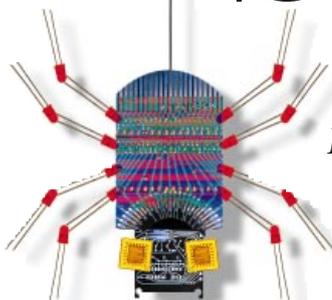


# Electronic Shopping



*Designing online stores with effective customer interfaces has a critical influence on traffic and sales.*

The global electronic market will have a profound impact on commerce in the 21st Century. While current U.S. sales in cyberspace (\$1 billion in 1995) are small in comparison to total U.S. retail sales (\$1.7 trillion in 1995) [3], U.S. cybersales projections for the year 2000 range from \$7 to \$117 billion [9]. More importantly, most experts predict a radical shift in how business will be conducted in the next century. This shift not only has businesses scrambling to meet this new marketing reality, but also raises many important research questions about business strategy, technical infrastructure, government policies, the electronic market demographics as well as how people will use the technology.

Issues of technology usage become critical as businesses and retailers attempt to exploit the boom in electronic marketing. There are large differences between a physical store and its electronic counterpart. A help button on the home page of the Web shopping site replaces the sales clerk's friendly advice and service. The familiar layout of the physical store becomes a maze of pull-down menus, product indices, and search features. Now more than ever, the promise of electronic commerce and online shopping will depend to a great extent upon the interface and how people interact with the computer.

Account managers, production staff, and merchant partners should not assume customers do not

want an item in an online retail store if it is not selling. Nor should they conclude that a poor response to a given store design is due to the merchandising mix. It is important to look at the relationship between sales and user interface design. Limited menus, poorly designed navigation, and the difficulty in comparing multiple products on the same screen all have adverse effects on electronic shopping [2]. Can customers find what they want in the stores? Are customers aware of what products are available? After all, diligence in browsing a store is not a virtue retailers should expect from its online customers.

We review online retail store attributes such as the number of links into the store, image sizes, number of products, and store navigation features. By reviewing the user interface features in the context of electronic shopping, we hope to facilitate the process of designing and evaluating alternative storefronts by identifying key features that impact traffic and sales.

While this article specifically addresses user interface design issues for electronic shopping, user interface design is an important component of all software development [10] with important implications for productivity [5]. Unfortunately, Web information systems (WIS) designers sometimes do not heed the importance of the message advocated by user interface design pundits such as Jakob Nielsen [11] and Vincent Flanders ([www.webpagesthatsuck.com](http://www.webpagesthatsuck.com)). Many of the lessons learned from online stores also apply to WIS applications.

## Online Retail Store Attributes

Electronic shopping incorporates many of the same characteristics as real shopping. The marketing literature identifies attributes that shoppers consider when patronizing a retail store. Based on a compilation from 26 researchers in the field, Lindquist [6] categorized store components into four groups: merchandise, service, promotion, and convenience. Arnold et al. [1] extended the convenience attributes to include a fast checkout and the ease of navigating through the store.

Recent studies also examined electronic shopping. Jarvenpaa and Todd [4] surveyed consumer reactions to Web-based stores using a sample of 220 shoppers. They offer insights about factors

known to affect consumer behavior and suggest ways to improve retail Web sites. Spiller and Lohse surveyed 35 attributes of 137 Internet retail stores to provide a classification of the strategies pursued in Web-based marketing [12]. Many of the descriptive statistics of retail store features in the Spiller and Lohse study resonate with the consumer reactions noted by Jarvenpaa and Todd. Lohse and Spiller [8]

measured 32 interface features for 28 online retail stores in August 1996 and identified store design features that influence online store traffic and sales. Based on these studies, we describe attributes that influence store traffic and sales for the following six categories:

**Merchandise.** Consumers infer information about quantity, quality, and variety of products from the brand names or reputation of the physical store. Unfortunately, not all products available in the merchant's catalog or real store are available online [4]. This leads to disappointment as noted by this customer: "...the last thing I expected to see from LL Bean was to see only one model of Swiss Army knife." Customers prefer a large product selection. However, only 5% of the Internet stores had more than 500 products and 62% had less than 50 products [12]. The number of products in a store explains 17% of all variance in store traffic but had no effect on sales [8]. This implies big stores are less effective than small stores at converting traffic into sales perhaps because consumers are not finding

the products they seek in larger stores.

As with paper catalogs, customers cannot interact with the product (for example, touch the fabric, try on the clothes for size, hear the sound quality of a pair of speakers, among others). Internet catalogs can offer hyperlinks to more extensive product information such as product testimonials (book reviews at [www.amazon.com](http://www.amazon.com)) and product demonstrations (software downloads).

However, most merchants do not even take advantage of adding rich product descriptions. Over 50% of the stores surveyed by Spiller and Lohse had less than three lines of text describing each product [12]. This may reflect a transfer of paper catalogs directly onto the Web without redesigning content

to take advantage of the lower cost of delivering text and images via the Web.

While a picture is worth a thousand words, small pictures are often poor quality and fuzzy. Large pictures take too much time to download. Less than 8% of the total screen area contained images, which is much lower than a typical paper catalog.

**Service.** Staff responsiveness to the customer service link is critical. The customer wants careful, continuous, useful communication, across geographic barriers (worldwide shipping, multilingual sites), 24 hours a day, 365 days per year. Service includes sales clerk service for merchandise selection, answers to frequently asked questions (FAQs) and credit, return, and payment policies. Most retail sites provide a pittance of service information. Almost one-third did not provide any information on the company's history, policies, or background; 80% had less than 10 lines of information [12]. This is a surprising number since customers want to know who they are dealing with and to whom they are sending credit card information. This is especially important for new virtual companies solely operating on the Internet.

Consumers want help with product selection (such as size, color, fabrics), gift services, contact information for sales representatives, a FAQ section for speedy answers, information about the security of their transactions, company return, payment and credit policies, information about shipping and handling costs, guarantees, and statements about product quality. In the survey by Spiller and Lohse, 95% of the stores did not have hyperlinks among related



**Moving text has an overpowering effect on the human peripheral vision making it difficult to process information elsewhere on the page.**

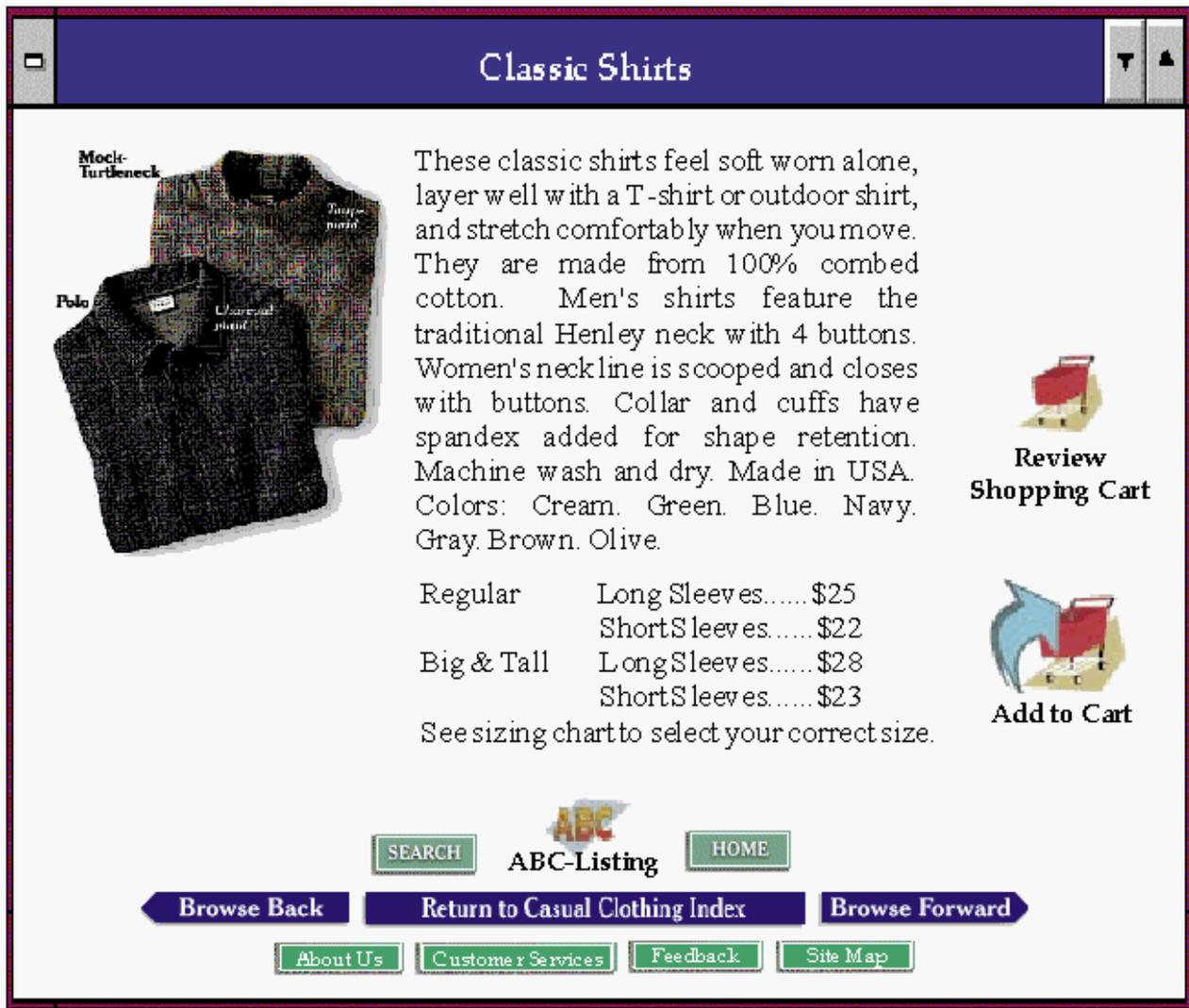


Figure 1. End product page with consistent navigation buttons and icons

products, only 25% had help for product-size selection, less than 9% of the sites had an FAQ section, and 47% did not offer interactive email. Eighty percent of the participants in the Jarvenpaa and Todd study had at least one negative comment about Internet customer service [4]. Stores that offer a FAQ section had more visits than those without such a section [8]. Stores with a feedback section for customers to obtain help had increased sales.

Users are unwilling to tolerate delays associated with delivering audio, animation, graphics, and video. Some browsers do not handle Java, sound, animations, and the like. The flood of consumer email can create a customer relations disaster when companies do not respond quickly. To reduce the barrage of email, many companies use a FAQ section. One company burdened consumers with separate forms for each question posed to the service department.

**Promotion.** Additional store visits and sales are generated by promotion. Each hour of promotion on the electronic shopping mall entrance screen explained 4% of the variance in sales and 1.4% of the variance in store traffic [8]. Promotions involve sales, advertising, and appetizer features that attract customers. While it is easy to spot the discount signs in the local department store, comments such as “you never get a sale,” “shopping is more fun in the real store,” and “you never get to see head-to-head competition that you see in the mall” suggest that online stores have a long way to go [4]. Spiller and Lohse noted that only 6% of the sites offered a ‘What’s new’ section and 76% did not offer incentives or appetizers to attract and retain customers. Appetizers not only for getting customers to return but also increase the enjoyment of shopping online.

Store promotions include frequent buyer schemes,

magazines with product-related articles, glossaries, travel or other product-related tips, lottery games, links to other sites, and auctions. Interestingly, few stores link between appetizer and product pages or among different product pages. One exception, the Spiegel site ([www.spiegel.com](http://www.spiegel.com)), features links to associated products elsewhere in the store. The LL Bean site ([www.llbean.com](http://www.llbean.com)) offers information about the U.S. national and state parks. The park information provides an opportunity to link to the store's outdoor gear.

Advertising has many forms on the Web. Banner ads are small rectangular ads on the top or bottom of a Web page that link to a target site or product. Spotlight ads at the store entrance feature icons or images that link directly to products. Featured products are analogous to store window displays and aisle products with links to an individual product. Figure 1 shows an end product page with navigation buttons. The browse forward and browse back buttons allow customers to navigate from product to product. Without such buttons, the consumer cannot look at merchandise adjacent to this promotion item nor access information about the company's reputation, returns policies, and so forth.

Web ads often use animation, scrolling text, and other special effects to capture your attention. As noted by Nielsen [11], moving text has an overpowering effect on the human peripheral vision making it difficult to process information elsewhere on the page. The position of an ad on the page or a product in a list has a large effect on consumer choice, even though the position says nothing informative about the business [7]. Serial position matters because people scan ads on a page sequentially and their scanning is not exhaustive. As a result, people never read certain ads or product listings.

**Convenience.** Store layout, organization features, as well as ease of use, all fall under the convenience umbrella. Comments from consumers such as "this is not for computer illiterate people," and "I had places I wanted to go but couldn't understand how" illustrate these convenience issues [4].

General help functions might assist users in error recovery or find a particular function in the docu-

mentation. Help also includes information about the store's navigation or the use of ordering features like a shopping cart function. Only 12% of the stores in the Spiller and Lohse survey had a help function.

Convenience features also help manage customer expectations. For example, sometimes it is difficult to determine the status of a process (such as downloading a large image file). Stores should include status indicators (such as percent-done bars, hourglass, and so on) to avoid losing customers during delays.

Only 10% of users scroll beyond the first screen of information on a Web page [11]. Long pages are difficult to scroll and take longer to load. To help the reader find information, Nielsen recommends that

designers be succinct, keep the text short, aid scanability using informative headlines, make judicious use of white space, and use multiple levels of headings, highlighting, and color text as visual cues.

**Checkout.** The checkout process is more complicated than necessary [4]. If the checkout process is too long, customers balk and sales are lost. For example, the checkout process is different for every store. This confuses the customer. Universally adopted standards would alleviate this concern. Also, consumers enter a lot of repetitive information such as name, address,

and credit card information. Ideally, this could be entered once and allow the customer to checkout once even though purchases are from multiple stores. Thus, Web designers can use the interface to improve the existing process.

The most common checkout method uses the shopping cart metaphor [12]. At a real department store, it is easy to undo a purchase during checkout. Just tell the clerk that you have changed your mind and only want the pants, but not the shirt. On the Internet, the undo button for one store emptied the entire shopping cart leaving the customer to start over. Inconsistent menus do not allow customers to review the contents of the shopping cart from any page in the store. Often there is no access to the shopping cart unless a purchase is made.

Some order forms do not provide customers with important information such as when the order will be shipped or whether an item is out-of-stock. For example, to make returns or cancel an order, an order number must often be provided. An electronic mail



**Links must be active. Nothing will drive away customers like a site full of dead links.**

confirmation should provide such information automatically. Order forms should clearly indicate if prices include shipping and handling. Finally, a real salesclerk provides service at checkout, asking, for example, if you found everything you wanted. There is no analogue online suggesting an opportunity to develop such a feature in the future.

**Store navigation.** Product search functions, site maps, product indices, and the overall site design and organization, are the features of store navigation. Such features are essential for large stores. Only 4% of the sites had a site index, 6% offered a product search function, and only 22% offered buttons on the end product pages to facilitate browsing [12]. Shoppers frequently use multiple links to locate a particular store. Additional links from other locations can be viewed as additional store entrances.

Hyperlinks aid the discovery of new and useful information and allow users to drill down into more details as needed. The links should be as context specific as possible (such as the sale of a Walkman CD player should have a link to buy batteries). Links reduce the effort of browsing by directing customers to related items. However, links must be active. Nothing will drive away customers like a site full of dead links.

Every Web page must have consistent navigation links to move around on the site. Not every person will come in the front door! Product searches often link directly to an end product page. If there are no navigation buttons on the end product page, customers will not be able to browse the rest of the store to find other items they might purchase. The browse forward and browse back buttons in Figure 1 allow the customer to turn pages without returning to a product list screen.

Improving navigation of product lists, product search, and increasing the use of hyperlinks within a store is the primary area of opportunity. Product list navigation explained nearly 61% of sales and 7% of the traffic [8]. A pull-down menu or list of products (Figure 2) typically provides only a name. Few purchase decisions are made based on name alone. Including additional information in the product list such as price, an image, and a product description increases sales by facilitating purchase decision making at the point consumers initially view the product. We view the streamlined product list navigation using a one-click-to-purchase approach of Amazon.com and 1-800-Flowers (www.1800flowers.com) as recognition that every additional mouse click reduces the possibility of a purchase.

Complex URLs follow a completely foreign



**Figure 2.** Scrolling menu showing a basic product list

naming convention making them nearly impossible to use as site navigation aids. Search features aid the navigation tools but do not eliminate their need. Marketers should clearly communicate the structure of the site on the home page (master index) and link to the master index from every page on the site.

Current systems restrict consumer comparison of products by attribute because it is difficult to compare products simultaneously [2]. Product lists often present information in a confusing or unfamiliar format. An alphabetic product list might show binoculars under "N" for "Nikon binoculars." Sometimes customers can not tell what the function or product is from the icon or its name. Cute or humorous department names do not provide cues as to where products are located. Elaborate graphics with realistic detail often leave the customer wondering where to click to start shopping. Consumers also find it difficult to remember where something was in the online store whereas the real store has many physical cues (second floor near appliances). This is especially true for stores using frames since the back button does not always go back and bookmarks often point to another frameset within the site.

Each retail store has its own search engine tailored to its store. These are different from popular Internet search engines such as www.infoseek.com and www.altavista.digital.com. Consumers must learn the nuances of each new search engine. As one consumer lamented, "the search function kept giving me ridiculous matches that had nothing to do with what I had in mind" [4]. Furthermore, most in-house search engines cannot search across multiple stores (for an exception, see www.bestbargains.com). Manually indexed sites (such as www.yahoo.com) are attractive alternatives to search engines because they cluster products into meaningful groups.

## Web Information Systems

Many user interface design issues for electronic shopping environments also apply to WISs. Compared to traditional information systems, WIS users have much more control of the user interaction, yet they are often unable to find sites they know exist or become disoriented and lost in a maze of hyperlinks.

Search engines should be mandatory for all large Web sites. Ideally, the search engine would go beyond Boolean keyword searches by incorporating category pick lists, radio buttons, and other features that facilitate search.

Search engines direct users to specific pages within a site without ever going through the home page, making it difficult for designers to anticipate a user's navigation path through the site. Thus, every

Web page must have consistent navigation links (such as site map or index) to move around on the site. Clearly communicate the site structure on the home page and link to the master index from every page.

Do not waste opportunities to link to related areas. Hyperlinks aid the discovery of new and useful information and allow the user to bore down into more details as needed. The links should be as context specific as possible. Hyperlinks are the essence of the Internet—use them!

The user interface is an essential link between the customer and the retail store in Web-based shopping environments. It is our belief the growth of Internet retail sales will depend, at least partially, on these interface design issues. ■

# Mediating Electronic Product Catalogs

David-Michael Lincke and Beat Schmid

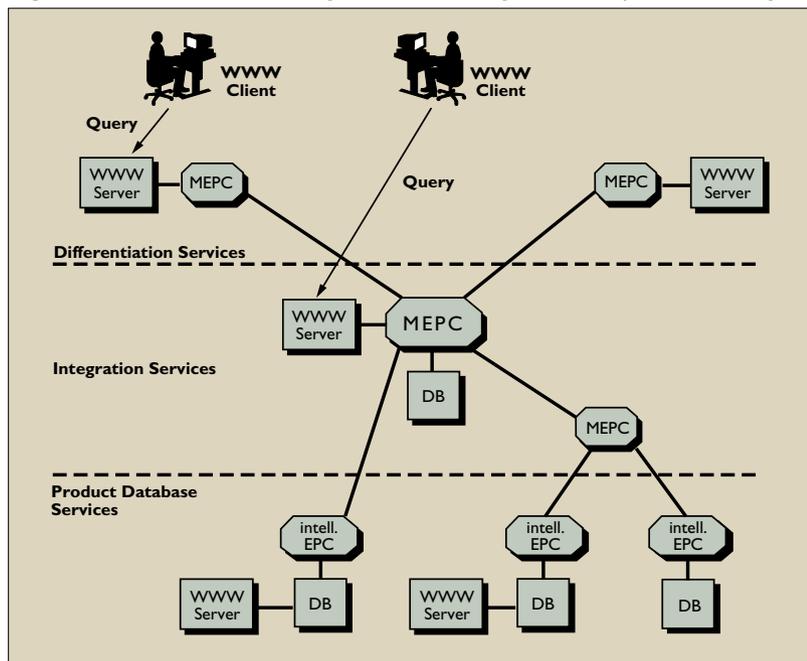
The information superhighway in its incarnation as the Internet has the inherent potential of enabling a global marketplace. Electronic product catalogs (EPCs) form the Web-based front end to this rapidly evolving marketplace.

Unfortunately, electronic shopping systems have had relatively limited success to date in supplanting or even augmenting traditional physical and catalog shopping. Besides problems with basic usability as Lohse and Spiller discuss,

most systems offered today are proprietary structures that lack interoperability and cross navigation. Despite the growing number of companies that present their products on the Internet, a global search for products and comparative analysis of their features is impeded by semantic differences between the EPCs. Thus, even though buyers enjoy broad access to different vendors' product specifications, integration and evaluation of product information still has to be performed manually. The impediments to an effective and efficient use of the Internet as a global marketplace at the stage of product identification can be summarized as follows:

- Buyers must acquire and maintain the relevant addresses of suppliers of a product.
- Typically, products are presented by each company in a different semantic con-

Figure 1. A federation of intelligent and mediating electronic product catalogs



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text. Buyers have to translate those semantics manually. Especially in a global environment as diverse as the Internet, where people from many different cultural backgrounds meet and a wide variety of languages is in use, the issue of translation between and integration of different vocabularies is exacerbated even further. The search engines available on the Internet today are of little help as they are practically all based on classic models of information retrieval that work on a strictly syntactic basis.

- Vendors tend to employ the user interface design of their EPCs as a means of differentiation. Thus, customers are continuously forced to get accustomed to new ways of interaction.

In order to overcome these problems a common language

for the specification of product information is needed. Based on such a language a *Mediating Electronic Product Catalog* (MEPC) [1, 2] can be constructed. Under the term MEPC we understand a catalog that semantically integrates several individual EPCs or other MEPCs into a federated system (see Figure 1), and provides the following functionality:

- Transparent search over several EPCs in a distributed environment
- Support for multilingual query resolution and national differences (conversion of measurements, sizes, or currencies, for example)
- Inference mechanisms for the evaluation of integrated information
- Interfaces to additional market services (such as payment or logistics services)

A MEPC federation is composed

of an arbitrary number of catalog modules structured in a recursive manner. The basic building blocks are intelligent EPCs, which are catalogs that are augmented by a semantic layer (see Figure 2). Such a layer is necessary in order to allow for the classification and evaluation of the contents of catalogs queried and to facilitate the semantic integration of heterogeneous catalogs. Besides Q-Calculus [3] (used in our implementation) other methods and languages for the formal representation of product information have been proposed by Kimbrough [4] and Keller [5], who has applied KQML to the modeling of EPCs.

Drawing from the information repositories of MEPCs, differentiation services can be established. Such services focus on niche markets by extracting specialized areas of product information from catalog intermediaries, subse-

quently enriching them with additional related information and services to create added value for their customers and build focused virtual communities.

A wide variety of business scenarios for the application of MEPC technology can be envisioned ranging from the support of purchasing and sales operations to the streamlining and optimization of sourcing processes of resellers and large organizations. On the customer side, the introduction of new intermediaries into the usage process of EPCs can offer significant added value to end users; while on the sides of vendors and intermediaries new business opportunities are arising and new business models are becoming viable (see Tenenbaum in this issue).

In trying to create added value for their customers, maintainers of MEPCs can adopt one or a combination of three different generic business models:

- *Horizontal integration:* Several catalogs covering various different kinds of product families are integrated under a common user interface offering multilingual support to users. This scenario corresponds to the model of a traditional shopping mall.
- *Vertical integration:* By integrating catalogs covering homogeneous product categories the search scope of users' queries can be vastly expanded. In addition to an immensely increased supply and variety of products, comparative shopping can be efficiently performed.

- *Cross integration:* The proposed MEPC's true potential, however, is only realized through integration of catalogs of complementary goods or services. For example, by integrating hotel booking, ticket and flight reservation systems, automatic creation of travel arrangements individually configured according to each customer's needs can

models for MEPC intermediaries are viable and successful in the setting of the tourism industry. **G**

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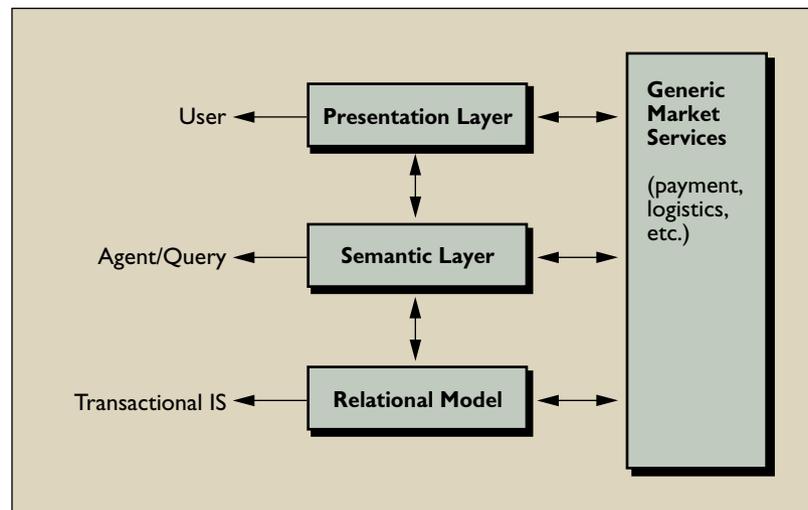


Figure 2. Logical architecture of an intelligent EPC

be offered. Thus, maintainers of MEPCs are not limited to a role as pure information brokers, but can enter the market as suppliers of combined product solutions. Their businesses are transformed into virtual enterprises that flexibly make use of other companies' services.

A first commercial MEPC implementation is currently under way in cooperation with a number of companies in the Swiss tourism industry and funded by the Swiss Commission for Technology and Innovation. The results of this project will provide further insight as to what business

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