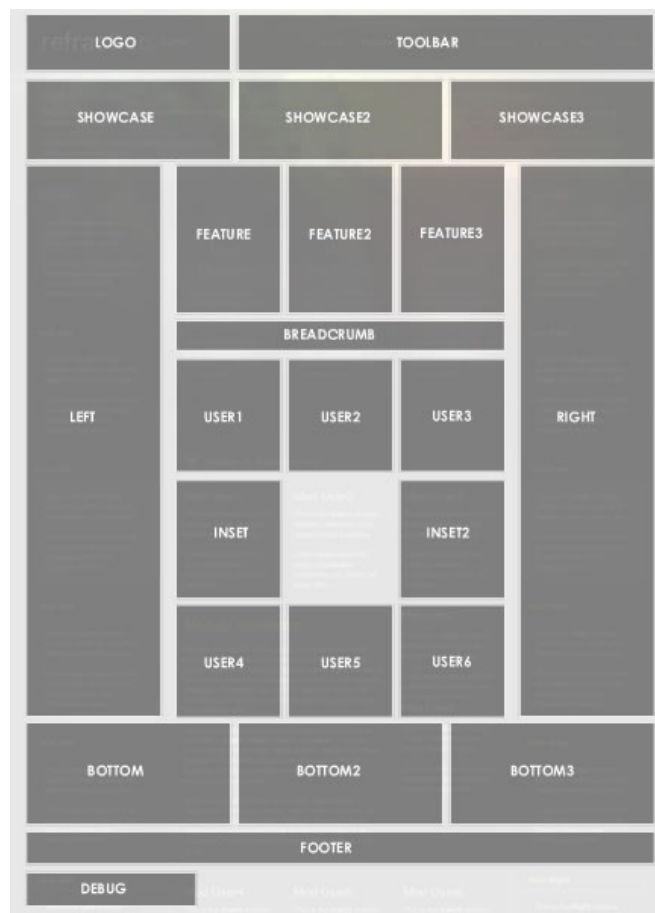
The followings would be the site structure for the classes of audience.



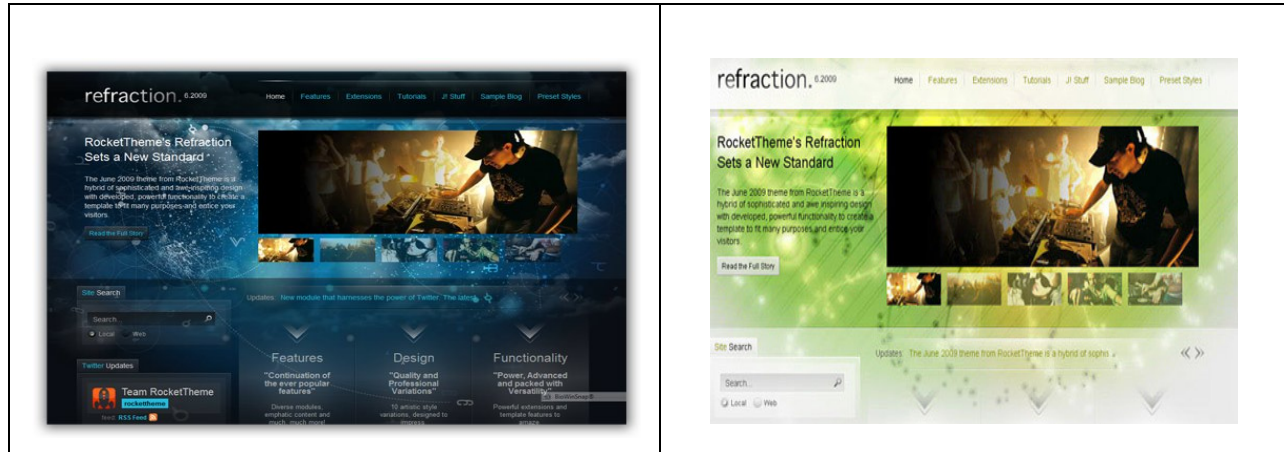
(Figure 116) Site Structure

### 5.3.5.2 Presentation Design

In WCMS frameworks, designers can either use previously created templates or build their own template from scratch. In either case there is the possibility to play around with the template and alter it to fit the desired presentation of the system. As an example, a pre-created template called “refraction” is demonstrated here, see (Figures 117) and (Figure 118). Each section has a specific name in which a specific module or component can be positioned. Of course these placements can be changed and even more, detailed attributes of the presentation (e.g. color, font) can be changed as well.



(Figure 117) Presentation Design, Template Position



(Figure 118) Presentation Design, Template Themes

### 5.3.5.3 Component/Module Selection

In this stage, the designer has to choose the components/modules (different names are used in different WCMS frameworks) needed in order to fulfill the requirements needed for the design patterns. As an example, a “shopping card” is a design pattern in our approach, at the same time it is a WCMS component that can be employed for the website. This phase consists of two parts. First, the WCMS framework the designer wishes to use must be selected. Whether it’s Drupal, Joomla, or any other WCMS framework, there usually exist a database of components or modules for that particular WCMS framework. After determining which WCMS framework will be used, the next question is to choose the appropriate components. Going back to our example, in order to implement a shopping cart for our system (assuming we are using Joomla as the WCMS framework), there are 32 modules/components providing this functionality<sup>80</sup>. The designer should decide which one to use. He should select the one that best suits the requirements needed.

<sup>80</sup> <http://extensions.joomla.org/extensions/e-commerce/shopping-cart>

The screenshot displays the Joomla! Shopping Cart component list. On the left is a navigation menu with categories like 'Access & Security', 'Administration', and 'e-Commerce'. The main content area shows a list of components with details such as version compatibility, ratings, and descriptions.

Component Name	Version Compatibility	Rating	Votes	Reviews	Type	Last Update
MyMuse	Joomla! 1.5 Native	5 stars	8	7	Commercial	2011-06-01
J2Store	Joomla! 1.7, Joomla! 2.5	5 stars	7	7	Non-Commercial	2012-03-21
HikaShop	Joomla! 1.5, Joomla! 1.6, Joomla! 1.7, Joomla! 2.5	5 stars	130	108	Non-Commercial	-

(Figure 119) Shopping Cart Component List, Joomla

### 5.3.6 Implementation

Based on the defined requirements in all the previous phases, the website will be implemented using the selected WCMS framework, the implementation process, normally includes the composition of modules and/or components that would provide the required functionalities aimed to be achieved.

## 6. Related Work

Since the core of this thesis is about WSDM, perhaps it is useful to mention other works similar to WSDM; one can refer to other design methodologies for web applications similar to WSDM like: Araneus (Merialdo, Atzeni & Mecca 2003), Strudel (Fernandez et al. 1999), Hypertext schema design (HDM) (Garzotto, Paolini & Schwabe 1993), W2000 (Baresi et al. 2002), Web Architect (Takahashi & Liang 1997), Object-Oriented Hypermedia Design Method (OOHDM) (Schwabe & Rossi 1995), Tiramis (Anderson, Levy & Weld 1999), Web Modeling Language (WebML) (Ceri, Fraternali & Bongio 2000), and Relationship Management Methodology (RMM) (Isakowitz, Stohr & Balasubramanian 1995). Of course there are other design methodologies to be mentioned as well, but these are some of the most important ones. It is worth mentioning that WSDM, the methodology under research in this thesis, was the first user-centered design methodology and was introduced in 1998 (De Troyer, Casteleyn & Plessers 2008).

There is no design methodology that follows the same approach as proposed in this thesis; however, there have been separate numerous attempts of categorizing websites based on genres and identifying design patterns for these genres, as well as the adaptation of website design methodologies to incorporate web content management systems. In this chapter, on the one hand, related work on website categorizations and design pattern definition and identification, and on the other hand, design and implementation methods for web content management system applications will be discussed.

As it was mentioned in chapter 3 (website genres), there are various websites and people that categorize websites based on their genres, namely: Wikipedia (Website 2012), Welie (Welie 2008), the book “The design of sites: patterns for creating winning websites”(Duyne, Landy & Hong 2007), the book “Genres of the web” (Lindemann & Littig 2011), and the book “Getting started building websites” (Dawson 2010). The strategies behind the categorization of websites varied from source to source, however certain genres were observed to exist across all of the mentioned resources, namely: the E-commerce, Blogs, Community, News, Corporate, etc.

Furthermore, some of these resources identified commonalities across websites belonging to the same genre and labeled them as “design patterns”; namely: Welie (Welie 2008) and (Duyne, Landy & Hong 2007). However there are other popular resources providing long lists of design patterns, for example

“Yahoo design pattern library” (Yahoo! Design Pattern Library 2012) provides a rather massive list of design patterns but the definition of a design pattern in their context is different from ours; those design patterns are more related to user interface design patterns similar to the design patterns in the book “Designing web interfaces: principles and patterns for rich interaction” (Scott & Neil 2009). It is worth mentioning that none of mentioned resources constructed a model of a website genre and the related patterns similar to the way it is done in this thesis using the Feature Assembly Model.

Regarding the adaptation of website design methodologies to web content management systems, there is few related work. Most of the related work in this context was done by Jurriaan Souer and his colleagues in two papers “Designing Web Content Management Systems Using the Method Association Approach” (Luinenburg et al. 2008) and “A Situational Implementation Method for Web-based Content Management System-applications: Method Engineering and Validation in Practice”(Weerd et al. 2006).In the latter, Jurriaan Souer developed a new method based on existing website design methodologies for the implementation of web application using content management frameworks using “assembly based situational method engineering approach” which is defined as follow: *“We use assembly based situational method engineering to develop the new design method. The advantage of such a method is that we can reuse relevant, established method fragments of existing methods. In this way, an optimized method for every implementation situation is being developed.”* (Weerd et al. 2006)

Based on the philosophy of the “uniqueness of a project situation”, Weerd et al. have proposed the following steps for an assembly based method engineering approach:

1. *Analyze implementation situations and identify needs.*
2. *Select candidate methods that meet one or more aspects of the identified needs.*
3. *Analyze candidate methods and store relevant method fragments in a method base.*
4. *Select useful method fragments and assemble them in a new method by using use route map configuration to obtain situational methods.*

Similarly, in the “Designing Web Content Management Systems Using the Method Association Approach” paper, (Luinenburg et al. 2008)propose:

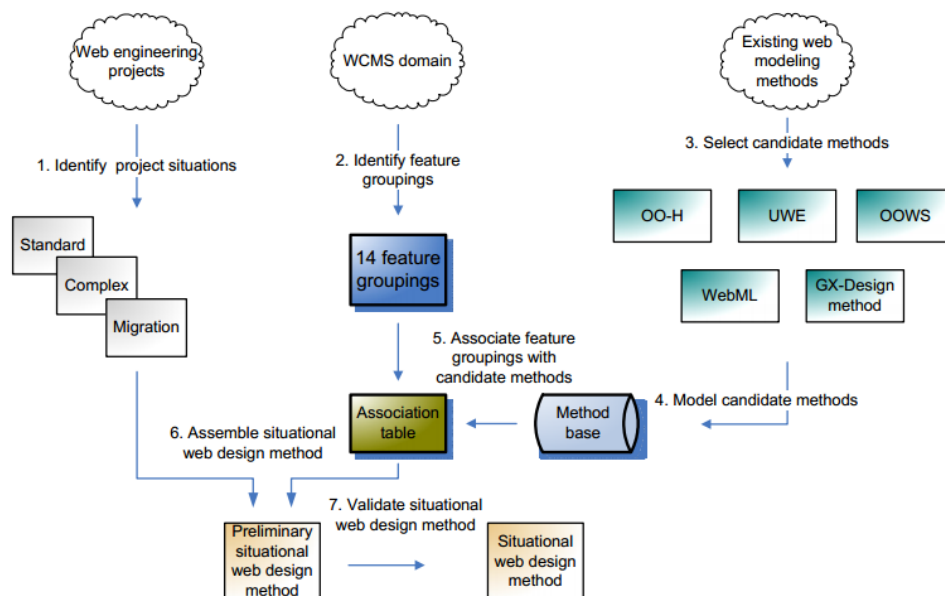
*“Due to the high amount of web modeling methods, each with their set of models, it is complex to make a decision on which web modeling method to choose for applying this to the WCM domain. In this research, we present a Method Association Approach wherein domain-specific feature groups are associated with web modeling methods in a uniform way. The Method Association Approach shows*



which feature groups are addressed by the selected web modeling methods, and so suitable for a particular application domain.”

The method association approach (MAA) is defined as: “a method that allows for association and selection of relevant web modeling methods” and contains the following steps:

1. Identify web engineering project situations.
2. Identify feature groups of a software product.
3. Select candidate methods for the identified feature groups.
4. Model relevant method fragments in a method base.
5. Associate feature groups with candidate method concepts.
6. Assemble situational web design method.
7. Validate situational web design method.



(Figure 120) The Method Association Approach (Weerd et al. 2006)

The mention method is quite fruitful because it uses the best practices of several design methodologies based on the project's situation and is adaptable to WCMS. However, there is a pitfall; and that is, unlike WSDM, it is not specialized to a specific design methodology. The method proposed for the WCMS-based WSDM version is utterly dedicated to WSDM and to no other design methodology; which makes this particular design methodology stand out from the rest. Our proposed methodology is, similar as the original WSDM, also more concrete in the sense that it contains specific steps with precise guidelines to be followed by the web developer. In addition, it still adheres to the main philosophy of WSDM, being audience driven, which is recognized as one of the strong points of WSDM.

## **7. Conclusions and Future Work**

This thesis consists of seven chapters, and in these chapters the followings were accomplished:

An introductory chapter discussed the objectives to be accomplished, the problem statement, the proposed solution and the structure of the thesis. The background chapter has given a short background on the major topics of the thesis. These topics were related to design patterns, WSDM, the relationship between WSDM and design patterns and Feature Assembly Modeling. Furthermore, we discussed the categorization of websites based on their genre in the next chapter, chapter 3, different strategies for this purpose were considered and evaluated. In the next chapter, four website genres were selected and explained. For these four website genres, related design patterns were collected and described; the situations where it could be appropriate to use these design patterns and the problems that may occur by applying them were also discussed. At the end of this chapter, a model for each website genre and related design patterns was created using the Feature Assembly Model. Some guidelines regarding anti-design patterns and dark patterns were also given in this chapter to create general awareness of the dangers of misusing design patterns and bad design patterns. In the next chapter an analysis of current deficiencies and problems of website design methodologies were made and as a proposed solution, two new versions of WSDM were proposed; one dedicated to Web Content Management Systems based (WCMS-based) implementation and the other to code-driven implementation, both using the introduced concepts of website genre and design patterns of the previous chapters. Lastly, a case study for demonstration the new WCMS-based version of WSDM was given to illustrate and explain the newly added phases and stages to the methodology. Chapter 7 analyzed the work related to the topics

mentioned in this thesis, and a comparison between them and the work done in this document was depicted. Lastly, in this final chapter, conclusions and the future works of this thesis is being discussed.

To summarize, the major contributions of this thesis are as follows: (1) we collected design patterns for four different website genres: social network websites, news websites, e-commerce websites, and corporate websites; (2) for each of these website genres, we presented a model that gives an overview of the different design patterns used for that genre, defines which patterns are considered mandatory and which are optional, and expresses relationships and dependencies between the different design patterns; (3) we adapted WSDM to be able to deal with the website genres and design patterns; and (4) for this we created two different versions of WSDM, one for Web Content Management Systems based websites and one for code-driven website implementations.

The potential future work of this thesis could be related to constructing a complete library of website genres and related design patterns to make the usage of this methodology for designing websites even easier and better documented. Possibly design patterns for new types of user interface, namely for touch-screen devices can be analyzed and documented and perhaps the design methodology WSDM could be adapted to be able to deal with these new types of devices, as they are becoming more popular every day. Even though these devices are relatively new, there are some guidelines regarding the design of applications for these devices, but no generally accepted one. In the field of web design, one can logically deduce that the design of the websites to be used on touch-screen devices should have different characteristics compared to normal ones due to the certain characteristics and functionalities provide by these devices; which could even result in a different style of task modeling, navigation design, site structure design and presentation design. Furthermore, a series of guidelines and design patterns could be provided for these kinds of devices, the concept of a design pattern in this context refers to mostly user interface design patterns, similar to Yahoo design patterns library. Since multi-touch screens are accepted and quite popular and expected to be in use for quite some time, having such guidelines and the relevant adaptation to website design methodologies are quite essential.

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