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# Divertimi: A Tourist Guide to a Unique and Enriching Experience

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## Divertimi: A Tourist Guide to a Unique and Enriching Experience

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## **Authorship Page**

Each individual member of our group contributed equally to the final product of our website design, Divertimi. The final website design and proposal displays the result of numerous hours of concentrated teamwork. The success of our final proposal is due to equal participation and cooperation from each member.

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## **Abstract**

This project lays a foundation for the development of an e-tourism website by Azienda di Promozione Turistica della Provincia di Venezia, the provincial tourism authority in the Veneto region of Italy. Our design employs individual and group profiling to recommend destinations and attractions. Social networking and various forms of user-generated narratives support travel recommendations. Finally, we propose a system for offering a personalized trip package based on user interests.

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# 1. EXECUTIVE SUMMARY

As fun and relaxing as a vacation may be, the trip planning process involved is quite the opposite. To help with this process many travelers turn to reliable e-tourist resources, such as TripAdvisor. However, TripAdvisor neglects many key components necessary to fully accommodate travelers. A truly all inclusive e-tourism website would consist of personalization for both an individual user and a group as well as customized recommendations on the local and regional scale. It would also include a social networking component and the convenience of downloadable narratives and itineraries. Therefore, our group proposed the design as displayed in Figure 1, of an innovative and unique tourism website that offers a personalized travel experience for each individual tourist. Our ultimate tourist website design, “Divertimi”, focuses on satisfying the desires and accommodating the needs of each individual by using his or her personal preferences.



Figure 1: Key Components of the Divertimi Website Design

Throughout the design of our website, we chose to focus on the Veneto region of Italy as our case study. One city of the Veneto region in particular, Venice, hosts 15 million tourists per year and caters to approximately 34 million visitor nights per year<sup>1</sup>. These factors make Venice a prime city for the focus of our tourism website.

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<sup>1</sup> Dr. Donato Concato: Dirigente APT, Provincia di Venezia, 2008.



Figure 2: Photorganizer: Profile Based on User's Connection to Photos

Our prototype website design includes a profiling component as displayed in Figure 2 where the user's connection to photos dictates his tourist profile. The idea of the photo-based profiler came from the article, *Photo-Based User Profiling for Tourism Recommender Systems*<sup>2</sup>. We also added enhancements to our profiling component by including a rating system of these photos, similar to Netflix's video rating system for new users. Not only does our system design create an individual profile, but it also allows for the generation of a group profile through the combination of individual profiles. Our profiling component provides for customization and personalization for the user either when traveling alone or when traveling with a group or family.

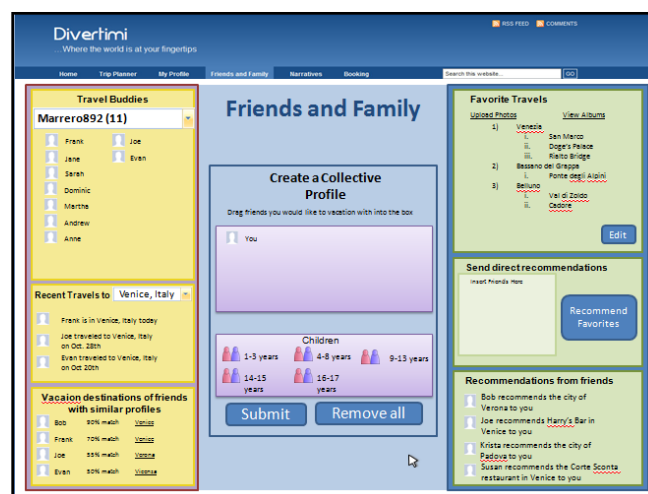


Figure 3: Friends and Family Networking Page of Divertimi

<sup>2</sup> Berger, Denk, Dittenback, Pesenhofer, Merkl, *Photo-Based User Profiling for tourism Recommender Systems*, 2007.

Our website design also incorporates a unique social networking component as displayed in Figure 3. where the user can communicate with family and friends and share travel advice. We included a social networking component similar to that of Facebook. We also included a collaborative filtering component similar to that of Amazon.com, which creates a “neighborhood” of similar users by grouping together users with similar interests, or in our case, similar profiles. The social networking component of our design allows users to receive helpful advice and opinions from close friends as well as from users who have similar interests.

In addition, the Divertimi design includes a unique trip-planning component where attractions are recommended to the user both on the local and regional scale as displayed in Figure 4: Local Trip Planner

Figure 5: Regional Trip Planner.

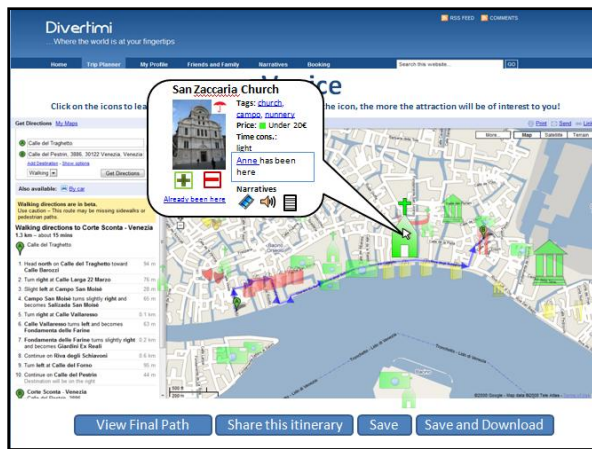


Figure 4: Local Trip Planner

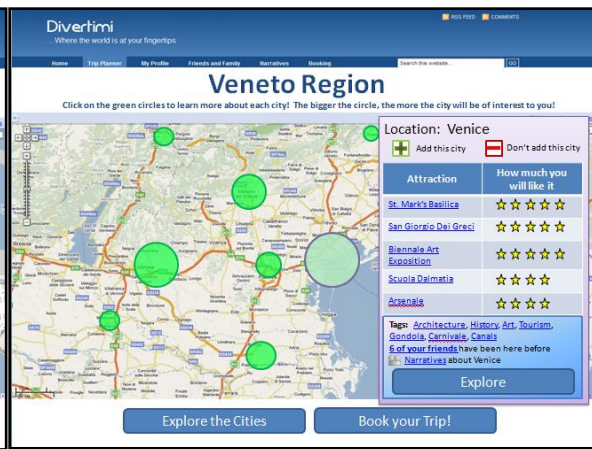


Figure 5: Regional Trip Planner

Our recommender system uses 17 different tourist personalities<sup>3</sup> taken from the literature to categorize tourists. Each tourist has a unique combination of these personalities, which comprises his or her tourist profile. Similarly, attractions have profiles; to recommend appropriate attractions, the profile of the user is matched with the profile of the attractions. Users have various options for choosing attractions and each decision the user makes alters his or her profile accordingly. Therefore, the more the tourist uses the site, the more customized his or her recommendations become. On the regional scale, cities are suggested to the user according to the number of specific attractions that match his or her profile within the city. The recommender system of our website design offers customized suggestions to the user based on his or her personal preferences.

Our site design also includes a booking function similar to that of Orbitz and Expedia but with an enhanced feature. Our booking component recommends entire trip packages to the user on a multi-city scale.

<sup>3</sup> Gibson and Yiannakis, Tourist Roles and Lifecourse, 2008

It suggests the best order to visit cities and best means of transportation based on time, price and special activities occurring on certain occasions.



Figure 6: Narratives Page of Divertimi

Lastly, our website offers narratives, as displayed in Figure 6, that are downloadable to mobile devices in video, audio, or text format so the user can take this information on vacation. Our narrative component relies heavily on the idea of crowdsourcing, similar to YouTube and Digg.com where users maintain the website by posting content and adding comments and ratings. This feature provides useful information for the user by displaying other user's feedback as well as facts about a specific location while at the desired destination.

With these unique features, our design supplies components missing from current web 2.0 sites for tourists. This design forms a starting point for the eventual implementation of a fully functional website, an initiative led by Dr. Donato Concato, Dirigente APT, Provincia di Venezia. Our website design is the ultimate tourist guide; it customizes the tourist experience based on the personal preferences of each individual user.

## 2. INTRODUCTION

Vacations and trips are always fun and exciting experiences; however, the planning procedure is often just the opposite. Trip planning is a very stressful and complicated process because there are numerous factors to consider. Travelers must determine and book transportation to and from the desired destination as well as book accommodations such as hotels, hostels, or apartments. Finally, tourists must determine the attractions they would like to visit while at their desired destination. Therefore, many travelers turn to knowledgeable and reliable sources to help with the stressful trip planning process.

A few decades ago, travel agents were a popular resource for planning trips<sup>4</sup>. However, with the improvements in technology and growing popularity of the internet, e-tourism has become the new travel planning resource. This online phenomenon is replacing the need for travel agents; in fact, approximately two-thirds of American tourists claim that e-tourism is a better resource for travel than travel agents.<sup>5</sup> The popular e-tourism site TripAdvisor.com, has made the most strides in accomplishing the task of creating an all-inclusive tourism website by catering to more than 25 million users<sup>6</sup>. TripAdvisor includes the booking of transportation as well as accommodations. It also provides numerous attractions and activities for tourists to participate in at each destination. Instead of travel agents, TripAdvisor uses reviews and feedback from other travelers to provide the user with information about both accommodations and attractions.<sup>7</sup> Although TripAdvisor satisfies many aspects of a trip, it still neglects several key factors of the trip planning process.

TripAdvisor does not include personalization for the user. Therefore, it does not consider the user's travel personality. In addition, TripAdvisor does not account for the challenge of group travel where more planning is required to satisfy all users. Moreover, TripAdvisor does not take the preferences of the individual user or group into consideration when suggesting regions, cities, accommodations or attractions. Finally, it does not provide the convenience of information available to the user at his or her destination. These missing components are integral parts of the trip planning process that must be taken into account when creating a travel website that provides the best experience for the user.

The Veneto region is the perfect test bed for an improved travel resource tool. One city in particular, Venice, is a popular destination in the region that brings in over 15 million tourists each year<sup>8</sup>. Visiting Venice requires a significant planning process prior to arrival. Tourists of the city must plan

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<sup>4</sup> Carton, *E-travel and E-tourism figures and trends*. E-Tourism Newsletter, 2008. Retrieved 9/28, 2008, from <http://www.tripadvisor.com/>

<sup>5</sup> Carton, *E-travel and E-tourism figures and trends*. E-Tourism Newsletter, 2008. Retrieved 9/28, 2008, from <http://www.tripadvisor.com/>

<sup>6</sup> *TripAdvisor* (2008). Retrieved 12/3, 2008, from [www.tripadvisor.com](http://www.tripadvisor.com)

<sup>7</sup> *TripAdvisor* (2008). Retrieved 12/3, 2008, from [www.tripadvisor.com](http://www.tripadvisor.com)

<sup>8</sup> Federica Durigan Dr.ssa and others, *Turismo a Venezia: Trend, Statistiche, Dati e Indrizzi* 2005 (Milano:Libri Scheiwiller, 2005).

transportation to and around the city, book accommodations, and choose from the many attractions the city has to offer. Due to these complexities, tourists of Venice would benefit greatly from a personalized travel planning website.

Our group has accounted for every aspect of the trip planning process by designing an all-inclusive web 2.0 site for tourists, which we call “Divertimi”. The design for Divertimi includes a unique tourist profiling component which adds personalization for the user. The site creates an initial profile of the tourist which describes the travel characteristics the tourist exhibits. The site’s collective profile planner creates a distinct profile for a group of which the user is a part. With the collective planner, Divertimi generates a combined profile of the group to account for each individual’s preferences. Divertimi provides tailored recommendations on a regional scale by suggesting cities of interest to users based on their personal profiles. Not only does it suggest cities, but it also recommends attractions based on the user’s preferences. Recommendations are made by the site based on the profile; however, friends or other users with similar preferences can also make suggestions. Finally, trip information may be downloaded to a mobile device so that travelers can view it during their trip. This information includes maps, itineraries, and narratives of attractions that may help travelers learn more about each attraction. By combining many existing e-tourism components with our own enhancements and new features, our website design succeeds in creating a unique and enriching tourist experience.

### 3. BACKGROUND

The amount of web users utilizing online travel resources to plan their trips or vacations has increased by over 300% in the past five years<sup>9</sup>. With the development of new internet technologies such as web 2.0 where sites are maintained strictly by user feedback, the travel planning process is becoming simpler. In order for these online travel resources to truly meet the user's needs, the individual must be taken into account and therefore must be analyzed and examined. After in depth research about specific tourist types, recommender systems can then be created to generate the perfect itinerary for e-tourists. By taking these factors into consideration, the ultimate tourist website can be created to aid the tourist through the entire trip planning process.

#### 3.1. Web 2.0

When the internet first began, it simply provided access to information that was originally difficult to obtain, like newspaper archives and research papers. As the internet advanced, it grew to include services like shopping and simple content distribution, but the majority of information was still created by the website owners. These earlier websites can be classified as Web 1.0. Around the year 2005, a shift began when website users started to publish their own content. This new Web 2.0 concept has taken off and now allows users to post their own news and leave comments, post reviews of items and services, create blogs, and share media.<sup>10</sup>

Web 2.0 is used widely in the e-tourism industry. The most important aspect of a Web 2.0 site is its users because Web 2.0 is strictly maintained by the input and feedback from everyday people<sup>11</sup>. It's a socially driven network of collaboration, which allows the website to ultimately run on its own<sup>12</sup>. Websites such as YouTube, Facebook, Amazon.com, and Pandora are a few of the popular Web 2.0 sites in use today. Through continued feedback from their users, these sites provide users with suggestions of either videos, friends, products, or music based on users' past interactions.

##### 3.1.1. Folksonomy

Web 2.0 sites depend on crowdsourcing, a process that utilizes user-generated content to provide features and services to its users. Because crowdsourcing allows anyone to post new content, methods need to be used that facilitate the easy categorization and organization of data. One popular method of

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<sup>9</sup> *E-Travel, E-Tourism, E-Journey and More* (2008). Retrieved 11/15, 2008, from <http://www.linkeygypt.com/blogs/b/eTravel-eTourism-eJourney-and-more-/56/eTravel-eTourism-eJourney-and-more-.html>

<sup>10</sup> Alexander, B., *Web 2.0: A New Wave of Innovation for Teaching and Learning*, 32-44, 2006.

<sup>11</sup> Wesch, M. (Director). *Web 2.0...the Machine is Using Us* (2008).[Video/DVD]

<sup>12</sup> Wesch, M. (Director). *Web 2.0...the Machine is Using Us* (2008).[Video/DVD]



organization is folksonomies, or the collective creating and managing of tags from various users to categorize data and information. Tagging allows amateur users to collaboratively classify and locate desired information. An example of a tag cloud is shown in Figure 7. Tag clouds aggregate all the tags on a website, and they increase the size of the tag based on its frequency. The more tags a word receives the larger and more noticeable the word becomes to other users.



Figure 7: Web 2.0 Tag Cloud

This method of categorization became popular around 2004 with social software applications such as Flickr, del.icio.us, and Youtube<sup>13</sup>. Folksonomies are beneficial for all users because they are purely based on the user's opinions, which allow the categorization to be determined by the user and customized to the users' specific preferences. At the same time, with the explosion of websites like Youtube (Figure 8) where over 13 hours of video are uploaded every minute<sup>14</sup>, they perform tasks that are impossible for moderator staff to accomplish.

<sup>13</sup> Palsen, Lean Folksonomies, *Taxonomies and Ontologies*. 30 October 2007. Welcome to the Doll House. <http://welcometothedollhouse.wordpress.com/2007/10/30/folksonomy-taxonomy-and-ontologies/>

<sup>14</sup> Stelter, B. (2008, August 15). *Some Media Companies Choose to Profit From Pirated YouTube Clips*. Retrieved December 9, 2008, from The New York Times:  
<http://www.nytimes.com/2008/08/16/technology/16tube.html>

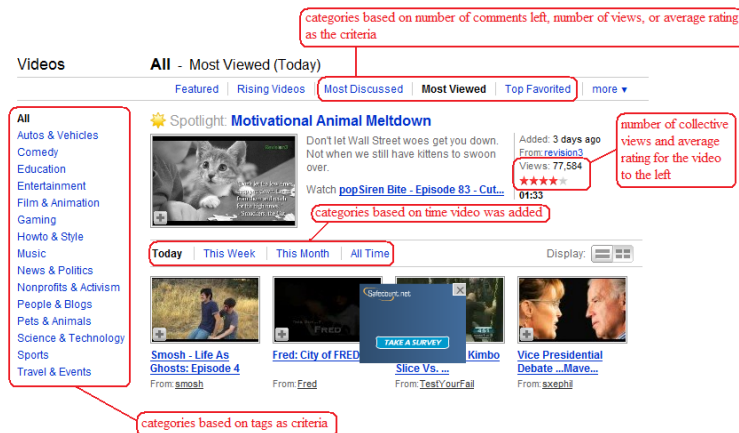


Figure 8: Portion of the Home Page of YouTube Account

### 3.2. Tourists

Differences in preferences and attitudes of each tourist contribute to different tourist experiences. Researchers have proposed that “relationships exist between individual psychological characteristics, consumer behaviors, demographic characteristics, and the types of tourism experiences they desire”<sup>15</sup>. Therefore, one must understand the psychology of tourists in order to better understand their behavior, what draws them to travel, as well as what draws them to any given destination<sup>16</sup>.

Tourists are categorized by how and why they travel. Roger C. Mannell, a professor in the Recreation and Leisure Studies department at the University of Waterloo<sup>17</sup> and Seppo Iso-Ahola, a professor in the Kinesiology department at the University of Maryland,<sup>18</sup> performed an experiment to study the motivations of tourists. They proposed a set of questions including “What factors lead people to describe an activity or a set of activities as authentic tourism or touristic experiences? Are these personal definitions similar to those of tourist operators or researchers? Are authentic touristic experiences leisure experiences? Are there other meaningful dimensions by which tourists label and define their experiences?”<sup>19</sup> Mannell and Iso-Ahola concluded that people take vacations to escape from stress and routine.<sup>20</sup> Similarly, economist H.P. Gray came up with two main motivations for tourist travel, wanderlust and sunlust. Wanderlust is the desire to “leave things familiar and to go and see different places,” and the desire for “rest and relaxation.” Sunlust is the “desire for better amenities,” or the “desire to learn”<sup>21</sup>. Tourists can be divided into these two categories when determining their motivations for travel.

<sup>15</sup> Hsu, Cathy H. C., Soo K. Kang and Kara Wolfe, *Psychographic and Demographic Profiles of Niche Market Leisure Travelers*. *Journal of Hospitality and Tourism Research*, 2002.

<sup>16</sup> Mehmet Mehmetoglu, *A Typology of Tourists from a Different Angle*, 2004

<sup>17</sup> Mannell, Roger, University of Waterloo: Department of Recreation and Leisure Studies, 2005.

<sup>18</sup> Iso-Ahola, Seppo, University of Maryland: The Department of Kinesiology, 2007.

<sup>19</sup> p. 13, Ross, G. F. *The Psychology of Tourism*. Melbourne: Hospitality Press, 1998

<sup>20</sup> p. 13, Ross, G. F. *The Psychology of Tourism*. Melbourne: Hospitality Press, 1998

<sup>21</sup> p. 22, Ross, G. F. *The Psychology of Tourism*. Melbourne: Hospitality Press, 1998

Dr. Stanley Plog, a consultant on travel and tourism,<sup>22</sup> has also developed a way in which tourists can be categorized. Plog has a personality theory of tourism stating that travelers are either allocentric or psychocentric. Allocentric travelers “prefer exotic destinations, unstructured vacations rather than packaged tours, and more involvement with local cultures<sup>23</sup>.” Psychocentric travelers “prefer familiar destinations, packaged tours, and touristy areas<sup>24</sup>.” In addition to this, he discovered that there are also high-energy travelers and low-energy travelers. High-energy travelers prefer a lot of activity while low-energy travelers prefer to relax and take their vacations slowly.<sup>25</sup>

Plog lists eight psychographic categories by which to define tourists. Similar to a demographic, a psychographic is a way of categorizing a population. Psychographics “include people's lifestyles and behaviors — where they like to vacation, the kinds of interests they have, the values they hold, and how they behave”.<sup>26</sup> Psychographics have become a popular method in determining the psychology of customers as well as their behaviors and styles of living. Psychographs have been applied to tourists to analyze the “individual's activities, interests, and opinions”<sup>27</sup>. The eight categories Plog developed are venturesomeness, pleasure-seeking, impulsivity, self-confidence, planfulness, masculinity, intellectualism, and people orientation. Someone who is “venturesome” is looking to discover new things in their travels. A “pleasure-seeker” holds comfort and luxury as their top priority. An impulsive traveler tends to plan things last minute, spend lots of money, and usually “lives for the moment”<sup>28</sup>. “Self-confident” travelers tend to look for unique or unusual experiences. A traveler possessing the “planfulness” quality tends to be very practical and plans their trip far in advance. These tourists search the most for travel packages and special deals as well. “Masculine” travelers are typically men seeking action and outdoor adventures in their travel. “Intellectual” travelers seek an educational experience and choose to visit museums, historical sites, and cultural activities. “People-oriented” travelers have qualities of “venturesome” and “impulsive” travelers but also are very social and hope to learn more about other people through their travel experiences.”<sup>29</sup> Most tourists fall into one of these eight basic categories and this characterization can be used to further profile the traveler.

Plog and Gray made great strides in developing methods for classifying tourists. Their findings were later analyzed and used by Gibson, Yiannakis, and Pearce to develop another method of categorizing

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<sup>22</sup>Cornell university school of hotel administration: The center for hospitality research: Faculty and research. Retrieved 10/1, 2008, from <http://www.hotelschool.cornell.edu/research/chr/pubs/quarterly/board/plog.html>, 2007.

<sup>23</sup> p. 32, Ross, G. F. *The Psychology of Tourism*. Melbourne: Hospitality Press, 1998

<sup>24</sup> p. 32, Ross, G. F. *The Psychology of Tourism*. Melbourne: Hospitality Press, 1998

<sup>25</sup> p. 32, Ross, G. F. *The Psychology of Tourism*. Melbourne: Hospitality Press, 1998

<sup>26</sup> *Demographics and psychographics*. (2008). Retrieved 10/1, 2008, from <http://www.allbusiness.com/marketing/market-research/426-1.html>

<sup>27</sup> Hsu, Cathy H. C., Soo K. Kang and Kara Wolfe, *Psychographic and Demographic Profiles of Niche Market Leisure Travelers*. *Journal of Hospitality and Tourism Research*, 2002.

<sup>28</sup> p. 34, Ross, G. F. *The Psychology of Tourism*. Melbourne: Hospitality Press, 1998

<sup>29</sup> p. 34, Ross, G. F. *The Psychology of Tourism*. Melbourne: Hospitality Press, 1998

tourists<sup>30</sup>. Pearce researched tourist behavior and discovered that tourists exhibit behaviors such as “living lives of luxury,” “searching for the meaning of life,” and “buying souvenirs”. From these behaviors, Pearce developed 15 different tourist types. In 1994, Yiannakis and Gibson conducted an experiment to test Pearce’s conclusions. Yiannakis and Gibson measured “tourist role preference, satisfaction of psychological needs, and demographic characteristics such as age, gender, marital status, and education level”<sup>31</sup>. The conclusions of their study resulted in creating two more tourists types. The addition of these two tourist types resulted in Yiannakis and Gibson’s 17 tourist types as explained below<sup>32</sup>. (See Appendix B for further information about this study)

1. Sun Lover: Someone primarily interested in warm places with lots of sun, sand, and ocean.
2. Action Seeker: Interests include partying, going to night clubs, and having uncomplicated romantic experiences.
3. Anthropologist: Interests include meeting local people, trying the food, and speaking the language.
4. Archeologist: Interests include archeological sites and ruins; enjoys learning the history of ancient civilizations.
5. Organized Mass Tourist: Interested in organized vacations, packaged tours, taking pictures, and buying lots of souvenirs.
6. Thrill Seeker: Interested in high risk, exiting activities that bring them to emotional highs such as base jumping.
7. Explorer: Enjoys adventures, going to out of the way places and the challenges involved in getting to those places.
8. Jet Setter: Enjoys going to high class hotels and resorts as well as exclusive night clubs and talking to celebrities.
9. Seeker: Interested in seeking knowledge to better understand one’s self and or the meaning of life.
10. Independent Mass Tourist: Likes to visit regular tourist attractions but plans own trip with minimal assistance from others.
11. Independent Mass Tourist II: Likes to visit regular tourist attractions, does so in a highly spontaneous manner with very little planning.
12. High Class Tourist: Appreciates first class travel, hotels, and restaurants, as well as seeing shows.
13. Drifter: Enjoys nomadic experiences; lives a hippie life style.
14. Escapist I: Interested in vacationing to get away from the daily routine and the stresses of everyday life.
15. Escapist II: Interested in places of solitude which are quiet and peaceful
16. Sports Lover: Primarily engages in very active vacations where they can still play their favorite sports.
17. Educational Tourist: Participates in planned study tours and seminars to obtain new knowledge and skills<sup>33</sup>

Each role describes a possible characteristic that a tourist could possess. In addition, no tourist is believed to possess only one tourist type; rather, tourists may share many different tourist types. By categorizing tourists in this way, it is easier to understand exactly what each tourist is interested in and why.

### 3.3. Recommender Systems

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<sup>30</sup> Gibson and Yiannakis, *Tourist Roles Need and the Lifecourse*, 2002.

<sup>31</sup> Gibson and Yiannakis, *Tourist Roles Need and the Lifecourse*, 2002.

<sup>32</sup> Gibson and Yiannakis, *Tourist Roles Need and the Lifecourse*, 2002.

<sup>33</sup> Gibson and Yiannakis, *Roles Tourists Play*, 1992.

With the explosion of user-generated content, finding the most relevant information on the internet can be analogous to trying to drink water from a fire hose. One of the most successful ways of dealing with this large amount of unstructured user-generated data is through recommender systems. Recommender systems are “software applications that recommend items of interest to users based on preferences they have expressed implicitly or explicitly”<sup>34</sup>. These systems are designed to offer “novelty, surprise, and relevance” when a user is searching<sup>35</sup>. Jeffery M. O’Brien explains the difference between recommender systems and search queries in CNN Money:

The Web, they say, is leaving the era of search and entering one of discovery. What’s the difference? Search is what you do when you’re looking for something. Discovery is when something wonderful that you didn’t know existed, or didn’t know how to ask for, finds you.

Recommender systems rely heavily on statistics to find relationships and clusters based on user interaction. They are comprised of “filtering” techniques that are used to comb through masses of data. There are four main filtering systems, and they filter by comparing user interactions, finding content similarities, relying on special lists of key words or phrases, or by any combination of these three systems.

### 3.3.1. Content-based Filtering

Content-based filtering systems filter results by analyzing key words or relationships defined by the content. These systems can operate through various relationship mediums, such as text descriptions or mathematical analysis of the content. For example, if a user searched for “astronomy”, the system would not only generate information with astronomy in the description, but also possibly, “constellations,” “The Big Dipper,” and “moon”. In addition, these systems rank their suggestions. For example, works with a higher frequency of the keyword “astronomy” would be given greater importance than ones with less frequency<sup>36</sup>.

One popular example of content-based filtering is Pandora.com. Pandora is a music website that creates playlists tailored to the user’s preferences. At Pandora.com, the user types a song or artist into a search and Pandora generates a list of similar songs based on certain attributes as displayed in Figure 9. To make this site possible, employees have broken down millions of songs and ranked them according to 400 different categories, such as “male or female lead singer” or “acoustic or instrumental style”. With such

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<sup>34</sup>*About Recommender Systems*. (2008). Retrieved December 9, 2008, from ACM Recommender Systems 2008: <http://recsys.acm.org/>

<sup>35</sup>*About Recommender Systems*. (2008). Retrieved December 9, 2008, from ACM Recommender Systems 2008: <http://recsys.acm.org/>

<sup>36</sup> Adomavicius and Tuzhilin, *Toward the Next Generation of Recommender Systems: A survey of the State-of-the-Art and Possible Extensions*, 2005.

detailed information for each song, it is easy to match songs and artists of similar styles and to recommend songs that the user is sure to enjoy<sup>37</sup>.



Figure 9: Creating a New Station on Pandora.com

### 3.3.2. Collaborative Filtering

Collaborative filtering systems suggest items or ideas that other users with similar preferences have chosen previously. Within this system, there are two main methods used, the “memory-based” method and the “model-based” method. In the memory-based method, the system develops a “neighborhood” of users who have ranked items similarly or bought similar items. When a user searches for a product, the system will generate a list of suggestions based on the purchases of their “neighbor”. Model-based filtering creates a “model” of user ratings utilizing probability to generate recommendations<sup>38</sup>. Although recommender systems

<sup>37</sup> Pandora: Radio from the Music Genome Project, (2008) Retrieved 10/30/2008, from Pandora.com

<sup>38</sup> Sarwar, Badrul, George Karypis, Joseph Konstan, and John Riedl *Item-based collaborative filtering recommendation algorithms*, 2001.

have proven to be very successful, they have one serious flaw. Because they rely on large amounts of user interaction data to determine similarities, new items will have much difficulty entering the system.

Amazon.com provides an example of collaborative filtering. Each time a user searches for a product on Amazon.com, the site generates a product description, list of user reviews, and a section labeled “Customers who bought this item also bought” as displayed in Figure 10. The site recommends a list of items that others have bought, assuming that since two people have searched for the same item, they may have similar tastes. While it is a seemingly simple process, it is very effective in recommending additional items of interest to the user<sup>39</sup>.



Figure 10: Amazon.com Recommendations

### 3.3.3. Knowledge Based Filtering

Knowledge-based filtering is a method by which a set of classification material is created, and then recommendations are given based on these classifications. For example, a consumer is shopping for a new car. The consumer looks for the following qualities: New Car, Sporty, Cool, Fast, Convertible. A simple search query can select cars from a database of quantified information, but two of these classifications, sporty and cool, are not quantifiable. A knowledge-based filtering system is designed to account for these non-quantifiable criteria through a range of techniques typically involving text analysis of the description and reviews. The creation of a knowledge-based filtering system begins with a knowledge-engineering process. This is when a system designer creates a compilation of key words to evaluate the products to be recommended. Examples could include luxurious, quaint, modern, cool, trendy, or traditional. Once the knowledge base is created, the system then extracts these characteristics from the description of the location and the reviews posted by other users. The most valuable feature of knowledge based filtering systems is their ability to recommend across a very diverse pool of products. For example, if a user selects an ultra-modern hotel, it can be inferred that they would also enjoy trendy bars, flashy clothes, and modern art exhibitions because all of these attractions share a similar, non-quantifiable, trait of “modernism”. One other very valuable feature of knowledge-based filtering systems is that they do not have any cold start issues. As soon as a product or service is posted with a description, the system is ready to recommend.

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<sup>39</sup> Amazon, 2008, retrieved 12/3/2008 from amazon.com

### 3.3.4. Hybrid Systems

Hybrid systems are a combination of any of the previous filtering systems and produce more benefits than any one system can offer. In *Designing Recommender Systems for Tourism*<sup>40</sup>, Berka and Ploessnig propose a method for combining all of the filtering systems as shown in Figure 11. Their method begins by performing a simple database pre-selection to reduce the amount of items that require computation in the following steps. Because the pool of results is still large, next the system performs knowledge-based filtering. This is because knowledge-based filtering is computationally lightweight; all the heavy computation is performed during the development of the system. Once the development is complete, the system simply applies static rules and queries. Now that the selection pool is a reasonable size, the system performs all other forms of filtering in parallel. The two most popular forms of filtering that would be applied during this step are content-based filtering and collaborative filtering. Each of these methods produce a ranked list of results, and the system now algorithmically combines these rankings to produce a final ranked list of results. Finally, the system selects the top N results and displays them to the user. By combining a variety of filtering methods, hybrid systems are immune to issues like cold starts and offer results that more precisely match the expectations of the user.

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<sup>40</sup> Berka, T., & Plößnig, M., Designing recommender systems for tourism. Salzburg, Austria: Salzburg Research, 2004.



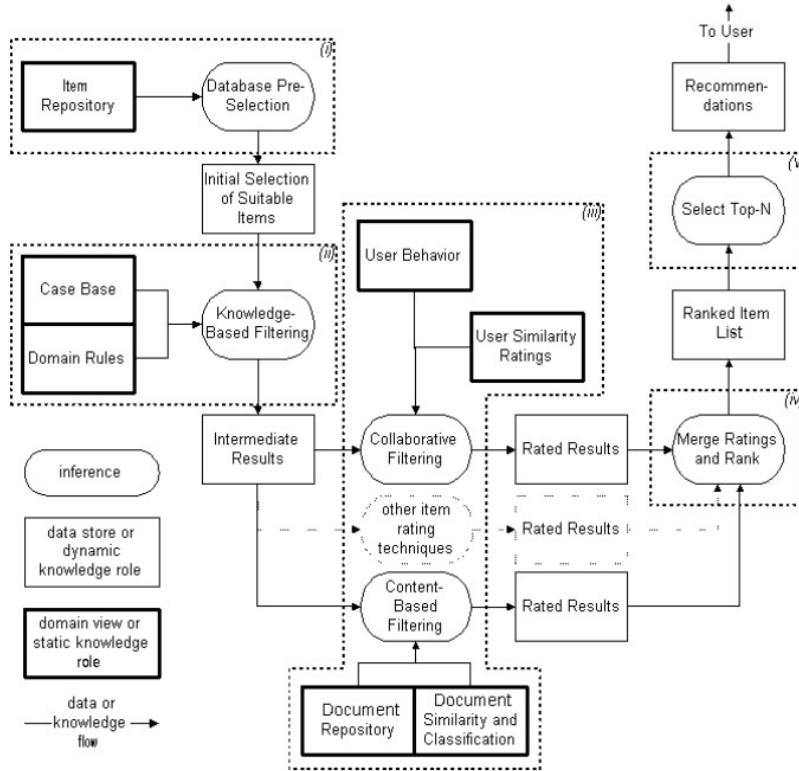


Figure 11: Architecture for a Hybrid Filtering Component

## 4. DESIGN

To develop the model for an ideal web 2.0 site for tourists, a combination of effective techniques and features were collected from a variety of popular e-tourism and web 2.0 sites. The positive aspects of each of these sites were thoroughly analyzed and used along with several innovative enhancements to create an all-inclusive, web 2.0 site for tourists. Our model website, Divertimi, provides tourists with the ideal travel experience based on personal profiles and user preferences. There are many key elements to our website design, as displayed in Figure 12, such as personalized profiling and social networking. Another key component, the trip planner, provides recommendations to the user on the local and regional scale. Lastly, our design includes a booking component as well as information on-the-go. All components of our website design are necessary to provide a customized trip planning experience.



**Figure 12: Key Components of Divertimi Website Design**

The tourist's first experience using Divertimi begins with the creation of a personal tourist profile. The tourist's profile becomes the foundation for generating the perfect travel experience for the user. This profile is used to recommend cities and attractions of interest to the user.

Next, the user begins establishing networks of friends and family. By establishing a base of friends, the user can begin sharing recommendations for vacations. The friends and family component also allows the user to create collective profiles to accommodate group travel. Like the individual profile, the collective profile is used to recommend cities and attractions; however in this case, the cities and attractions are those that satisfy the majority of the group.

The trip planning page first recommends cities that interest the user based on the user's profile. The user then has the option of booking flights, hotels, and activities at each location. Additionally, Divertimi has a system that suggests entire trip packages to the user on a multi-city scale. Divertimi suggests the best order

to visit cities and the best means of transportation based on time, price and special activities occurring on certain occasions.

To plan the finer details of the trip, the user has the option to further explore any city to create itineraries. Attractions are presented to the user based on how closely they match the user's profile. The user is provided with brief information about each attraction such as the price, time constraint, and tags placed by other users. To receive further insight on the attraction, the user is able to download narratives about the particular attractions as well as read reviews and ratings on those narratives.

When the user completes the planning of all the details of the trip, the travel plans can be saved, printed, or downloaded. By downloading the itinerary to a mobile device, this information is readily available to the user throughout the trip. With these components, our website provides a personalized and convenient trip planning experience for the user.

## 4.1. Profiling

An efficient and accurate travel recommender system needs to understand the experiences individual travelers desire and those they prefer to avoid. By generating a profile of the traveler's personal interests, the system is able to recommend attractions that the user will enjoy. The system we developed to create this personal profile is the Photorganizer, as displayed in Figure 13. The Photorganizer uses a combination of features and techniques from two particular resources, the Photo-Based Tourist Profiler Project and Netflix.com.

Divertimi  
Where the world is at your fingertips

Home Trip Planner My Profile Friends and Family Narratives Search this website

**PHOTORGANIZER!**

Photographs 1-10 11-20 21-30 31-40 41-50 51-60

Please drag and drop those photos you identify with here  
Rank them with 10 being pictures you really identify with

10  
9  
8  
7  
6  
5  
4  
3  
2  
1

Please drag and drop those photos you do not identify with here  
Rank them with 10 being pictures you really dislike

10  
9  
8  
7  
6  
5  
4  
3  
2  
1

Submit Profile Skip this step

Figure 13: Photorganizer: Profile Based on User's Connection to Photos

#### 4.1.1. Photorganizer

Profiling is a two-step process which involves creating the profile and then reviewing the profile to make any necessary adjustments. To provide the most enjoyable experience for the user while creating the personal profile, the user organizes photos instead of filling out a tedious survey. In the Photorganizer, the user categorizes a series of photos into two separate areas; those that the user identifies with the most and those that the user does not identify with. The user rates the photos in each of the two areas on a scale of 1-10, 10 being the strongest emotion and 1 being the weakest emotion. The user places the photos he or she finds most identifiable in the green bin and the photos he or she finds least identifiable in the red bin. For example, the user in Figure 14 selected a picture of natives playing instruments to place in slot number 10 because the user loves learning about the culture and locals of an area.

The screenshot displays the Divertimi website's Photorganizer interface. At the top, the site's navigation bar includes links for Home, Trip Planner, My Profile, Friends and Family, and Narratives, along with a search bar. Below the navigation bar, the title "PHOTORGANIZER!" is prominently displayed. A row of photo thumbnails is shown, with the first ten labeled "Photographs 1-10". The interface is divided into two main sections: a green bin on the left for photos the user identifies with, and a red bin on the right for photos they do not. Both bins have a vertical scale from 1 to 10. The green bin's instruction is "Please drag and drop those photos you identify with here. Rank them with 10 being pictures you really identify with." The red bin's instruction is "Please drag and drop those photos you do not identify with here. Rank them with 10 being pictures you really dislike." A photo of natives playing instruments is being dragged into the slot 10 of the green bin. At the bottom, there are two buttons: "Submit Profile" and "Skip this step".

Figure 14: Placement of Most Identifiable Photo

Likewise, in Figure 15 the user selected the photo of the skydiver to place in the number 10 slot of the least identifiable category because the user fears thrill seeking activities.

Divertimi  
...Where the world is at your fingertips

Home Trip Planner My Profile Friends and Family Narratives Search this website

**PHOTORGANIZER!**

Photographs **1-10** 11-20 21-30 31-40 41-50 51-60

Please drag and drop those photos you identify with here  
Rank them with 10 being pictures you really identify with

10 9 8 7 6 5 4 3 2 1

Please drag and drop those photos you do not identify with here  
Rank them with 10 being pictures you really dislike

10 9 8 7 6 5 4 3 2 1

Submit Profile Skip this step

Figure 15: Placement of Least Identifiable Photo

To provide the user with an enjoyable experience while completing the profiling aspect of the website, the user can categorize as many or as few photos as desired. However, the more photos the user categorizes the more accurate profile he will receive.

After the user has categorized the photos, the tourist profile is then generated in the user-friendly format displayed in Figure 16.

**Divertimi**  
Where the world is at your fingertips

Home Trip Planner My Profile Friends and Family Narratives Search this website GO

**Your tourist profile!**

| You are... |   | You are not...   |               |
|------------|---|--|---------------|
| 10         | 10 Anthropologist   | -10 Thrill Seeker  | -3 High Class |
| 9          | 6 Educational Tourist   | -6 Sun Lover   |               |
| 8          | 2 Drifter   | -4 Jet Setter  |               |
| 7          |   |  |               |
| 6          | You are primarily interested in meeting the local people, trying the food, and speaking the language.         | You definitely don't enjoy participating in risky activities or extreme sports.                |               |
| 5          |   |  |               |
| 4          | You are interested in taking informational tours or listening to seminars or conferences at your destination. | You are not interested in warm places with sun, sand, and water.                               |               |
| 3          |   | You don't like attending high class night clubs or restaurants with celebrities.               |               |
| 2          | You are interested in drifting from location to location, living like a "hippie".                             | You don't like traveling first class, booking the best hotels, going to shows, or fine dining. |               |
| 1          |   |  |               |

I'm done Submit Changes Start Over

Figure 16: Generated Tourist Profile

The tourist types the user identifies with the most will appear at the top of the list. Each tourist type that categorizes the user is then explained in the corresponding slot. For example, the user in Figure 16 placed the photo of the natives playing instruments in slot number 10 and therefore received a rating of 10 for the tourist type Anthropologist. The red area displays the tourist types that the user's profile does not match. For example, the user received a -10 rating for the tourist type of Thrill Seeker, which means the user has no interest in any thrill seeking activities.

In order to assure our site accommodates the needs of the tourist, the user can verify the accuracy of the profile. The user has the opportunity to change any aspect of the profile by moving the descriptions of the tourist types to any ranking or by removing the tourist type completely from the profile by un-checking the box (Figure 17). The Photorganizer then generates a new profile for the user based on these corrections.

**Divertimi**  
... Where the world is at your fingertips

Home Trip Planner **My Profile** Friends and Family Narratives

**Your tourist profile!**

| You are... |   | You are not...  |  |
|------------|---|---|--|
|            | 10 Anthropologist<br>7 Educational Tourist  | -10 Thrill Seeker<br>-9 Jet Setter<br>-8 Drifter<br>-3 Sun Lover<br>-2 High Class |  |
|            | <input type="checkbox"/> Check to keep  | <input type="checkbox"/> Check to keep  |  |
| 10         | You are primarily interested in meeting the local people, trying the food, and speaking the language. <input checked="" type="checkbox"/>         | 10  | You definitely don't enjoy participating in risky activities or extreme sports. <input checked="" type="checkbox"/>              |
| 9          |   | 9   | You are not interested in attending high class night clubs or restaurants with celebrities.. <input checked="" type="checkbox"/> |
| 8          |   | 8   | You are not interested in drifting from location to location, living like a "hippie". <input checked="" type="checkbox"/>        |
| 7          | You are interested in taking informational tours or listening to seminars or conferences at your destination. <input checked="" type="checkbox"/> | 7   |  |
| 6          |   | 6   |  |
| 5          |   | 5   |  |
| 4          |   | 4   |  |
| 3          |   | 3   | You are not interested in warm places with sun, sand, and water. <input checked="" type="checkbox"/>                             |
| 2          |   | 2   | You don't like traveling first class, booking the best hotels, going to shows, or fine dining. <input type="checkbox"/>          |
| 1          |   | 1   |  |

I'm done Submit Changes Start Over

Figure 17: Accuracy of Tourist Generated Profile

The Photorganizer is an improved profiling system, which uses features and techniques from the Photo-Based Tourist Profile Project and Netflix to best profile tourists with limited effort and time consumption from the user.

#### 4.1.2. Development of the Photorganizer

The foundation of the Photorganizer originated in the paper *Photo-Based user profiling for Tourism Recommender Systems* (Figure 18). The Photo-Based Tourist Profiler requires users to select pictures that they most identify with in order to generate a tourist profile. The premise of this project was that tourists take photos of events that they enjoy while vacationing. For example, “if the primary emphasis of the tourist is to remain active while on vacation, the tourist will engage in their favorite sports and take snapshots of their

magic moments”<sup>41</sup>(Berger, 2007). Therefore, the project concluded that when presented with a collection of travel photos, tourists select photos that will best represent their interests.



**Figure 18: Photo-Based Tourist Profiler Project**

We used this photo-based method as our initial cold start solution to profile tourists because pictures “bring moments back to life” and are easier to identify with than “lengthy surveys on self-analysis”<sup>42</sup>(Berger, 2007). “Leading the user through a series of mind puzzling diagnostic questions is often cumbersome and discourages use” of the system<sup>43</sup>(Gretzel, 2004). Therefore, “an intelligent recommender interface minimizes a new user’s effort and gets him to the fun part of using the system and seeing recommendations”<sup>44</sup>(Rashid, 2002). With the use of the Photorganizer, our profiling system requires minimal work as well as entertainment for the user.

We have also adapted Netflix’s system of profiling new users by rating movies into our profiling system, by asking the user to rate photos. The concept of rating has proven to be successful in a study conducted by GroupLens Research where 54% of 375 MovieLens users said “one of their top 3 reasons to rate movies was because it was fun”<sup>45</sup>.

#### 4.1.3. Enhancements to Profiling

The Photo-Based Tourist Profiler uses a “waste bin” as a category strictly for mistakes made when identifying pictures. The waste bin in the Photo-Based Tourist Profiler does not have any effect on the overall tourist profile. Our Photorganizer uses the waste bin as a disposal for photos the user strongly dislikes. Placing the photos into the waste bin of the Photorganizer adds negative weight to the tourist profiles and therefore contributes to the overall profiling system.

<sup>41</sup> Berger, Denk, Dittenback, Pesenhofer, Merkl, *Photo-Based User Profiling for Tourism Recommender Systems*, 2007.

<sup>42</sup> Berger, Denk, Dittenback, Pesenhofer, Merkl, *Photo-Based User Profiling for tourism Recommender Systems*, 2007.

<sup>43</sup> Gretzel, Mitsche, Hwang, Fresenmaier, *Tell me who you are and I will tell you where to go: Use of Travel Personalities in Destination Recommendation Systems*, 2004.

<sup>44</sup> Rashid, Albert, Cosley, Lam, Mcnee, Konstan, *Getting to Know you: Learning New User Preferences in Recommender Systems*, 2007.

<sup>45</sup> Frankowski, Sen, Harper, Yilek, Cassano, Riedl, *Recommenders Everywhere: The WikiLens Community-Maintained Recommender System*, 2007



We discovered that “predictions and user profiling can be sensitive to errors in the interaction with the system or changes in the user interest”<sup>46</sup>(Delgado, 2002). To account for any mistakes in the system, we decided to allow users to view and make changes to their profile. By allowing users to view and adjust their profile, our system is more accurate in providing recommendations for the user.

#### 4.1.4. Implementation of the Profiling System

The purpose of the photo profiler is to generate a mathematical representation of the user’s interests. According to *Photo-Based User Profiling for Tourism Recommender Systems*, a user’s tourism interests can be defined by only two mathematical factors, their affinity for *kick* and *pack*<sup>47</sup>. Kick is defined as the tourist’s motivation to explore exciting activities and destinations while on travel; for example skydiving or mountain climbing. Pack is defined as the tourist’s interest in travelling alone, with a group of friends, or with large groups of tourists. From the photos selected by the user, the photo-based profiler generates a vector that is simply a user’s kick and pack values plotted on the 2-dimensional grid shown in Figure 19. The grid displays the statistical location of the pictures on the Kick vs. Pack axes that were found during a surveying process. Pictures of exciting activities like skydiving are high on the kick axis, while pictures of relaxation are at the bottom. Likewise, a busload of tourists is on the right of the Pack axis, and a lone hitchhiker on the left. In order to make the vector system more understandable whenever the user has to interact with it, Gibson and Yiannakis’s 17 different tourist types have also been statistically plotted on the grid below. These 17 tourist types provide the user with a written explanation describing a location or area on the grid.

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<sup>46</sup> Davidson and Delgado, *Knowledge Bases in User Profiling in Traveling and Hospitality Systems*, 2002

<sup>47</sup>. Berger, Denk, Dittenback, Pesenhofer, Merkl, *Photo-Based User Profiling for Tourism Recommender Systems*, 2007.



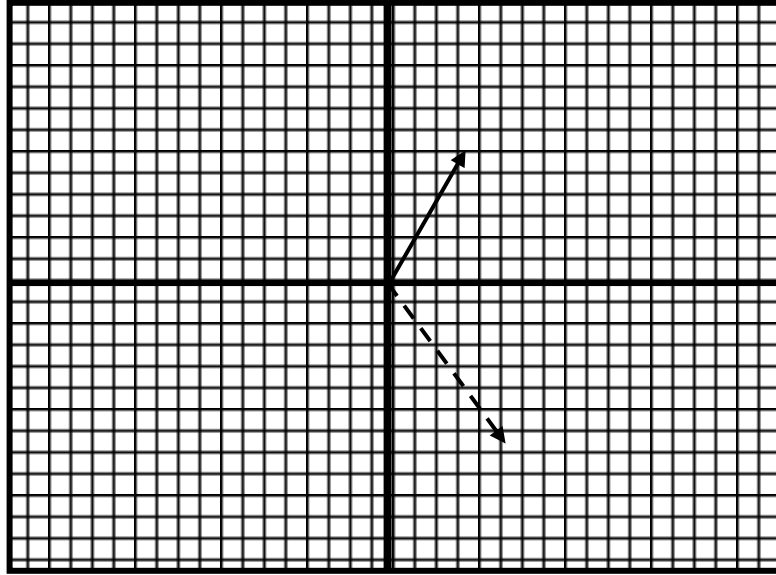


Figure 20: Vectors Before Addition

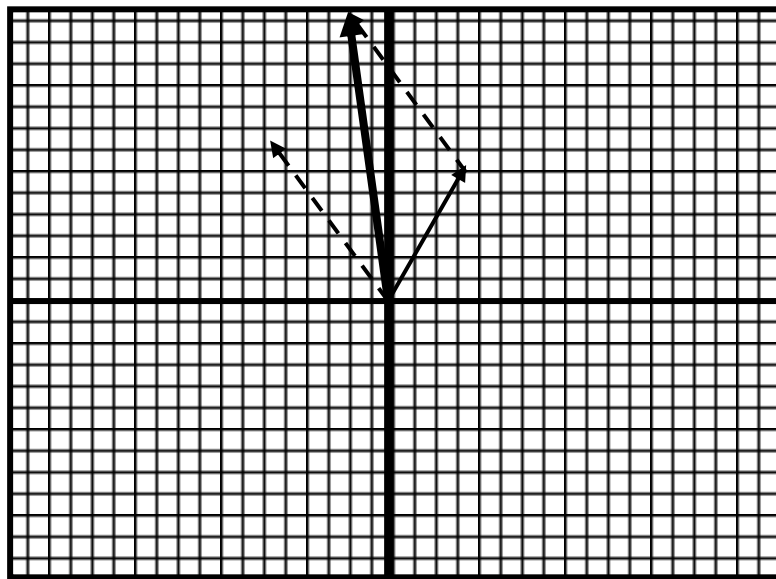


Figure 21: Vectors After Negation and Addition

## 4.2. Friends and Family

An important and popular feature of web 2.0 is social networking, which enables users to communicate with and track their friends online. A social network is an important aspect of travel planning because many web users desire personal advice about vacations and travel from people they know and trust. In fact, over 80% of travelers participating in a TripAdvisor.com survey agree that “reading other travelers’ online reviews increases confidence in decisions, makes it easier to imagine what a place would be like, helps reduce risk/uncertainty, makes it easier to reach decisions, and helps with planning pleasure trips more

efficiently”<sup>48</sup>(Gretzel, 2007). We combined and improved features from websites like Facebook and Amazon.com to develop our own social networking tool so that users can interact and share recommendations with friends, family and other travelers.

An original feature that our friends and family page offers is the Collective Profile Planner. Often, people travel in groups; however, each individual has varying interests and travel preferences. Children also add a different dynamic to trips because they have extremely different vacation preferences than the average adult. Our Collective Profile Planner meets the challenge presented by group and family travel by finding destinations and attractions that will please everyone.

#### **4.2.1. Friends and Family Recommendations**

Under the social networking section of our website as displayed in Figure 22, users interact with family and friends to plan trips and itineraries. The friends and family tab displays the user’s “travel buddies” which the user acquires from frequent use of the system. Users can search through “friends” who currently use the website and add them to their list. Users can also categorize their “travel buddies” into different groups of family and friends. For example, a user may create a network of people he works with or a network of his family. A unique component of the family and friend page allows users to interact with other users who have similar profiles to their own. The section “Vacation Destinations of Buddies with Similar Profiles”, displays these other users with similar profiles as well as attractions these travelers visited. With this convenient feature, users obtain suggestions from others users with similar preferences to their own. Users can also input their “Favorite Travels” that may be viewed by their friends and family. Lastly, users may share direct recommendations with friends or family members. This feature is a quick and easy way to obtain trusted recommendations about travel experiences.

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<sup>48</sup> Gretzel, *Online Travel Review Study, Role and Impact of Online Travel Reviews*, 2007.

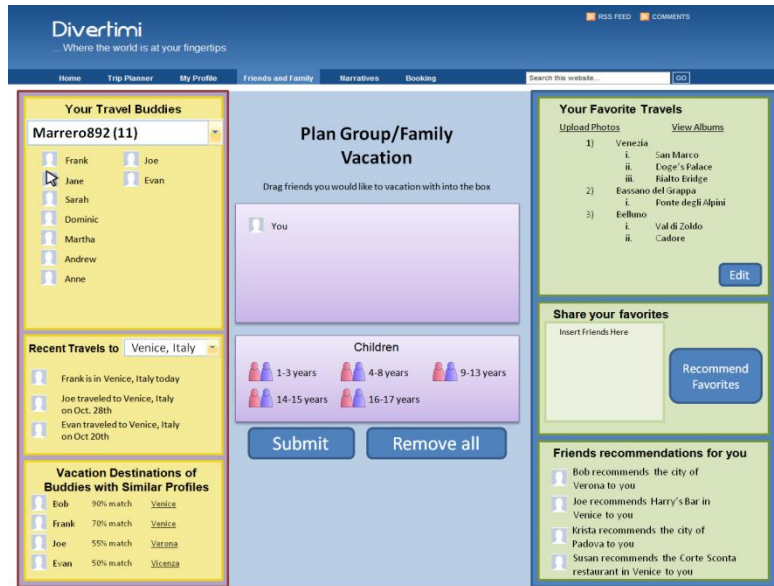


Figure 22: Friends and Family Page of Divertimi

#### 4.2.2. Development of Friends and Family Recommendations

We adapted the friend network concept from the popular web 2.0 site, Facebook. Facebook as displayed in Figure 23, is a web 2.0 social networking site where users can communicate with friends and view the personal profiles of these friends.



Figure 23: Facebook Profile Page

Personal profiles include specific information about the user such as the user's interests, activities, birthdays, education etc. Communication amongst friends is simple as users can post comments on their friend's pages as well as send private messages. Facebook also allows users to view recent activities of their friends. For example, users are notified when one of their friends posts a new photo album. We have implemented these concepts within our own website design by allowing our users to create networks of friends, view each other's favorite travels, share recommendations with one another, and view each other's recent travel activities. In addition to ideas taken from Facebook, our group also added features and ideas from Amazon.com.

Amazon.com is a shopping website that uses collaborative filtering to offer suggestions to the user. Amazon.com includes a section entitled, “Customers who bought this item also bought” as displayed in Figure 24. This section suggests items to the user based on the item the user is currently looking at and the purchases of other users who also bought the same item. For example, if a user searches for the book “Don’t Make Me Think: A Common Sense Approach to Web Usability”, the site will also recommend “Designing Interfaces: Patterns for Effective Interaction Design”, “The Design of Everyday Things” and “Prioritizing Web Usability” because other users who bought “Don’t Make Me Think” also bought these books.



Figure 24: Amazon.com Recommendations

Amazon.com assumes that users who buy the same item have similar interests and may therefore purchase similar items. Divertimi makes a similar assumption that users with similar profiles will enjoy participating in the same travel activities. Facebook and Amazon provided a useful background for the social networking component of our design.

#### 4.2.3. Friends and Family Collective Profile Planner

Divertimi provides a unique feature called the Collective Profile Planner as displayed in Figure 25. When planning a group trip, users can add friends or family members to the Collective Profile Planner. Divertimi also provides generic children profiles for both boys and girls of various age ranges. Because most children will not have created profiles, Divertimi uses assumed characteristics of each age group and gender in creating the generic profiles. After adding family, friends, or children to the planner, Divertimi uses the individual preferences of each profile in the group and generates an average profile for the entire group that aims to accommodate the interest of each member.



**Figure 25: Collective Profile Planner**

#### **4.2.4. Development of Collective Profile Planner**

We developed the idea for this Collective Profile Planner through collaboration with Dr. Donato Concato and Professor Michele Tamma<sup>49</sup>. Dr. Concato brought forth the idea that many travelers often travel in groups and therefore, offering a group profile option would be useful to potential tourists<sup>50</sup>. Professor Tamma suggested that children drastically change the flow of group travel and at certain age groups children have similar interests. Insight on factors such as these allows our Collective Profile Planner to account for the many different dynamics that group travel presents.

#### **4.2.5. Implementation of Collective Profile Planner**

The group profile is created by taking a weighted average of all of the group's members. A weighting system is employed here to address issues like children. For example, even though there may be only 2 children in a group of 15, the two children vectors will command all others in order to keep all attractions child appropriate.

### **4.3. Trip Planner**

The Trip Planning component of the Divertimi website allows the user to plan customized trips based on the profile the user created in the Photorganizer. The trip planner begins at the regional scale of

<sup>49</sup> Michele Tamma, Professor of Economics at the University Ca' Foscari Venezia, 2008.

<sup>50</sup> Dr. Donato Concato, Dirigente APT Provincia di Venezia, 2008.

cities in the Veneto region and then focuses on the local scale of specific cities within the region. The foundation for this portion of the website design came from Google Maps. Through analysis of Google Maps and in collaboration with Dr. Donato Concato<sup>51</sup> and Professor Michele Tamma,<sup>52</sup> our group created an innovative trip planning design with many enhancements and specialized features used to customize the trip planning process.

#### 4.3.1. Trip Planner Regional Scale

The regional trip planner asks the user to input a specific city or region of interest, however if the user does not have an area of travel in mind, cities will be recommended to the user based on his profile. Cities are recommended to the user in the form of green circles as displayed in Figure 26. The size of the circle indicates the user's affinity for the city; therefore, a large circle indicates a city with many attractions that match the user profile. By displaying the user's affinity for the attraction through the size dimension of the circle, users can easily observe which cities would be of most interest to them. Users can also receive more information about the cities including popular attractions in the city rated by users with similar profiles.



Figure 26: Recommended Cities Regional Scale

#### 4.3.2. Trip Planner Local Scale

The local scale trip planner is closely related to the regional scale trip planner. The local scale trip planner focuses on traveling to and from the destinations and attractions recommended by the Divertimi system. The user can input a start and end location, much like Google Maps. The site then generates the fastest route between these two points and suggests diversions along the way. Diversions are displayed as icons in the location of specific attractions as shown in Figure 27. The shape of the icon indicates the type of attraction such as a museum, church, or shopping attraction. The size indicates how closely the attraction

<sup>51</sup> Dr. Donato Concato, Dirigente APT Provincia di Venezia, 2008.

<sup>52</sup> Michele Tamma, Professor of Economics at the University Ca' Foscari Venezia, 2008.



meets the user's interests, and the color indicates the price range of the attraction, red being the most expensive and green being the least expensive.

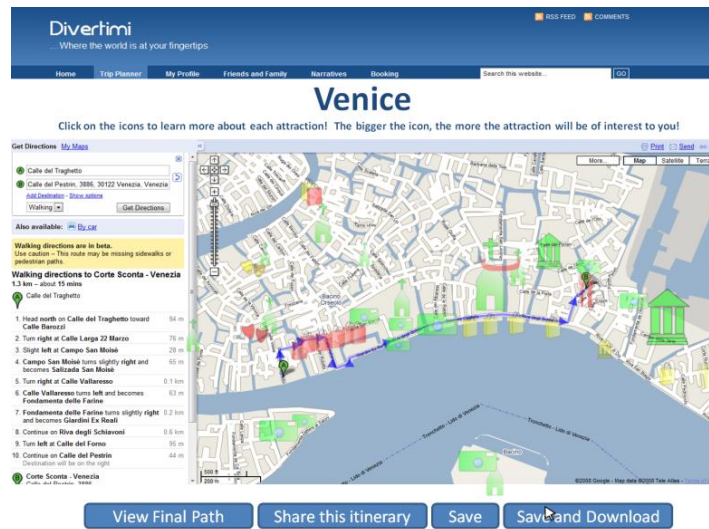


Figure 27: Local Planner Suggested Diversions

Each attraction also has an information window as displayed in Figure 28. The information window includes the name and picture of the attraction, an icon of an umbrella indicating that the attraction is accessible in the rain, and tags placed by other users. The information window also displays a general idea of the time consumption of the attraction, friends who have visited the attraction, and an option to view narratives in either video, audio, or text format.



Figure 28: Information Window of Attraction

The user can add or remove the suggested attractions from his itinerary. By adding or subtracting these suggestions, not only is the user's itinerary changed, but the user's profile is adjusted to accommodate his new selections. For example, the user in Figure 29 chose to remove "Prada" from his itinerary. Divertimi now removes stores similar to "Prada" from his itinerary and updates his profile to represent a decreased interest in high-class shopping stores. If the user has shown enough disinterest in high-class shopping, Divertimi will remove the store from the map and no longer recommends similar attractions.



Figure 29: Removing Activities from Itinerary

Lastly, the information window includes a link labeled “I’ve already been here.” This informs the site that the user has previously visited the attraction and it can be removed from the itinerary. However, if the attraction is dynamic, the website informs the user of new exhibits or special events occurring at these locations so the user will not miss out on an entertaining opportunity. For example, in Figure 30 the user expressed that he had already visited the Biennale and the site informed the user that there was a new exhibit at this particular museum. This unique option not only informs the user about new opportunities, but also provides feedback to the recommender system about the exact attractions that interest the user. Because the user has previously been to the attraction, we assume that he or she will enjoy similar attractions. In this way, the profiling system will then strengthen the user’s profile to be match more closely with these attractions.

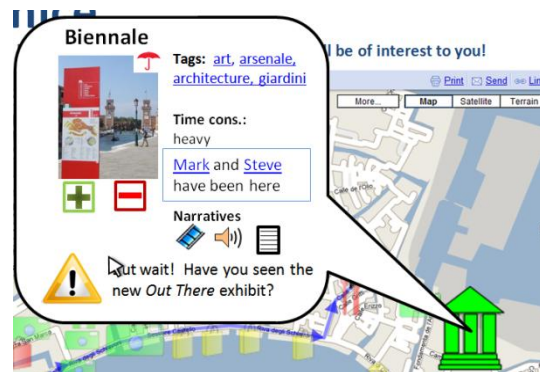


Figure 30: “I’ve Already Been Here” Feature

#### 4.3.3. Implementation of the Trip Planner

The recommendations and diversions suggested to the user are the core foundations of the Trip Planning component. In order for a computer system to provide personalized results similar to a travel agent, it must select attractions that specifically meet the traveler’s interests. As explained in the background chapter, there are numerous methods for producing recommendations. From research and analysis, we have discovered that the best system is one that combines the elements of many recommender systems. Because of

the complexities of these recommender systems, we will offer explanation on only the core of our system. A compilation of relevant research papers is included in the Annotated Bibliography appendix.

Just as the Photorganizer generates a vector for each tourist type, attractions also have vectors. Whenever the user is searching for attractions, the system will compare the user's personal vector with the attraction's vector. In Figure 31, the black arrow represents an individual user or a collective group's vector, and the blue dots represent the vector locations of several attractions. The white circle represents the area closest to the user's vector. The closer an attraction's blue dot is to the tip of the vector, and thereby the more similar the attraction is to the user; the more the user will like it, and the larger the icon appears on the trip planner.

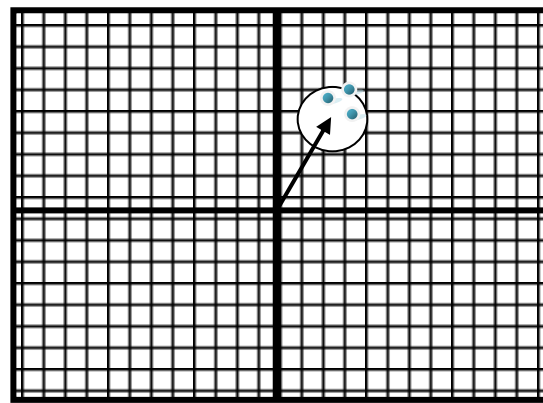


Figure 31: Matching the User with an Attraction

The vector-based recommender system is only one part of the entire hybrid recommender system, and it falls in section iii of Figure 11. The results of the vector comparison will be combined in parallel with content based filtering and collaborative filtering systems to produce the final result. More research needs to be done to determine how attractions receive profiles. The following are some of the methods that were briefly explored: the attraction takes on the profile of the user who submitted it, and is then altered as users interact with it. Secondly, the profile could be inferred from the average of the users who view and comment on the attraction. Finally, the system could obtain a direct categorization from the user during the submission process. Through a thorough evaluation, the best method for determining the profile of attractions will be discovered.

#### 4.4. Booking

When a planning a trip, travelers must book transportation, accommodations, and any event tickets needed during their travels. Our design offers all components of the booking process in one website. Our

website design is similar to popular sites like hotels.com and Orbitz, but also includes unique components and features developed through collaboration with Dr. Donato Concato<sup>53</sup>.

#### 4.4.1. Enhancements of Booking

The booking process often occurs in cycles. First, the traveler finds a convenient flight, but then he receives information that his hotel has no vacancy on the necessary the dates of travel. The user must now find a new flight in order to be able to stay at the desired hotel. After finding the appropriate flight and hotel, the user may encounter a regional transportation issue like train scheduling, or a one-time only concert, which would cause them to once again start the process from the beginning. By combining all steps into one website, Divertimi will be able to do in seconds what would have taken the traveler many hours of searching.

**Divertimi**  
...Where the world is at your fingertips

Home Trip Planner My Profile Friends and Family Narratives Booking Search this website...

**You**

| Transportation  | Accommodation              |
|---|----------------------------|
| 15 June 09 – Monday (plane)<br>LV: New York (JFK) 0800PM<br>AR: Venice Marco Polo (VCE) 0915AM (+1 day) | Hotel Bauer                |
| 18 June 09 – Thursday (train)<br>LV: Venice St. Lucia 0900AM<br>AR: Verona 1030AM                       | MaxinHotel                 |
| 20 June 09 – Saturday (train)<br>LV: Verona 0900AM<br>AR: Castelnuovo del Garda 0912AM                  | Gardaland Hotel and Resort |

**Group**

| Transportation   | Accommodation              |
|--|----------------------------|
| 19 June 09 – Friday (plane)<br>LV: New York (JFK) 0830PM<br>AR: Venice Marco Polo (VCE) 1000AM (+1 day)  | Gardaland Hotel and Resort |
| 20 June 09 – Saturday (train)<br>LV: Venice St. Lucia 1115AM<br>AR: Castelnuovo del Garda 0100PM         |                            |
| 23 June 09 – Tuesday (train)<br>LV: Castelnuovo del Garda 0500PM<br>AR: Venice St. Lucia 0645PM          |                            |
| 23 June 09 – Tuesday (plane)<br>LV: Venice Marco Polo (VCE) 0800PM<br>AR: New York (JFK) 0915AM (+1 day) |                            |

Print  
Download to Calendar  
Share  
Explore Cities

Figure 32: Booking Page Final Itinerary

Divertimi approaches this planning nightmare by offering unique travel packages customized to the user's interests. The user first inputs dates of travel, and any pre-existing commitments like bookings or conferences. Next, the system looks at each city and gathers the attractions and events that would most interest the individual or group. Divertimi compares the number of interesting attractions and events offered with the associated cost of travel and accommodations. It then determines the most affordable trip that

<sup>53</sup> Dr. Donato Concato, Dirigente APT Provincia di Venezia, 2008.

includes the most attractions. Users are then able to search for and book their transportation, accommodation, and activities. After choosing a booking package, Divertimi offers a final itinerary of the user's trip as displayed in Figure 32.

## 4.5. Narratives

The narratives component of our website design offers more information about a specific attraction in the forms of audio, text, or video. These narratives can be downloaded to mobile devices so the user can retrieve this information while visiting the attraction. Divertimi ranks the narratives based on ratings from users with similar profiles. The users can watch, listen to, or read the full narrative, view the name of the user who uploaded the narrative, see the date the narrative was posted, and leave comments.

### 4.5.1. Development of Narratives

The idea for the narratives portion of our website design came from the popular web 2.0 site, YouTube.com. YouTube.com uses crowdsourcing as a means of maintaining its website. Our narrative section, like YouTube, is created and moderated by the users. Any user or tourist can upload any form of narrative to the website. The narratives are then rated by others “like you” so eventually the best narratives for the specific user are filtered to the top of the page. Our website design displays the top three narratives based on ratings by users with similar profiles as displayed in Figure 33.



Figure 33: Top Three Narratives

Each narrative has a list of comments given by other users as displayed in Figure 34. The comments are displayed with the user name and the date posted as well as a full text of the comment. We have adapted Digg.com's rating system in this section of our website design. Digg.com is a social news website, which has created a unique process of rating comments. Through the use of crowdsourcing, users are able to reply to

the comments and view replies posted by other users. The users are also able to rate comments with a thumbs up if they agree or a thumbs down if they disagree with the comment. If a certain number of users give the comment a thumbs down, the comment is “grayed out” and regarded as inaccurate. Our website uses the same comment system as Digg.com by providing rated comments to each narrative. Another feature we adapted from Digg.com is the “flag if inaccurate” feature. Because our narratives are used for providing specific information about attractions, it is important that the narratives are accurate. When users flag a narrative, they can offer a correction within their comment. Then when a tourist downloads this narrative, the corrections are included. This way, minor inaccuracies in a video will not necessitate its deletion.

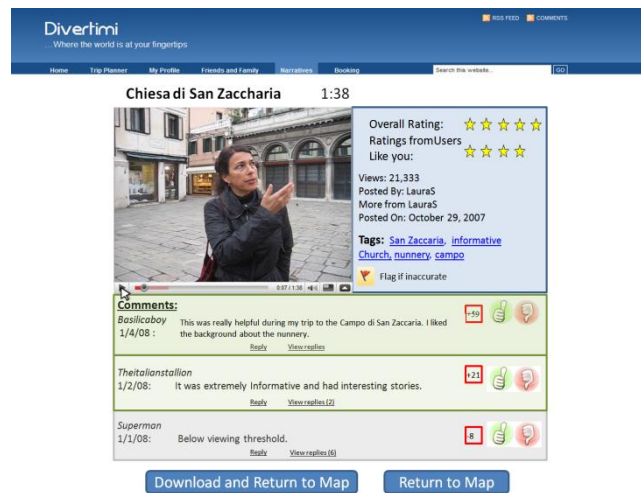


Figure 34: Narratives with Comments

#### 4.5.2. Enhancements of Narratives

Our narratives are readily available to the user while at the specific location to provide convenience for the user. This feature, Divertimi on-the-go, allows the user to download narratives to mobile devices with GPS capabilities (Figure 35). When the tourist is near a particular attraction that Divertimi has recommended, his or her mobile device will vibrate. This vibration not only informs the user that the attraction matches his or her personal preferences but it also provides a short narrative about the attraction. In addition, Divertimi on-the-go allows the user to edit his personalized itinerary and download more narratives at any point of the trip where internet is accessible.



Figure 35: iPhone with Divertimi Itinerary

## 5. CONCLUSION

Our all-inclusive website, Divertimi, covers every aspect of the trip planning process through its innovative and unique components. These components transform Divertimi from a website used for searching to a website that facilitates the discovery of unexpected, but personalized results. The Photorganizer makes the profiling process less tedious by providing the user with entertainment through classification of photos. Through this profiling component, Divertimi learns the unique behaviors and preferences of each user to recommend with accuracy. Our design not only recommends based on the user's personal interests, but also allows the user to receive trusted recommendations from family and friends. Our social networking component also provides a specialized group planner to take into consideration the many tourists who travel with family and friends. In addition to these components, our design also features multimedia narratives that provide an invaluable resource for the trip planning process and the trip itself. These narratives are readily available to the user at any time during the trip when downloaded to a mobile device. By providing these core innovations and enhancements through the design of our website, our work has supplied Dr. Donato Concato with the strong foundation needed for the grant proposal of a web 2.0 site for tourists. Our design is a significant improvement on existing travel websites and provides tourists with a customized, unique, and enriching travel experience.



## 6. RECOMMENDATIONS

Our website design incorporates many new ideas and features; however the next step of our proposal is the implementation of these features. Our profiling component, the Photorganizer, is based off the profiling system from the article *Photo-Based User Profiling for Tourism Recommender Systems*<sup>54</sup>. This system utilizes vectors based on the combinations of 17 different tourist types representing each tourist profile. More research is required to determine the specific vectors for each photo and the complex algorithms behind the profiling system.

In addition to the Photorganizer, the recommender system must also be implemented. Our group determined that just as each tourist profile has a vector, each attraction must also have a vector. By matching vectors of the tourist with vectors of the attraction, the appropriate attraction is suggested based on the personal preferences of the user. Because we were unable to perform the necessary tests explained in the *Photo-Based User Profiling for Tourism Recommender Systems* due to time constraints, we were unable to determine how to generate the vectors for the attractions as well as the tourist types. Because personal preferences of the user and opinions about what the attractions have to offer are subject to change over time, vector adjustments are necessary to maintain the accuracy of the system. Therefore, further investigation of these algorithms is the next step in implementation of a functional website

In addition to further investigation on the profiling and recommendation components of our website design, more research is required on the social networking component, specifically the group planner. The group planner generates distinctive group profiles based on an average of the vectors of each individual in the group. However, because we are unsure of the complete mechanics behind the profiling system, more research is required to implement the group-profiling component.

The group-profiling component also takes into consideration travel with families by allowing users to input generic children profiles. However, because of time constraints our group was unable to study the personalities and desires of children or how gender and age affects children's preferences. Further research must be conducted on the psychology of children to determine the correct vectors for the generic children's profile.

Another aspect of the social networking component that requires further investigation is the implementation of the feature, OpenID. OpenID is a service that facilitates the sharing of the user's profile and friend networks between new accounts and the user's pre-existing accounts on other websites. Implementation of this feature in our website design will allow the user to transfer existing networks of friends to Divertimi consequently eliminating the tedious task of manually creating networks of friends.

Our website has laid the grounds for which this further research can be conducted. Although more time and investigation is necessary to implement all of these suggested components, the outcome will be

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<sup>54</sup> Berger, Denk, Dittenback, Pesenhofer, Merkl, *Photo-Based User Profiling for tourism Recommender Systems*, 2007.

worthwhile. Implementation of all of these innovations will create a fully functional web 2.0 site for tourists that customizes features based on the personal preferences of the user.

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## 8. APPENDIX A: ANNOTATED BIBLIOGRAPHY

### 8.1. Collaborators

Concato, Dr. Donato. Dirigente APT, Provincia di Venezia. 2008

The purpose of collaboration with Donato was to discuss the aspects of travel planning that needed attention so these issues could be potentially solved with our prototype web 2.0 for tourists. Our prototype will be used to lay the foundation for a grant proposal on a functional e-tourist web 2.0 site. Results from these meetings showed the need for an advanced booking function for flights and accommodations as well as personalization in travel planning.

Tamma, Dr. Micheal. Professor of Economics at the University Ca'Foscari Venezia. 2008

In meeting with Tamma there has been discussion on the relationship between time dependencies, group planning, and the added dynamic of addressing children's needs with travel planning. Results from these meetings brought to our attention the need for generic children profiles, group profiles, as well as a function that accounts for time consumption in travel. These meeting also yielded advice on usability and feasibility of different component/features of our prototype web 2.0 site for tourists.

### 8.2. Crowdsourcing

Arbors, J., J.C. Ramos, J.L. Hervais. (2008). New Learning Network Paradigms: Communities of Objectives, Crowdsourcing, Wikis and Open Source. *ScienceDirect*, 194-194-203.

This article discusses the motivations for and consequences of "collaboration paradigms". It discusses how this new idea was developed and its advantages and disadvantages. It also discusses different examples of these "collaboration paradigms" such as wikis or RSS blogs.

Brabham, D. C. (2008). Crowdsourcing as a Model for Problem Solving: An Introduction and Cases. *The International Journal of Research into New Media Technologies*, 76-76-92.

This article discusses the idea of crowdsourcing as a "model for problem solving. It also gives several examples of how crowdsourcing has been used as this model. It explores the idea that crowds are often more efficient at problem solving than a concentrated team of individuals.

Palsen, Lean Folksonomies, *Taxonomies and Ontologies*. 30 October 2007.  
<http://welcometothedollhouse.wordpress.com/2007/10/30/folksonomy-taxonomy-and-ontologies>

This article explains the meanings of folksonomy, taxonomy, and ontology, how they differ, and when they became popular.

Stelter, B. (2008, August 15). *Some Media Companies Choose to Profit From Pirated YouTube Clips*. Retrieved December 9, 2008, from The New York Times:  
<http://www.nytimes.com/2008/08/16/technology/16tube.html>

This article explains the shift of major media companies from demanding their intellectual property be taken down, to embracing the content. With the introduction of VideoID, media companies can automatically search for their own content, claim it, and then offer targeted advertisements.

### 8.3. E-Tourism

Carton, *E-travel and E-tourism Figures and Trends*. E-Tourism Newsletter, 2008.  
Retrieved 9/28, 2008, from <http://www.tripadvisor.com/>

This online article provides various facts and figures about the number of tourists using e-tourism resources to plan travel. This article discusses the growing trend of e-tourism and how it is replacing the need for travel agents.

*E-Travel, E-Tourism, E-Journey and More* (2008). Retrieved 11/15, 2008, from  
<http://www.linkeypt.com/blogs/b/eTravel-eTourism-eJourney-and-more-/56/eTravel-eTourism-eJourney-and-more-.html>

This article explains the definition of e-tourism and its impact on the tourist economy. It describes the recent rise in web users and its correlation with this rise in the use of travel websites. The article also explains how sites have been adapted to the dynamic and multi-faceted tourism industry.

*Real travel. real people. read advice. real experiences.* (2008). Retrieved 10/16, 2008, from  
<http://realtravel.com/venice-italy-travel-blogs-d20737-3.html>

*Real Travel* is a Web 2.0 site, which displays the desire for tourists to customize their trips. This site provides numerous blog entries and reviews generated by users about specific locations in Venice. Other users then rate these blogs and those with the highest ratings are filtered to the top of the page. Through this site, users can view blog entries and plan customized trips based on information provided by other users. The components of this site were useful in providing ideas for our own website design.

Riganti, Patrizia and Strielkowski, Wadim, Jing Wang, "Cultural Tourism and E-services; using in depth interviews to assess potential consumers' preferences", 47<sup>th</sup> Congress of the European Regional Science Association, 2007

This article describes the use of in-depth interviews to analyze tourists for e-services to improve access to cultural heritage in Amsterdam, Leipzig, and Genoa.

Sigala, M., "Reviewing the Profile and Behavior of Internet Users Research Directions and Opportunities in Tourism and Hospitality", *Journal of Travel & Tourism Marketing*, 2/15/2005

This article creates a perspective for analyzing online tourists by integrating several aspects of e-business such as the individual and the societal. The article also aims to discuss future research opportunities in the behavior of online tourists.

Steinbauer, Annette and Werthner, Hannes "Consumer Behaviour in E-Tourism" *Science Direct*, 2007

This journal discusses many tested studies that focus on the use of the internet by tourists for travel. Since we designed a profiling website that focused on the main needs of the tourist, this website helped determine the factors tourists use to influence their travel decisions.

*Tripadvisor*. (2008). Retrieved 10/15, 2008, from [www.tripadvisor.com](http://www.tripadvisor.com)

This website aids in the travel planning process. Users can search for and book, flights and accommodations. They can also view reviews and ratings for accommodations and attractions at any city of interest.

## **8.4. Profiling**

Adomavicius, G., & Tuzhilin, A. (2005). *Toward the next generation of recommender systems: A survey of the state-of-the-art and possible extensions*

This site gives an introduction to recommender systems. It provides a good explanation of each type of system and introduces the algorithms that they utilize. It also explains the pros and cons of each system and gives some examples of current sites that use these methods.

*Amazon*. (2008). Retrieved 9/30, 2008, from [www.amazon.com](http://www.amazon.com)

This website uses the collaborative filtering method of recommender systems. It is a practical example of this method.

Berger, Helmut, Denk, Michaela, Dittenbach, Michael, Pesenhofer, Andreas, and Merkl, Dieter. (2007). "Photo-Based User Profiling for Tourist Recommender Systems". EC-Web 2007. Pp. 46-55.

This article explains an online survey, which revealed the dependencies between tourist pictures and tourist types. The results from this survey aided the authors in creating a web-based tourist-profiling tool based on photo selection.

Gretzel, Ulrike, Hyan, Kyung Yoo, & Purifoy Melanie. (2007). Online Travel Review Study: Role & Impact of Online Travel Reviews

This article was a study done in collaboration with the leading example of tourist profiling online, *Tripadvisor.com*. The study was performed to examine the role and impact of travel reviews, to identify factors that influence perceived credibility, identify motivations for posting online, and study the demographics of frequent online travel reviewers.

Hughes, J. and Hanek, H., "System and Method for Intelligently Determining User Preferences and Responding Thereto", US Patent App. 10/444719, 2003

This article is a description of claims for an invention that provides the tool by which a thought can be entered, interpreted, processed, presented back to the user, stored, and updated. This article discusses a multitude of claims and diagrams that explain what the invention is capable of and how it works in terms of flow charts.

Pandora: Radio from the Music Genome Project. (2008). Retrieved 9/30, 2008, from [www.pandora.com](http://www.pandora.com)

Pandora utilizes the content-based filtering method. It is a practical application of this method. Also, there is a short “About Pandora” section on the site that describes some of the methods behind the site.

Rashid, A. M., Albert, I., Cosley, D., Lam, S. K., Mcnee, S. M., Konstan, J. A., et al. (2002). Getting to Know you: Learning New User Preferences in Recommender Systems.

This is a comprehensive paper explaining many different methodologies of profiling new users. It explores the most effective methods for profiling including how to tailor the questions so that redundancies are minimized. It also includes the results when the research was applied to a “live” study of over 300 participants.

Sarwar, Badrul, George Karypis, Joseph Konstan, and John Riedl. (2001). *Item-based collaborative filtering recommendation algorithms*

This article focuses on the “collaborative filtering” method of recommender systems. It provides a more in depth explanation of this method and its application.

## **8.5. Psychology and Behaviors of Tourists**

Banasree, Dey and Sarma, M.K. (2006). Tourist Typologies and Segmentation Variables with Regard to Ecotourists. *VII*, 9/27/08

This website is useful because it discusses and analyzes different tourist types. Understanding tourists is necessary to create an effective profiling system, so therefore this article was a useful resource.

*Cornell university school of hotel administration: The center for hospitality research: Faculty and research.* (2007). Retrieved 10/1, 2008, from <http://www.hotelschool.cornell.edu/research/chr/pubs/quarterly/board/plog.html>

The purpose of this source was to determine the title of Stanley Plog, a main contributor to our research on how to categorize tourists.

*Demographics and psychographics.* (2008). Retrieved 10/1, 2008, from <http://www.allbusiness.com/marketing/market-research/426-1.html>

The purpose of this site was to determine the definition of psychographics in order to better understand how the idea can be related to tourism.

Gibson, Heather, and Yiannakis, Andrew. (1992). “Roles Tourists Play”. *Annals of Tourism Research*. Vol. 19. Pp. 287-303.

This article explains the process of conceptualization and measure of tourist roles on a three dimensional scale. These three dimensions are familiarity-strangeness, stimulation-tranquility, and structure-independence. This process attempts to address the relationship between the tourist roles, psychological needs, and tourist destinations.

Gibson, Heather, and Yiannakis, Andrew. (2002). “Tourist Roles and the Lifecourse”. *Annals of Tourism Research*. Vol. 29. Pp. 358-383.

This article explains a study conducted to understand the tourist role preference and psychological needs of tourists throughout the lifecourse. The study was conducted on males and females from ages 17-90.



Results concluded that tourist roles correlate with satisfying psychological needs at different stages in their lifecourse.

Hsu, Cathy H. C., Soo K. Kang and Kara Wolfe. (2002). Psychographic and demographic profiles of niche market leisure travelers. *Journal of Hospitality and Tourism Research*, 26

This article assesses the use of psychographics in profiling tourists. It explains the psychographic method and how it was used to profile the tourists traveling to different “niche” destinations.

Mehmetoglu, Mehmet. (2004). “A Typology of Tourists from a Different Angle”. *International Journal of Hospitality and Tourism Administration*. Vol. 5(3). 69-90.

This article explain how tourists’ experiences vary based on psychographic variables as well as their collectivistic/indeividualisic orientation. An attempt has been made to apply these experiences and orientations in categorizing tourist types.

Ross, G. F. (1998). *The psychology of tourism*. Melbourne: Hospitality Press.

This book explores the psychology of tourists. It looks into the attitudes and behaviors of tourists to discover their motivations for travel, and desires to participate in certain tourist activities. It draws from several different tourist studies to explore the minds of tourists.

*University of Maryland: The department of kinesiology*. (2007). Retrieved 10/3, 2008, from <http://sph.umd.edu/KNES/faculty/sisoahola/index.html>

The purpose of this source was to determine the title of Seppo Iso-Ahola, a main contributor to our research on the motivation of tourists.

*University of Waterloo: Department of recreation and leisure studies*. (2005). Retrieved 10/3, 2008, from <http://www.ahs.uwaterloo.ca/rec/research/mannell.html>

The purpose of this source was to determine the title of Roger C. Mannell, a main contributor to our research on the motivation of tourists.

## 8.6. Recommender Systems

Abbattista, F., Degemmis, M., Liccheli, O., Lops, P., Semeraro, G., & Zambetta, F.. “Improving the usability of an e-commerce web site through personalization”. *Proceedings of the AH’2002 Workshop on Recommendation and Personalization in eCommerce*, 2002.

In this article the solution of maintaining websites that cater to the personal needs of the customer through the COGITO Project. This project aims to solve this issue through creation of a virtual assistant based on “*intelligent personalized agents*” and in collaboration with these agents through chat dialogue.

*About Recommender Systems*. (2008). Retrieved December 9, 2008, from *ACM Recommender Systems 2008*: <http://recsys.acm.org/>

This website is the homepage of the ACM Recommender Systems 2008 conference. It explains the structure of the conference and how to submit papers. Additionally, it describes the concept of recommender systems.

Arslan, Bora and Ricci, Francesco. "Case Based Session Modeling and Personalization in a Travel Advisory System". Proceedings of the AH'2002 Workshop on Recommendation and Personalization in eCommerce, 2002

This article describes the advantages of a Case Based Recommender system that exploits the user's past on-line sessions to build personalized recommendations. It also describes the applications of this CBR in creating a guide that aids European travelers in making travel decisions.

Baure, Mathias and Dengler, Dietmar. "Group Decision Making Through Mediated Discussions", Proceedings of the AH'2002 Workshop on Recommendation and Personalization in eCommerce, 2002

This article presents the idea of accommodating the needs of an entire group, as opposed to just the single user, in making a joint purchase. It presents a system that uses mediation of asynchronous group discussions to arrive at this goal.

Berka, T., & Plöbñig, M. (2004). Designing Recommender Systems for Tourism. Salzburg Research.

This article explains how to design a recommender system for tourists, written for non-technical people. It covers the types of filtering, how to choose one, and how to design system architecture to favor filtering.

Ciaccia, Paolo, and Torlone, Riccardo. "Which Are My Preferred Items?", Proceedings of the AH'2002 Workshop on Recommendation and Personalization in eCommerce, 2002

This article assumes that preferences are calculated *qualitatively*, through collective information on a product, instead of *quantitatively*, defined by means of scoring. It presents a study of the basic principles of this concept and presents a practical algorithm for the *best* operator to decipher these preferences.

Cöster, Rickard, Gustavsson, Andreas, Olsson, Tomas, and Rudström, Åsa. "Enhancing web-based configuration with recommendations and cluster-based help". Proceedings of the AH'2002 Workshop on Recommendation and Personalization in eCommerce, 2002

This article presents a discussion of a web-based prototype, RIND, which aids users by giving recommendations, providing accurate searches, and by providing a help system to support novice users in finding help information. The system is based on collaborative and content-based filtering, and therefore does not require a user profile.

Davidson, Richard, and Delgado, Joaquin. (2002). "Knowledge Bases and User Profiling in Travel and Hospitality Recommender Systems".

This article describes the construction of 1) creating a domain specific dialogue model, 2) building a knowledge base of ratings for items of interest, and 3) generating personalized recommendations based on relevancy. The purpose of this process is to aid a user in the travel planning process by presenting them with understandable options as well as alternatives.

Frankowski, Dan, Lam, Shyong K. (Tony), Sen, Shilad, and Harper, F. Maxwell. (2007). "Recommenders Everywhere: The WikiLens Community-Maintained Recommender System".

This article introduces a software named WikiLens which permits anyone to create a community recommender around any item of interest without the use of complicated algorithms. This system addresses the community contribution of items and associated information as well as finding items of interest. The article describes the features of this website as well as the experience the creators have accumulated from 2 years of running the site.

Ghani, Rayid, and Fano, Andrew. "Building Recommender Systems using a Knowledge Base of Product Semantics". Proceedings of the AH'2002 Workshop on Recommendation and Personalization in eCommerce, 2002

This article discusses that through text analysis of product descriptions, a knowledge base of product semantics is created. From there, the system can offer recommendations based on the inferred preferences of the user. The system is immune to qualitative data issues, and cold start issues. It is also successful in high-turnover systems and can recommend from a very diverse pool of items.

Goren-Bar, Dina and Kuflik, Tsvi. "Can Automatic Personal Categorization deal with User Inconsistency?". Proceedings of the AH'2002 Workshop on Recommendation and Personalization in eCommerce, 2002

This article discusses that Self-Organized Maps and Learning Vector Quantization have been applied in automatic document classification according to a predetermined set of cluster information. They have also been applied to assess the effect of user inconsistency in this process. This paper explains the evaluation and comparison of these two processes and the effectiveness of automatic clustering methods in correlating with personal clustering.

Gretzel, Ulrike, Nicole Mitsche, Yeong-Hyeon Hwang, and Danielle R. Fesenmaier., (2004) "Tell Me Who You Are and I Will Tell You Where to Go: Use of Travel Personalities in Destination Recommendation Systems"

This article explores how to best make travel recommendations in a way that is enjoyable for the reader. It explains the idea of using travel characteristics to categorize users. This article concludes that travel personality types relate to different travel behaviors.

Herlocker, J. L., Konstan, J. A., Terveen, L. G., & Riedl, J. T. (2004). Evaluating Collaborative Filtering Recommender Systems. *ACM Trans.Inf.Syst.*, 22(1), 5-53.

This research was funded by the NSF to quantitatively evaluate the differences between different collaborative filtering methods. It offers a large amount of information regarding recommendation systems, but it also offers a very useful and comprehensive list of bibliography.

McGinty, Lorraine, and Smyth, Barry. "Deep Dialogue vs Casual Conversation in Recommender Systems". Proceedings of the AH'2002 Workshop on Recommendation and Personalization in eCommerce, 2002

This system focuses on the chat dialog between a user and an online sales agent. It stresses the importance and methods of utilizing "low-cost" user interaction instead of "deep dialog". Because the

“low-cost” information is not as valuable as the “deep dialog,” more user interaction is necessary to produce strong recommendations.

Shoval, N. and Raveh, A. , “Categorization of Tourist Attractions and the Modeling of Tourist Cities: Based on the Co-Plot Method of Multivariate Analysis”, *Tourism Management*, 2004

This article approaches the analysis of the relation between the trip characteristics of tourists and the places they go. This is done through the simultaneous breakdown of observations and variables as well as the interrelations between them. The method is known as the “co-plot” method.

Stolze, Markus. “Domain-Oriented Recommender Applications: A Framework for Intimate Recommending”. *Proceedings of the AH’2002 Workshop on Recommendation and Personalization in eCommerce*, 2002.

This article proposes a domain oriented recommender system that accounts for a customer’s previous interests as well as the constant evolution of these interests. This recommender system will help online shops in selling goods to new customers as well as expand the relationship they have with their current customer by providing personalized recommendations.

## **8.7. Socially Driven Websites (Web 2.0)**

Alexander, B. (2006). *Web 2.0: A New Wave of Innovation for Teaching and Learning*. 41(2), 32-44.

This article provides background information on the topic of socially driven websites. It was a helpful resource since we created the design of a web 2.0 site.

Wesch, M. (Director). *Web 2.0...the Machine is Using Us* (2008). [Video/DVD]

This short video describes Web 2.0 through visual representations, the video shows how the socially driven website works and explains the importance of the user.

## **8.8. Tourism**

Bahlatzis, Jonathan, Sophia D'Angelo, Hamlet Nina and Ilan Shomorony. (2007). *Pressing issues: A Venetian socioeconomic overview*. Unpublished manuscript.

This is a proposal written by past IQP students that discusses the current state of tourism in Venice. They focus on the large amounts of tourists traveling to Venice and their effects on the society and economy. The group also highlights the benefits and detriments of the tourist industry in the city.

Bahlatzis, Jonathan, D'Angelo Sophia, Hamlet, Nina and Shomorony, Ilan. (2008). *Venice Wiki Book* Everything you ever Wanted to know about Venice. Retrieved September 17, 2008, from <http://venice1point0.wikidot.com/venice1-0>

This website was created by fellow Venice Project Center students who have compiled all information they have discovered about Venice. This website is very useful for finding information and facts about the city of Venice such as how many tourists visit Venice as well as how many excursionists visit Venice on a yearly basis. It also discusses the affect of large numbers of tourists on Venice.

Caruso, R. W., Cryan, M. P., Holton, A. E., Pancheri, F. Q., & Schady, M. (2000). *An Assessment of the State of Tourism in Venice*. Unpublished manuscript.

This report focuses on tourism in Venice. It counted the number of tourists coming into Venice by visiting the “hot spots” at different times of the day. It also compares two different types of tourists, excursionists and residential.

Cortes-Jimenez, Isabel and Paulina, Manuela. (2006). Tourism and growth: Evidence for Spain and Italy. European Regional Science Association,

This article states the economic situations in both Spain and Italy and how tourism affects them. It gives statistical facts and tables as quantitative evidence. The methodology of this article tests the hypothesis that tourism and exports are benefitting the economy in these two countries.

Venice Italy Guides. It: A Sightseeing Revolution. Retrieved 9/27 [http://www.italyguides.it/us/venice\\_italy/download\\_audio\\_book\\_guides/free\\_ipod\\_mp3/venice\\_ipodguides.htm](http://www.italyguides.it/us/venice_italy/download_audio_book_guides/free_ipod_mp3/venice_ipodguides.htm)

This website is useful because it is a prime example of enriching the experience of the tourists by providing podcasts and virtual tours of specific locations of the city.

The rise of tourism. (2008). Retrieved 10/1, 2008, from [http://portal.unesco.org/en/ev.php-URL\\_ID=29008&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.php-URL_ID=29008&URL_DO=DO_TOPIC&URL_SECTION=201.html)

This article explains some of the statistics relating to tourism and how there has been an influx in the past few years. It then describes the different factors contributing to this rise in tourism.

World Tourism Statistics Exceed Expectations in 2007, [asiatraveltips.com](http://asiatraveltips.com), 2008

This website was useful in gathering information and statistics about the number of tourists traveling worldwide. The facts come directly from the United Nations World Tourism Organization.

## **8.9. Tourists in Venice and their Effects on Cities**

Hummon, David M. "Tourist Worlds: Tourist Advertising, Ritual, and American Culture." The Sociological Quarterly Vol. 29, No. 2 (1988): 179,179-202.

This article studies tourism and how it affects the culture of different cities. It explores tourist advertising, which analyzes the marketing used by different destinations. It addresses “plentitude, nature, leisure, history, and paradise of different popular locations.

*Info Hub Specialty Tourist Guide*. (2008). Retrieved October 4, 2008, from <http://www.infohub.com/Destinations/Europe-&-Russia/Italy/Venice/107459.htm>

This site was useful because it gave details about the peak tourist seasons in Venice from April to October. It also gave details about the busy tourist holiday of Carnevale, which occurs in February before Lent.

Mason, Peter. Tourism Impacts, Planning and Management. Butterworth-Heinemann, 2003.

This book looks into how tourism affects cities and who is involved in the creation of this impact. The book also addresses how to manage tourism in today's world as well as what is happening with the future of tourism.

Pearce, P.L., "8 The relationship between residents and tourists: the research literature and management directions", Global Tourism, 1998

This article focuses on the impact of tourists and their relationship with residents.

Povoledo, Elisabetta. "Death of Venice? Tourists Pour in as Residents Head Out." International Herald Tribune 2006.

This article discusses the current problem in Venice and how tourists are overwhelming the city. The excursionist tourists are outnumbering the residents and tourism is slowly pushing the Venetians out of the city.

Russo, A. P. (2002). The "vicious circle" of tourism development in heritage cities. *Science Direct*, 29(1), 165-165-182.

This article discusses the negative affects tourism can contribute to the city. The article discusses different aspects of tourism and its negative impacts on the environment and local residents. It describes how tourism brings wealth and destruction to a city.

## **8.10. Website Usability**

Krug, S. (2006). In Whitehouse K. (Ed.), *Don't make me think: A Common Sense Approach to Web Usability* (Second ed.). Berkeley, CA: New Riders.

This book is designed to enlighten web developers along with anyone else involved in the creation of a website about the common misconceptions regarding website usability. The book also proposes many methods of improving the usability of a website while providing many examples. Finally, the book stresses the importance of frequent usability testing, and even offers a plan for "usability testing on 10 cents a day".

## **9. APPENDIX B: GIBSON AND YIANNAKIS RESEARCH ARTICLES**

## 9.1. Gibson and Yiannakis, Tourist Roles Needs and the Lifecourse, 2002



www.elsevier.com/locate/tourres

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### TOURIST ROLES Needs and the Lifecourse

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**Abstract:** This study investigated the relationship between psychological needs and tourist role preference patterns for men and women over the adult lifecourse. A purposive sample of New England (USA) residents ranging in age from 17 to 91 years was surveyed. Three trends in tourist role preference over the lifecourse were observed: roles that decrease in preference, roles that increase in preference, and roles that demonstrate variability. Time series analysis revealed that roles engaged in while on vacation are a function of a complex interplay of satisfied and unsatisfied psychological needs which assert themselves at different stages in the adult lifecourse. **Keywords:** tourist roles, lifecourse, psychological needs, time series analysis, gender. © 2002 Elsevier Science Ltd. All rights reserved.

**Résumé:** Rôles touristiques, besoins et parcours de vie. Cette étude a investigué le rapport entre les besoins psychologiques et les préférences de rôle touristique des hommes et des femmes en fonction du parcours de vie. Un échantillonnage empirique de résidents de la Nouvelle Angleterre (USA) âgés de 17 à 91 ans a participé à un sondage. Trois types de préférence de rôle touristique en fonction du parcours de vie ont été repérés: des rôles qui diminuent en préférence, des rôles qui augmentent en préférence et des rôles qui varient. Une analyse de série temporelle a révélé que les rôles adoptés par des touristes pendant leurs vacances sont en fonction d'une interaction complexe des besoins psychologiques satisfaits et non-satisfaits qui se manifestent aux différentes étapes du parcours de vie de personnes adultes. **Mots-clés:** rôles touristiques, parcours de vie, besoins psychologique, analyse de série temporelle, sexe. © 2002 Elsevier Science Ltd. All rights reserved.

#### INTRODUCTION

The second half of the 20th century witnessed a substantial growth in the tourism industry. With technological advances in transportation and increased standards of living in the developed world, traveling for pleasure has become an accepted and even necessary part of life. Initially, beach tourism, or tours of well-known sights were the most common ways to spend a vacation. However, as tourists became more sophisticated, the industry responded by diversifying its product and,

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## 9.2. Gibson and Yiannakis, Roles Tourists Play, 1992