





MULTIMEDIA-BASED INTERACTIVE  
ADVISING TECHNOLOGY FOR

# Online Consumer Decision Support

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Multimedia technologies (such as Flash and QuickTime) have been widely used in online product presentation and promotion to portray products in a dynamic way.

The continuous visual stimuli and associated sound effects provide vivid and interesting product presentations; hence, they engage online customers in examining products.

Meanwhile, recent research has indicated that online shoppers want detailed and relevant product information and explanations [2]. A promising approach is to embed rich product information and explanations into multimedia-enhanced product demonstrations. This approach is called Multimedia-based Product Annotation (MPA), a product presentation in which customers can retrieve embedded product information in a multimedia context.

ILLUSTRATION BY JEAN-FRANÇOIS PODEVIN



Figure 1. Front view of DX3900 lens specifications.

MPA is already used in some commercial Web sites, such as [www.kodak.com](http://www.kodak.com), where MPA is used to present digital cameras. On this site, a customer can manipulate multimedia context to visually examine a digital camera from different views: front, back, bottom, and menu. Figure 1 shows the front view of the Kodak DX3900 camera. Some parts that need special annotation are highlighted in a distinct color. When a customer moves a mouse over one of these parts (for example, the lens in Figure 1), an annotation will emerge on the right side of the camera describing optical zoom and digital zoom. When the mouse is moved away from the part, the embedded annotation disappears.

MPA provides explanations corresponding to the features or functions associated with certain parts of a product while consumers look at an illustration of the product. However, MPA has two limitations. First, customers may not be able to use the information in their product evaluation because they lack relevant expertise and knowledge. For example, if customers are not satisfied with the optical zoom of the DX3900, they might not know what other products better suit their needs. This is unlike traditional shopping environments, where customers can consult sales representatives for further assistance. Second, MPA is of little help if customers have to examine many different products in order to decide what to buy. Usually on the Internet, numerous product types and brands are available; therefore it would be difficult, if not impossible, for customers to use MPA to evaluate all products individually.

To overcome these problems, we propose a new method to incorporate intelligent agent and advising technology into MPA design, and thereby to aid consumers' online decision making and product evaluations. This is referred to as Multimedia-based Interactive Advising (MIA) technology.

Maes et al. have argued that intelligent agents can help buyers and sellers combat information overload, expedite the online buying process, and improve users' decision quality [5]. An effective way to implement these technologies is to use the Internet to deliver an agent-user dialogue to obtain users' preferences and needs, and to advise these users [10]. Hence, we propose to use this kind of dialogue in MIA design in place of the pure delivery of product annotations in MPA. That is, the product evaluation process is treated as a two-way agent-to-customer conversation. The conversation not only provides customers with explanations of features and functions that are associated with certain parts of a product, it also elicits customers' needs, enables them to adjust their needs, and then provides recommendations accordingly.

To continue with the previous Kodak DX3900 example, suppose you want to use MIA to display this digital camera. As Figure 2 illustrates, when a customer moves a mouse over the lens, a dialogue will show up in response: "The lens you are examin-



Figure 2. MIA example: Front view of DV3900 and initial dialogue.

ing has 2X Optical Zoom, 35–70mm (35mm Equiv.)." Customers who have little expertise with optical zoom may click on the link "I would like to know what optical zoom is" to get more information. If a customer is not satisfied with the maximum focal length, he or she can also select "I would like to see other products with different maximum focal lengths" to initiate a new dialogue. In the dialogue, MIA will first elicit customers' needs, through agent-customer conversations, as the basis of recommendations. Since particular customers may not have enough expertise to explicitly describe their preferences in technical terms, the conversations are stated in plain English (Figure 3). Customers can then choose different options to adjust their needs and preferences with-

out any difficulty. After receiving a customer's replies, MIA will recommend new products with different maximum focal lengths while keeping other product attributes similar to those in the previous camera. The most suitable model (for example, the Kodak DX 4300) will replace the previous one in the MIA demonstration, and other models satisfying customer preferences are presented next to it.

The uniqueness of MIA is its use of advising technology to facilitate online product evaluation. In effect, agent-customer conversations are embedded into multimedia-based product demonstrations. The shopping agent is designed to take care of customer needs, to assist customers throughout their shopping experiences, and to recommend products based on customers' adjusted preferences and needs



Figure 3. Another MIA example, showing customer preference elicitation dialogue.

in relation to particular product parts. After making a recommendation, the agent will replace the previous product with new models. In this way, customers are able to continue evaluating products seamlessly, because the agent offers products with the specifications that satisfy customers, in addition to improvements in particular attributes requested by the customers. Similarly, customers can adjust their needs and preferences

for other product parts or attributes to get continuously updated product choices, resulting in an almost uninterrupted product evaluation process.


### THE BENEFITS OF MIA

MIA aims to simulate the real physical shopping experience with a virtual shopping assistant, and thereby compensates for the disadvantages inherent in the nature of the Internet. Simultaneously, MIA technology can bring a variety of benefits.

As a context to deliver agent-customer conversations, the multimedia format contains multiple information cues and can appeal to multiple sensory channels [4]. It thus gives online customers the opportunity to appraise products in detail, while the attractive presentation may engage them and motivate them to complete a purchase. In addition, interactive multimedia gives customers a great deal of control over the product information flow, including the ability to manipulate product images (such as the perspectives for viewing a product), and the determination of when agent-customer conversations are invoked and how the conversations proceed. This empowerment allows customers to effectively match the information available to their own decision-making processes [1], facilitating customer understanding of product information and the options available.

The effectiveness of MIA technology can be increased when agent-customer conversations are tailored to and embedded into corresponding product parts. Customers can engage in the conversations without losing the image of the product or breaking the continuity of their product evaluation processes; hence, they have no need to spend extra cognitive effort to link the images with the conversations. That is, with this contextualized conversation [6], customers do not have to switch back and forth between specific product images and the corresponding agent-customer conversations, which are

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likely not accommodated in the same screen in conventional online product demonstrations. Customers also have access to continuous assistance throughout the shopping experience. Using the need-based conversation approach, the agent communicates with customers in a friendly and easy-to-understand way, helping them to recognize and specify their potential needs more accurately. As an additional benefit, customers do not need to examine all the products separately in order to find the one that best fits their needs and preferences. By continuous recommendations, the shopping agent associates different products together by allowing customers to adjust or change their needs and preferences. In other words, customers can get instant advice about more suitable products whenever they are not satisfied with a given product, and they can adjust their preferences through the agent-customer conversations.

#### **MIA DESIGN**

The designs of MIA applications include four aspects: context design, content design, interaction design, and agent engine design. Context is the overall look and feel of a multimedia-enhanced product presentation; content is the information that is embedded within agent-customer conversations; interaction is the style and functionality of how customers invoke and proceed with conversations; and the agent engine is the underlying intelligent agent that advises customers on product evaluation.

*Context design.* A well-designed context is integral for a successful MIA design. Designers must ensure that the interface is aesthetically appealing so it will attract customers during their initial contact with the Web site. Several related issues are worth special attention and design efforts.

First, designers should pay attention to the over-

all layout of the Web site. There are challenges in effectively integrating visual product demonstrations (still images or animations) with associated agent-customer conversations. Ideally, the placement and color schemes of product demonstrations and conversations will be harmonious. Similarly, images should be set at an optimal size; if they are too small they may not attract enough attention, but if they are too large they can be intrusive [9]. The first design rule proposed is based on these concerns:

**Rule 1.** An MIA interface should have a comfortable layout that accommodates visual demonstrations of products and agent-customer conversations harmoniously on the same screen.

Second, efforts are needed to design effective and compelling product demonstrations. Customers' first impressions are usually derived from the visual appeal of the products; therefore, the quality of still or animated images will significantly affect customers' attitudes toward products and thus their intentions to buy. Specifically, a product demonstration should have high fidelity to the products. This is particularly important for some Web sites where product images are not photo-realistic. Since low fidelity has a deleterious effect on customers' attention and their attitudes toward products, Web designers should be cautious of using low-fidelity images. Similarly, motion can be associated with products. Although a certain amount of motion can attract customers' attention and portray dynamic characteristics of the products, excessive motion becomes distracting [9]. The use of multiple sensory cues in product demonstrations is yet another feature that affects initial impressions of products, and MIA designers should consider using sound, for example, to simulate the sound of the flash of a digital camera.

**Rule 2.** MIA applications should present vivid product demonstrations.

*Content design* focuses on information that is contained within agent-customer conversations. In general, the conversations are required to be considerate, helpful, and instructive.

Computerized agents appear considerate when they converse with customers about their needs in a natural and easy-to-understand way. First, all agent-customer conversations must be need-based, and initiated only when customers require information for their product evaluations. For example, customers may want to know what optical zoom is (in comparison with digital zoom) or they may want to explore other products with different maximum focal lengths; the two corresponding conversation topics are suggested in Figure 2.

Second, for agents to be considerate they should conduct conversations in a natural and easy-to-understand way, while eliciting customers' needs and preferences. For example, when customers want to adjust the maximum focal lengths, instead of asking customers about the focal length levels directly, the agent can determine customers' needs by asking questions like "How far will you be from the main subjects of most of your pictures?" and then translating customers' responses into focal lengths (see Figure 3). These questions do not require special product expertise and therefore will not be difficult for the customers to answer. The reasoning process used to recommend products should also be shown, in order to make the advice acceptable to the users. For example, in Figure 3, the underlying reasoning is provided in each option by presenting the corresponding maximum focal length. Therefore, the following is proposed:

**Rule 3.** MIA applications must show consideration of customers' needs, preferences, and expertise, and include explanations of the reasoning underlying product recommendations.

To be helpful and instructive, MIA conversations must not simply convey currently relevant knowledge, they should also remind customers of other potential needs and preferences, following the flow of typical consumer decision-making processes and offering customers further product knowledge. For example, in Figure 2, in addition to focusing on the optical zoom and focal length, a hyperlink is provided for a related product feature: digital zoom. Similarly, MIA can initiate another conversation to show customers how to use the optical zoom.

Through this kind of guidance, customers will be motivated and able to understand products sequentially, thoroughly, and effectively.

**Rule 4.** Agent-customer conversations should guide customers to explore other relevant product information.

*Interaction design* involves alerting customers to the availability of advising resources and optimizing the styles of delivering conversations to customers.

The first issue of MIA interaction design is to inform customers about the availability of the interaction. A very important concept here is affordance, representing all of the possible ways that a computer user can interact with the interface [8]. A well-designed MIA should allow customers to perceive the affordance so that they can initiate an interaction process. For example, the existence of functional buttons on a product may afford customers a cue that they can press the buttons. If these buttons are formatted and displayed distinctively from the rest of the product (for example, highlighted in a different color), the affordance cue is emphasized.

**Rule 5.** MIA applications should allow customers to perceive affordance when interacting with the interface.

The second issue related to MIA interaction concerns the number of conversations that consumers can engage in at one time. In our previous Kodak DX3900 example, only one conversation, corresponding to a particular product part, is presented on each screen. That is, once a second conversation is invoked, the first conversation may disappear. Such a design is convenient for customers who want to evaluate one attribute at a time, but it does not allow them to assess multiple attributes simultaneously. However, simultaneous evaluation of multiple product attributes may be more efficient and therefore desired by other customers. Thus, a better MIA design will allow customers to choose either a single conversation or multiple conversations. It is worth noting that the inclusion of multiple conversations on one screen should not be at the cost of context design. It is designers' responsibility to keep MIA screens neat and all conversations easy to follow.

**Rule 6.** MIA should allow customers to maintain multiple conversations at the same time, if desired.

*Agent engine design.* The essence of the advising task is to link what customers know, that is, their

needs and preferences, to what they need to know, that is, product attributes that best fit those needs, uses, and preferences [9]. The first step is to elicit users' initial needs and preferences in order to make an initial recommendation. An option is to allow users to answer a few needs-based questions, such as price range and brand preference, without referring to any specific product. Then, based on the answers to these questions, the agent will recommend some products to start with.

**Rule 7.** MIA should begin with the elicitation of customers' initial needs, prior to showing products.

When customers adjust their preferences by choosing different options in agent-customer conversations, the adjustment should be translated to changes in product attributes. Product knowledge from experts is needed to accomplish this translation. Meanwhile, new products with attributes updated as per customers' needs and specifications should maintain all other attributes the same as or close to those of the previous products. A rule-based or fuzzy logic-based recommendation engine may be applied here.

**Rule 8.** An effective method is needed to convert customer needs into product recommendations.

#### APPLICATIONS OF MIA

The applications of MIA have two constraints. First, it is ideally suitable only for relatively complex products. The products should have features or functions that are associated with different product parts. If a product is too simple and does not have many features or functions to be explained, then there is no need to use MIA because a simple image with a text description will provide enough information for product evaluation. Second, MIA is suitable for products that have a large product line. That is, there should be numerous other similar products with different attributes, which can make it difficult for customers to choose the most suitable product. Thus, it is best applied to online stores that offer many products.

MIA is a new approach to e-commerce Web site design in that it integrates existing technologies, including interactive multimedia [3], contextualized explanations [6], and intelligent agents [5] for improving product demonstrations and customers' product decisions. Specifically, it uses multimedia as a context for agent-customer conversations. With MIA, the agent helps customers to recognize their needs and to better understand information about

specific product parts and features. Alternatives are then recommended if customers adjust their preferences pertaining to particular parts.

The eight proposed rules for MIA application are based on the analysis of MIA in terms of context, content, interaction, and the agent engine. Our goal in this discussion has been to illuminate relevant practices and research, and thus to improve online product demonstrations and enhance customer decision support. **□**

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