The Open Tourism Consortium: Laying the foundations for the future of tourism

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Abstract

The current highly fragmented and multitude of information systems supporting tourism greatly increases the tourist’s search costs, and while touring there is almost no information systems support. A more cohesive and integrated approach should enhance the tourist’s experience in the three phases of tourism: planning, touring, and reminiscing. The emergence of u-commerce, the ultimate form of commerce, is the backdrop to identifying a series of information products that will improve the searching, management, delivery, and sharing of tourism data. It is proposed that the six products identified (TourDM, TourML, TourStyle, TourCMS, TourImplement, and TourCommunity) be developed using the open source model and the cooperative efforts of a large number of geographically dispersed students. The Open Tourism Consortium has been created to support this collaborative endeavor.
**Introduction**

Tourism is an important global industry with international tourism receipts reaching $462 billion in 2001 and accounting for about eight percent of total global exports for goods and services, making it the largest export category.¹ For some countries (see Table 1), tourism is an important employer and major source of foreign currency. In 2003, the U.S. tourism and travel economy is expected to represent nearly 11 percent of GDP and over 16 million jobs. For France, the world’s major tourist destination, the corresponding figures are 12.3 percent of GDP and 3.4 millions jobs.² Sustainable tourism is the hope of many developing countries as they attempt to deal with the simultaneous problems and opportunities of economic growth, high unemployment, and environmental protection. For the European Union, the objectives of social cohesion and sustainable growth (6) are partially achievable by increased tourism, which as well as increasing growth, typically boosts tolerance of other customs and cultures.

Because tourism is an information intensive business, there are opportunities to apply information technology to support tourism and tourists. Traditionally, the industry has focused on applying technology to support the suppliers of services to tourists (e.g., reservation systems, hotel management systems). With the advent of the Internet, some of these systems were extended to customers. Thus, many tourists now book their own travel and accommodation.

¹ [www.world-tourism.org/market_research/facts&figures/menu.htm](http://www.world-tourism.org/market_research/facts&figures/menu.htm)
² [www.wttc.org/measure/TSACountryRptCZLA.htm](http://www.wttc.org/measure/TSACountryRptCZLA.htm)
Table 1: The top five tourism destinations (January, 2003)

<table>
<thead>
<tr>
<th>Nation</th>
<th>Arrivals 2002 (millions)</th>
<th>Market share 2002 (%)</th>
<th>Receipts 2001 (€ billions)</th>
<th>Market share 2001 (%)</th>
<th>Receipts per arrival €</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>75.2</td>
<td>10.7</td>
<td>33.5</td>
<td>4.7</td>
<td>445</td>
</tr>
<tr>
<td>Spain</td>
<td>50.1</td>
<td>7.2</td>
<td>36.7</td>
<td>5.1</td>
<td>733</td>
</tr>
<tr>
<td>United States</td>
<td>45.5</td>
<td>6.4</td>
<td>80.7</td>
<td>11.3</td>
<td>1,774</td>
</tr>
<tr>
<td>Italy</td>
<td>39.1</td>
<td>5.6</td>
<td>29</td>
<td>4.1</td>
<td>742</td>
</tr>
<tr>
<td>China</td>
<td>33.2</td>
<td>5.1</td>
<td>19.9</td>
<td>2.8</td>
<td>599</td>
</tr>
</tbody>
</table>

Source: World Tourism Organization

Nevertheless, there are three fundamental problems with current tourism information systems. First, there is an overwhelming mélange of tourist information through which tourists have to sift and winnow. They confront too many Web sites and can easily spend too much time searching for useful information. Second, there is little use of information technology to support tourists when they are touring. Third, experiences gained during a trip are not easily shared and reminiscing is rarely supported. In this article, we apply the concepts of open standards (5) and u-commerce (16, 18), the next and ultimate form of commerce, to foretell how, within a few years, information technology can effectively support tourists in all phases of their travel. We outline the architecture of a meta-information system, U-tour, built on data management and network technologies. The name, U-tour, is an amalgam of the ideas of u-commerce (18) and the notion that under the projected system tourists will in many respects be their own travel agents and tour guides.
The phases of tourism

There are three phases in which tourists could benefit from information systems: planning, touring, and reminiscing. The information systems opportunity differs by phase (see Table 2), as we explain in the following discussion.

Table 2: Tourism phases and information systems opportunities

<table>
<thead>
<tr>
<th>Phase</th>
<th>Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Data management</td>
</tr>
<tr>
<td>Touring</td>
<td>Data delivery</td>
</tr>
<tr>
<td>Reminiscing</td>
<td>Data sharing</td>
</tr>
</tbody>
</table>

In the **planning** phase, prior to the trip, the tourist collects information about destinations. In recent years, the Web has significantly augmented the traditional sources of tourist guides and travel services. Now, tourists suffer from a surfeit of planning information. For instance, a Google search on the keywords ‘Rome tourism’ gives nearly 600,000 hits. The glut of information is overwhelming and trying to find relevant information is time-consuming and frustrating. There is a major opportunity to improve data search and integration to facilitate faster access to useful information.

Tourists require an overarching meta-organizing information system that provides them with a well-organized starting point for their search. A data warehouse (8) is a corporate solution for information disorganization. A standard data model could have a similar effect for the tourism industry. TourDM is a conceptual model for a database to support a tourist’s information search. This entry point for a tourist’s information search will need a distinguishing global
service mark and supporting publicity campaign to make tourists aware of its presence. As nearly all states, provinces, and governments operate tourism agencies of some form, these institutions are probably the potential hosts of a standard data model. However, tour operators and travel firms are not ruled out as hosts, because the open nature of TourDM means that adoption is in no way restricted.

The emergence of the Web browser as a global information systems interface clearly illustrates the value of standards. In the case of tourism, a standard data model and supporting queries will significantly reduce the learning time and dissatisfaction of tourists during trip planning. They will know what information they can expect to find and how to go about finding it irrespective of whether they are planning a visit to Rome or Casablanca. They will learn, for example, that they can find out when museums are open and how much they charge and what vegetarian restaurants are within walking distance of a specific hotel.

**Touring**, the second phase of tourism, defines the period when a person is visiting sites, wandering around museums, attending a festival, and so forth. During this phase, the tourist needs location-based information services to inform them about the tourist attractions within their environs. They might, for example, seek information about objects within their immediate vicinity (e.g., What is the history of the memorial on the corner?) or find out what is available (e.g., What is the nearest open museum?). Tourists might also seek information about services in areas they are approaching (e.g., What hotels in the next town have vacancies, what their relative locations are, and what their rates are?). These
are not new information needs, but typical of the queries for which tourists have sought answers for many years. What is new is the capacity to deliver answers to such questions, and many more, to tourists as they tour. Thus, the central information systems concern is the delivery of relevant, context-sensitive, tailored information to tourists wherever they are, or perhaps more specifically, exactly where they are and exactly what they are doing.

Mobile phones are increasingly gaining features that make them portable information appliances. Recent mobile phones, such as the Sony Ericsson P800, are far more than mere communication devices. They include features such as a camera with picture editing capabilities, personal information manager (calendar, contacts, tasks, notepad, and voice memo), Internet access, Bluetooth connectivity, music player, and game machine. Because they come with an operating system, these phones have all the power of a computer. Furthermore, these information appliances have the capability to determine their location using techniques such as uplink time difference of arrival (U-TDOA) (19), which has an accuracy of somewhere between 20 and 50 meters. Location-based services have been operational for some time (e.g., the Austrian mobile network operator’s ONE service called ONE COMPASS).

The technology is in place to deliver information to the mobile tourist, and now we need the imagination and market research to determine profitable services. Importantly, we believe that the current mobile phone models should not be perceived as a micro, mobile Internet browser, even those with larger displays. The power of the mobile phone is to deliver voice, which may be particularly
important for tourists who are unlikely to patronize a service that requires them to wander around peering at a small screen when their goal is to capture the ethos of a new environment. Obviously, the screen mechanism of the device and its ability to capture and store text is still important—the device can remember telephone numbers, names and street addresses, and of course “non-map” directions (“take the rear exit of the Colosseum station, turn right into Via dei Fori Imperiali, and proceed to Trajan’s column”). Some mobile phones are already sold with GPS capability and have the potential of becoming personalized tour guides, responding to a request for information about a particular object in the language and level of detail the tourist wants.

At various stages after a trip, reminiscing ensues. On returning from a trip, travelers recall the highlights and often share these with relatives and friends. Also, they might want to comment on places they have visited. Hence, there is a need to support creation of a personal electronic trip album so that the traveler can relive and share memories, and potentially increase tourism through this electronic variation of word of mouth. Also, by adapting the book review model of Amazon and following feedback sites such as epinions, tourists should have a convenient method of sharing their thoughts with those planning a trip. One of the strengths of both the printed guides and of the Internet version of the Lonely Planet series is that the content is added by ordinary tourists who like to contribute, thus providing credible content that can be used by others. Both

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3 [www.epinions.com](http://www.epinions.com)
4 [www.lonelyplanet.com](http://www.lonelyplanet.com)
reminiscing features and opinions must be an integral element of TourDM to provide ease of use and information value. Information systems can support reminiscing by providing tools for various forms of information sharing.

Current technology and solutions support the three phases previously described, but it is left to the tourist to integrate the many sources of information and available systems. There is a need to take support for tourism beyond the current state where the Web is a daunting mound of information that imposes heavy searching costs (Figure 1). The old model forces tourists to integrate information, when this is a task for which information technology is highly suited.

Figure 1: The old tourism information model

We need a single integrated platform to solve the data management, delivery, and sharing deficiencies of the current hodgepodge of diverse offerings (Figure 2). Information technologies exist to integrate data from a diverse range of sources, to reduce searching costs by providing a single interface, and to support seamlessly all phases of travel. The technology is here, or almost here, and in the remainder of this article we describe a solution for enhancing all phases of the
The tourist’s experience—planning, touring, and reminiscing. We start by describing the emerging electronic environment to help us envision the future.

Figure 2: The new tourism information model

**U-commerce conceptual foundations**

It is conjectured that the near future will see the emergence of a multi-faceted *u-commerce*, where the u stands for ubiquitous, universal, unique, and unison. U-commerce is defined as *the use of ubiquitous networks to support personalized and uninterrupted communications and transactions between an organization and its various stakeholders to provide a level of value over, above, and beyond traditional commerce* (18). Building on this foundational work, we describe each of the key concepts and illustrate its relevance to tourism.
Ubiquitous
Networks will soon be everywhere—from the global GPS network, to national GSM\(^5\) mobile phone systems, local area WiFi, and short-range Bluetooth. Low cost microprocessors and network connections will be embedded in most consumer durable devices. Intelligence will be added to everyday entities to improve their usefulness and information providing capacity. For example, Sailing Software\(^6\) markets a Bluetooth\(^7\) application that enables Sony Ericsson phone owners to control remotely applications (e.g., a slide presentation) running on a Macintosh computer.

The mobile phone is an early example of ubiquity. Already mobile phones are accessible to people beyond the reach of today’s Internet, notably those in the developing world, because they do not require complex and costly personal computers. Mobile phones bring many of the benefits of electronic information access to a far wider population than is able currently to enjoy the Internet.

Universal
Many information appliances (e.g., desktop, laptop, cell phone, or PDA) are limited in their usefulness because they are not universally functional. They do not work on all networks. For example, a U.S. cell phone is unlikely to work in Europe because of different standards and network frequencies. In the future, consumers will have a universal phone that will enable them to stay connected wherever they are. The laptop and PDA, or some convergence of the two devices,

\(^5\) Global System for Mobile communications, see [http://www.gsmworld.com/technology/glossary.shtml#g](http://www.gsmworld.com/technology/glossary.shtml#g)

\(^6\) [homepage.mac.com/jonassalling/Shareware/Clicker/](http://homepage.mac.com/jonassalling/Shareware/Clicker/)

\(^7\) Bluetooth is a short-range wireless technology for connecting electronic devices.
will also gain universality and always be connected to the Internet via a wireless network or satellite, wherever the owner is.

The Internet has also become universal in another way because information is more portable than a physical device. One can travel to many places that nowadays have Internet access and still access one’s “own” Internet. Airline lounges and high-end hotels are installing WiFi access, and many firms and institutions have facilities for visitors. The need to carry a laptop for Internet access is decreasing rapidly.

*Unique*
Information can easily be customized to the current context and particular needs of each person. For example, electronic tourist guides could be tailored to the personal preferences and current location of a tourist. Tourists should be able to opt to hear descriptions of items of interest at the preferred level of detail in their language.

JNavi is a service in Japan that lets travelers enter a phone number, address, or landmark and then searches the area within a 500-meter radius. This makes it possible to find the subway station nearest to a given shop, or a particular restaurant within walking distance of a specific office building. Users of the service can download a full color map. At launch in May 2000, JNavi was expected to handle 100,000 hits per day. By day 3, it already had 1.6 million hits. Now, it has 2 million hits a day, and 50,000 users a day request a map.
Uniqueness in its full bloom means that consumers will receive information that is dependent based on the person’s location, time of day, current role or multiplicity of roles (e.g., tourist, parent, commuter, manager), and that person’s expressed or learned preferences (i.e., learned by the systems providing the service). When visitors to Singapore land at Changi Airport and turn on their mobile phone, they immediately receive a few SMS messages. One is from the Singapore Tourist Authority, providing contact numbers for cab companies and hotels.

*Unison*

When consumers have complete synchronicity between their phonebook, calendar, “to do” list, and other such files across a range of electronic tools (i.e., cell phone, computer, and PDA), they have unison. Thus, a change in one electronic phonebook is transmitted to all others with complete transparency to the owner. With unison, operational, specified files are kept synchronized and the required information is always available irrespective of the device and location. Unison means the integration of various communication systems so there is a single interface or connection point. Apple’s iSync synchronizes files between a person’s personal computers (e.g., work, home, and laptop) and digital devices, including music player, mobile phone, and PDA.

For the tourist, it could mean adding reservation details, hotel addresses, and event times to a desktop system when planning a trip. Before leaving home, the

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tourist would synchronize this information with the information appliance she will take on the trip. Alitalia supports unison by providing details of a travel reservation in vCalendar format for easy loading to most electronic calendars.

**U-space**

U-space, the new arena of marketing and tourism, has two dimensions (18). Time-space specificity ranges from the unique (time-space specific or localized) to ubiquitous (time-space unspecific or everywhere). Awareness varies from the unconscious to ultra-conscious. Technology can amplify or attenuate consciousness as directed by the consumer. First, it can extend or enhance a consumer’s ordinary awareness (i.e., make it ultra-conscious). Second, it can take something that once occupied a consumer’s conscious awareness and perform it automatically (i.e., render it an unconscious process for the consumer). U-space delineates four types of commerce: the hyper-real, the post-human, the matrix, and the node (Figure 3) and the four forms of marketing described in Table 3.

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9 [www.alitaliausa.com](http://www.alitaliausa.com)
10 [www.imc.org/pdi/](http://www.imc.org/pdi/)
Table 3: Types of marketing

<table>
<thead>
<tr>
<th>Type of marketing</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amplification</td>
<td>Creating value by extending or enhancing conscious interaction with phenomena</td>
<td>Augmenting a tour of the Parthenon with virtual reality</td>
</tr>
<tr>
<td>Attenuation</td>
<td>Creating value by reducing the necessity of consciously interacting with phenomena</td>
<td>Using a mobile phone as an electronic wallet that automatically does currency conversion and transfer</td>
</tr>
<tr>
<td>Contextual</td>
<td>Processes that are time-space specific, and add value through their specificity</td>
<td>Providing information on the nearest seafood restaurant, menu pricing, and table availability</td>
</tr>
<tr>
<td>Transcension</td>
<td>Processes that create value by transcending, or enabling transcension, of the traditional constraints of time-space</td>
<td>Enabling the tourist to take a photo, add a voice message, and send it to his daughter a continent away</td>
</tr>
</tbody>
</table>
The Hyper-Real (Ultra-conscious, Unique)

When technology delivers value by extending normal conscious experience to unique contexts, we enter the realm of the ‘hyper-real.’ This is the domain of the immersion marketing, the extension of the experience economy (13) to the network age. A tourist can travel to a cultural heritage site to gain the perspective and ethos that only physical presence can provide and then virtual reality can enhance the visit. In the foreseeable future, say by 2010, mobile information appliances should have sufficient processing and memory to provide an immersive experience within the domain of the real setting. This will probably
require the tourist to don some form of headgear or spectacles to provide the visualization. The Cultural VR Lab\textsuperscript{11} at the University of California Los Angeles has many examples illustrating the engaging richness of virtual reality.

\textbf{The Post-human (Ultra-conscious, Ubiquitous)}

In the post-human quadrant, technology extends the tourist’s normal conscious experience ubiquitously (i.e., across time and space). There is an enduring enhancement of the touring experience. Travelers are more aware of their environment. They learn more about the things of personal interest, they ‘see’ more of their surroundings because, like an expert guide, technology alerts them to salient features of the locality. This information service is always ‘on,’ independent of a tourist’s location.

This quadrant is the sphere of transformation marketing. It enriches a tourist’s conscious interaction by transcending specific time-space. An omnipresent, omniscient tourist guide is always at one’s side. Touring is transformed because information paints the full color of any setting in the tourist’s favorite shades and hues. The history enthusiast, for instance, is informed of all the major events and characters of the current site. Whereas, the architecture fan learns about the buildings in the immediate vicinity.

\textbf{The Matrix (Unconscious, Ubiquitous)}

In the matrix quadrant, technology delivers value by ubiquitously removing and performing tasks outside or behind awareness (i.e., across time and space).

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\textsuperscript{11} \url{www.cvrlab.org}
Network technologies (e.g., Internet, mobile phone, GPS, Wi-Fi, Iridium, Bluetooth, sensornets) mediate interaction between the tourist and the environment. As an example, the tourist might define a daily news report to be delivered to all her information devices. The characteristics of the news report are selected in advance (e.g., top two international stories and news about her favorite football team) and delivered in an appropriate format to each active information appliance.

*Synchronous marketing* is the replication, updating, and integration of processes across time and space. Changes or additions added to any one of the tourist’s collection of electronic devices automatically propagate to all other devices. When planning, for instance, reservations sent in electronic form to the tourist’s desktop computer are also transparently replicated to her laptop and mobile phone.

**The Node (Unconscious, Unique)**

In node mode, technology performs tasks outside or behind awareness in specific time-space locations. The node takes over many transactions that are often time-consuming and challenging for the tourist. For example, tourists visiting a museum will not queue to buy tickets, rather they will walk into the ticket purchasing area, get the price displayed in the currencies of their choice on their information appliance, approve the purchase with a single click, and enter the building. In some cases, such as using a city transport system, the cost of travel between two points will be automatically determined and deducted from a designated account. The node focuses on the creation and supply of services
designed to perform automatically processes on behalf of tourists. Such services might include an electronic wallet that handles the purchase of low-cost items, thus freeing the tourist from having to handle an unfamiliar currency. One of the great recent successes of the Dutch banking system has been the “Chip-Knip” cash card. This is a simple smart card that can be loaded with cash at an ATM, and then used to pay for just about anything that requires a relatively small cash payment (all McDonalds’ restaurants in the Netherlands accept the card). Originally the Dutch banks had attempted to push adoption of the card in order to reduce the costs of handling small amounts of cash and change. The uptake of the card was accelerated significantly when local authorities permitted its use in paying for parking. Now the card can be used for a host of small payments such as tram and train tickets. It will shortly be made available on a “pay-as-you-go” basis for tourists without Dutch bank accounts.

Nexus marketing describes features that reduce the necessity to interact consciously in specific contexts (e.g., electronic entry fee collection). It centers on the utilization of time-space specific connections (nexuses or nodes) to perform processes on behalf of the tourist. Another good recent example from the Netherlands is the Premier Iris Scan service at Schipol airport. Frequent travelers to and from the Netherlands can avoid standing in lengthy passport control queues by having their iris scanned (the human iris is as distinct as a finger print) and recorded. They then simply stand in front of an iris scanner that verifies their identity and permits them to pass through.
Now that we understand the four quadrants of the emerging environment of u-commerce, it is pertinent to consider the key features of an information architecture that can enhance the tourist’s experience in each of tourism’s phases and for each quadrant of u-space.

**The information architecture**

The foundations of U-tour’s architecture are a blend of the old (relational technology) and the new (XML). Relational technology (3), conceived more than thirty years ago, is the dominant method for managing large collections of data and there are well-established techniques for relational database design. XML, a data exchange technology, is a project of the World Wide Web Consortium (W3C) (14) released in 1998. Because it is an extensible markup language, XML supports development of industry standards for data exchange.

**TourDM—** _standard for data management_

Creating a data model is the first step of solving any data management problem. A data model visually identifies the entities, attributes, and relationships that a database should store and manage (15). In the case of tourism, the data model needs to define tourism objects such as locations and events, the facts that must be remembered about them (e.g., the latitude and longitude of all locations), and the relationships (a city can have many hotels).

TourDM serves several purposes. _First_, a single, widely implemented entry point for learning about tourist objects in a city, region, or country will be a major convenience for tourists. They will learn what they can expect to find and gain
proficiency in searching. This does not mean a single interface, because clearly various tourist bureaus will want to create a look and feel that resonates with the local scene.

Second, TourDM means that different databases can be merged virtually to broaden search capabilities. For example, if each of the major cities in France uses TourDM, then a tourist could pose a single query (e.g., find jazz concerts in July in France) that could be run against each city’s database rather than the jazz fan having to run the same query multiple times. Widespread adoption of TourDM would create a global distributed tourist database, but at the same time support local independence for data management.

Third, standardization reduces duplication of database design effort and will also support some other economies of data management. For example, there may be some standard reporting routines for comparison of usage across systems.

**TourML—a standard for data exchange**

A great deal of the data required to populate and maintain a tourism database is already in electronic format. What is missing is a language for describing how to exchange data between these databases and a TourDM database. Several industries have used XML as the foundation for data interchange. Geography markup language (GML) (4) is a potential starting point for developing a tourism markup language. Borrowing from the description of GML, we arrive at the following high-level specification.

Tourism markup language (TourML) is an XML encoding for the transport and
storage of tourism information, including both the spatial and non-spatial properties of tourist objects. TourML defines the XML Schema syntax, mechanisms, and conventions that

- Provide an open, vendor-neutral framework for the definition of tourism application schemas and objects;
- Allow profiles that support proper subsets of TourML;
- Support the description of tourism application schemas for the full range of tourism objects and activities;
- Enable the creation and maintenance of distributed tourism application schemas and datasets;
- Support the storage and transport of application schemas and data sets;
- Increase the ability of tourism supporting organizations to share tourism application schemas and the information they describe;
- Enhance the tourist’s experience by providing relevant location-based information in an appropriate format.

TourML will support a variety of data exchanges, as the following examples illustrate.

- A hotel chain generates a TourML description of all its hotel properties for electronic delivery and uploading to TourDM compliant databases;
- A symphony orchestra creates a TourML file describing its forthcoming tour with details of cities visited and local contact information and supplies it to the tourist bureaus in each city it will visit;
- A car rental firm produces a TourML file detailing the location of its rental agencies;
- A local history group prepares for its state tourism agency a TourML file describing the historical features of its area and their location.

For those readers unfamiliar with XML, Figure 4 contains a short example of TourML code for describing a restaurant.
Figure 4: A TourML example

Any implementation of TourDM should also support form-based input for those circumstances where data exchanged via TourML is not efficient. Thus, a local restaurant should be able to login and update its database details.
TourStyle—managing information delivery
Rapid change in technology, particularly in the area of information appliances
where there is a convergence of previously discrete functionalities, means that it
is prudent to design an information architecture that is device independent.
Furthermore, the system should be adaptable to take advantage of output
characteristics of new devices.

Extensible Stylesheet Language (XSL) (7) is a language for specifying the
transformation and presentation of an XML file. By applying different
stylesheets, a single XML file can be transformed in a variety of ways. The format
and content of output can be altered to match a device’s characteristics. Thus, a
tourist executing a query from a desktop might view a combined text, graphics,
and video response. A traveler initiating the same query from a mobile phone
might hear a synthesized text answer.

TourCMS—site management
Every tourism bureau has a Web site, or tourism portal, so there is also an
opportunity to gain some economies by developing a content management
system (CMS) for tourism bureau Web sites. Open source products such as
Plone\textsuperscript{12} and PHP-Nuke\textsuperscript{13} are potential foundations for a specialist CMS that is
integrated with TourDM, TourML, and TourStyle. CMSs have considerable
opportunity for customization so there should not be a concern that all tourist
bureaus’ Web sites are cookie-cutter replicas. All such sites should provide

\textsuperscript{12} plone.org
\textsuperscript{13} www.phpnuke.org
similar functionality, but be customized to fit with local culture and tourism specialties.

**TourImplement—exploiting social capital**

Once the previously described elements are available, a tourism or travel organization could implement a tourism information system to support the three phases previously defined. To accelerate and reduce the risk of implementation, the accumulated knowledge of prior implementations should be harvested and readily accessible. TourImplement, a knowledge portal containing information to guide implementation, will include a project plan template, guidelines, checklists, tools for estimating required resources, frequently asked questions, and a newsletter.

Knowledge cannot always be made explicit because there is the tacit element of a “knowing in action in a community of practice” (10) or, to be more accurate, a social capital (1). A normalized project plan template, guidelines, and checklist will never cover the particular situation in each location. Nothing replaces “contact persons” who are ready to respond to specific questions. Therefore, TourImplement must support collaborative tools such as an on-line forum and a regular conference, where developers and implementers can share knowledge and plan future development. Building this social capital is a necessary component of both software construction and system implementation.

**TourCommunity—engaging and extending**

In many communities there are citizens with specialized local knowledge of appeal to tourists but of limited commercial value. For example, the local bird...
watcher’s club will have members who know the best places to watch circling hawks or migrating geese. History buffs, for instance, might have developed a record of all burials in the local cemetery. These data are of interest to some, though not many, and a goal of OTC is to engage communities so that specialized interests can be served. By engaging local citizens in the production of useful information for tourists with similar pasttimes, the value of a tourist information system is extended. Indeed, communities who excel at extending the information available might attract more tourists because they create awareness of opportunities (e.g., finding great-grandfather’s headstone) that were previously elusive.

TourCommunity will need software and procedures to ensure data quality. One approach might be to appoint local editors who will vet database entries before they are posted. Alternatively, local community organizations might accept responsibility for managing a portion of the database related to their interests.

TourCommunity creates a third form of openness. Open standards (TourML) and open source code (TourCMS) are joined by open participation. Provided certain quality safeguards are maintained, the database is open to all to add content. This does not mean a free-for-all, but similar to open source software, community members can propose content that is reviewed and verified before insertion.

**The tourist experience model**

The customer service life cycle model (9), which has been adapted to the hospitality sector (11, 12), is a foundation for considering the tourist’s electronic
experience. The model (Figure 5) breaks each of the phases into the same set of subphases: attraction, navigation, requirements, and acquisition.

Figure 5: Tourist experience model

**Attraction**
Information services, just like any business, must attract visitors (17) and convert a reasonable percentage of these surfers to customers in order to be successful (2). Different attraction strategies are appropriate for each phase. For example, the goal of the planning stage is to attract tourists to the Web site, and tourist bureaus, as they already do, would advertise the URL in their promotional material. For the touring phase, tourists must be attracted to the mobile service. Their awareness should be created in the planning stage and reinforced as they make the transition to touring (e.g., airline magazine adverts). Similarly, when
the trip is completed, they should be reminded of the services that support reminiscing (e.g., a follow up message from the airline because it has details of when the traveler returned).

**Navigation**
Tourists must be able to navigate quickly and accurately the information they require or they might discontinue the service. Navigation is likely to be a particular challenge for information appliances that have a limited screen size. In which case, it might make sense for interface designers to make appropriate use of voice recognition to maximize ease-of-use.

**Requirements**
The requirements subphases support the tourist’s information needs. In planning, it means providing the information typically found in a tour book with the addition of links to further information (e.g., a link from a hotel’s entry in the database to its Web site). While on tour, the tourist’s needs could include finding the nearest laundry service, Thai restaurant, and the cost of a day pass on the transport system.

**Acquisition**
Once the tourist’s requirements are determined, there should be support for obtaining the product or service. Many acquisition services are likely to lie outside the range of the proposed system since its prime goal is to provide meta-information. Thus, hotel reservations, for example, would be handled by traditional reservation systems.
However, U-tour will deliver a range of information-based services. We envisage that while touring, sightseers will be able to receive customized voice (synthesized or pre-recorded) descriptions of objects within their environment. During an earlier requirements subphase (planning or touring), they would have specified their requirements (e.g., Italian language, female voice, brief description, history emphasis), and during acquisition, this information would be delivered.

**A seamless experience within bounds**

U-tour implicitly supports an integrated approach because it covers the three major phases of tourism. Its success will be determined by ensuring successful encounters in each of the sub-phases of the entire cycle. There is, however, the ever-present problem that, since U-tour is a meta-information system, tourists will attribute shortcomings in connections (e.g., a linked restaurant) to U-tour. These expectations need to be managed by teaching tourists about the limits of U-tour and terminating—or perhaps even highlighting—links that prove to be a source of continuing dissatisfaction.

**The Open Tourism Consortium**

The open source movement has been galvanized by the open standards of the Internet, which is not only an open standard (e.g., HTML and TCP/IP) but also an apparatus for diverse and distributed collaboration to create new open standards. Global communities have created an operating system (Linux), a database management system (MySQL), a Web server (Apache), a statistical analysis package (R), a Web application development language (PHP), and many
products based on these and other open source software. Complex commercial systems can be built entirely with open source software and many governments and organizations are rethinking their reliance on proprietary software.

With the model of the open source movement in mind and a the goal of using open source software, we decided to create an Open Tourism Consortium (OTC)\textsuperscript{14} to support development of U-tour. All specifications (e.g., TourML) and software (e.g., TourCMS) will be created by distributed, collaborative efforts, placed in the public domain, and freely downloadable.

We also plan to use students to bootstrap the development of U-tour. University of Georgia Information Systems students completed prototype versions of TourDM and TourML in spring 2003. For his diploma thesis, Markus Seibold, a University of Regensburg student, will create TourDM 1.0 and TourML 1.0 for release in late 2003. Meanwhile, students in graduate classes at Georgia State University have investigated applications of the U-tour concept and considered some of the design and implementation issues. At this stage, more than 10 universities, in Brazil, China, France, Italy, Germany, Greece, Portugal, the Netherlands, UK, and US, have joined OTC and announced plans to include their students in building and implementing U-tour.

The open source approach to tourism information standards and systems will lower development costs for most tourist bureaus. They will not have to develop a

\textsuperscript{14} \url{www.opentourism.org}
data model and should be able to customize TourCMS more rapidly than building a new information system.

**Revenue opportunities**
Governments have traditionally funded tourist bureaus and information centers, and their Web sites are offered as a free public service. We don’t expect this to change, but we do anticipate that the new information services, particularly those provided during touring, will be a source of revenue. Interviews with representatives of tourism agencies in Rome, Athens, and Nantes indicate that tourist bureaus expect additional revenue from these new services. Present trends suggest that WiFi or mobile phone networks will deliver information in the touring phase. Both of these systems could lend themselves to a revenue collection system similar to that of Minitel, an early information services network that is still operational. Information service fees are collected by France Télécom, which takes its share and then forwards the remainder to the service provider. A centralized billing system simplifies accounting for both tourists and providers, and is one less problem for entrepreneurs to solve when establishing a new information service. If tourist bureaus were to share in this revenue stream, governments might find they have a highly efficient method of funding their tourist information services. For instance, this system is used by AlloVisit® and

\[1\] www.minitel.com
provided in more than 30 cities in France by Voxinzebox\(^{16}\). In each city, AlloVisit offers an audio-guided tour of the main memorials through a low cost phone call.

Managing tour guides is often an important problem for major tourism destinations (e.g., the Roman Imperial Forums). Indeed, the three fundamental problems for tourists considered at the beginning of this article are also important issues for the guides. Mobile digital devices would help them to prepare and conduct a tour. They could also share knowledge with their colleagues to improve the quality of information delivered by guides to tourists. Knowledge sharing would be particularly valuable for novice guides.

**Conclusion**

A quick search of the Web quickly reveals that tourists are inundated with information, but floods are not friendly. They overwhelm and create disorder. We propose the creation of a buffer or dam between the information flood and the tourist. Like a well-regulated irrigation system, U-tour will enable a steady flow of personalized and useful information to the tourist.

Those in the hospitality and travel industry have much to gain when tourists’ experienced are enhanced by high quality information services. The maxim “good service leads to repeat business” can be rephrased in the information age to “good information leads to repeat business.” Increasingly, businesses compete on the basis of the quality of information that they provide to the customer (9).

\(^{16}\) http://www.voxinzebox.com
To ensure high quality information and friendly systems, the hospitality industry needs, we believe, to participate actively in OTC. The industry’s knowledge will accelerate the development and deployment of standards and systems that enliven tourists’ experiences. Thus, we hope that this paper, as well as defining the foundations for the next generation of tourism technology, also encourages the hospitality industry to engage in molding and crafting the vision.

The resources for building and deploying U-tour exist. They are plentiful, talented, and motivated. They are the world’s students, who are studying subjects such as information systems, tourism, marketing, cultural heritage preservation, and computer science. Guided by their professors and industry specialists and building on the work of each other, students can build and maintain the infrastructure of tourism information systems that will benefit many. Today’s students, tomorrow’s leaders, can lead today.

References