Practical Magic:
The Use of 3D Graphics and Simulation in Visual eCRM Applications

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Abstract:

The web has been found to be an effective means of providing customer service in a wide range of applications. Despite the advantageous properties of this form of information delivery, there remains a wide range of applications for which current web-based implementations of customer service are unsatisfactory. For instance, the communication of product-oriented information involving complex spatial relationships is very difficult to convey using traditional techniques. This sort of information needs to be conveyed in order to assemble, install, maintain, and configure a range of products from bicycles to jet engines. We have found that the augmentation of traditional web-based techniques with the enhancement of 3D graphical simulation techniques is able to expand the capabilities of the web to successfully handle these applications (See figure 1).

Figure 1: An Example of a Web-based Customer Service Center

Part 1: The Web and its Place Among the Channels of Customer Communication

There are numerous ways that a corporation can communicate customer service information with its customers. These vary widely in terms of speed, price, and capability. We will show that the web has a set of characteristics that make it particularly attractive for customer service applications. The challenge then becomes how to make the web effective for those applications. The visual approach that we describe expands the applicability of the web into those domains.

Benefits of The Web: Cost, Convenience, Consistency, and Capability

A successful customer care solution will incorporate several different channels of communication to the customer. However, an economical solution will attempt to steer customers towards the most economical means of interaction first.

Cost: The Web Is Your First Line of Defense

From the figures stated to the right on the cost of the various channels of communication, it can be seen that the web has a huge potential to save a corporation money.

Figure 2: Channels Of Customer Communications and their Cost

Channel	Cost
Field Personnel	$300
Call Center Representative	$60
Automated Phone System	$1
Mail	$1
E-Mail	$0.30
Web Site	$0.10

While the web may not completely eliminate other means of customer interaction, it is by far the most economical means of communication. Any interactions that can be transferred to the web will ultimately result in significant cost savings for the corporation. In addition, for applications where there exists a high volume of low value customers, the web may be the only economical way of offering these customers a satisfactory level of customer service.

Convenience: Where Customers Turn To for Information

Much has been said about the web's ability to deliver targeted information on demand, all the time. As time goes on, the web will become the first place that customers turn to for help. For many types of information, this transformation has already occurred. The web is already the primary source for many types of research and for news and current events. It used to be that if you asked any 5th grader where to look for information, the answer would most likely be "the library". Now it is most certainly "the web". This shift is inevitable for customer service as well.

Consistency: All Customer Service Reps Are Not Created Equal

How many times have you waited for a customer service representative to become available only to find out that you know more about the problem than they do? Dialing for help can be a hit or miss proposition. The web is the most capable form of self-service assistance. It has the potential to provide the consistency and completeness of a manual with at least some of the active assistance response of a customer service representative.

Capability: The Web Can Do It!

The web has not yet begun to live up to its potential as a capable medium for customer service. Most web-based customer service materials go little beyond the average printed service manual. As we shall see, however, the web no longer must remain a static reflection of the printed page.

Part 2: The Need for a Visual Solution

There is a large class of customer service problems, which are best solved if you can ***show*** the solution to the customer rather than just ***tell*** them what to do. These applications are described in the following analysis.

Figure 3: Example Applications in Assembly & Configuration

Applications in Assembly & Configuration

The first series of applications that we would like to address is related to assembly and configuration (see Figure 3). The assembly and configuration problem is illustrated by the "Christmas Eve Crisis". This situation, which has been experienced in one way or another by almost everyone, is what happens under the following circumstances. A customer waits until the last minute to assemble a product such as a bicycle, grill, toy, etc. only to find out that the instructions are missing, unclear or incomplete. In this case, where does the customer turn? Because of its convenience and 24/7 availability, the answer in the future will most likely be the web. In fact, it is a fairly typical situation that this sort of assembly or configuration information is needed in an "on-demand" basis, which makes it perfect for web distribution. Assembly and configuration information illustrates the need to deliver information to the customer with the following considerations:

(1) It must be delivered in an immediate fashion
(2) It must be delivered in a form that can be understood immediately (a visual form).

The customer is interested in solving the problem quickly. Putting a long, detailed written description of an assembly process on-line is not likely to satisfy the customer because they will still end up spending a lot of time solving the problem. Our interactive visual techniques attack both of these problems simultaneously by making the information immediately available and immediately understandable.

Figure 4: Example Applications in Operations & Maintenance

Applications in Operations & Maintenance

The next series of applications that we have found to benefit from a visual solution is related to operations and maintenance (see Figure 4). This is another situation in which information is needed "on-demand" and in a readily understandable format. Wherever the value of information is related to the speed of its application, the web is a medium that should be considered. Most of us have at some time or another

experienced problems related to operations and maintenance information not being readily available or understandable. For example,

- How many times have you impatiently flipped through a 500-page operations manual for a supposedly simple-to-operate piece of office equipment?
- How many times have you sat on an airport runway waiting for maintenance to be performed on an aircraft?
- How many times have your customers complained that they lost the operations manuals belonging to your products?

Operations and maintenance information is somewhat different from assembly and configuration information because it is needed throughout the lifetime of the product. This makes the web an ideal medium for the distribution of this kind of information because it allows the centralization of archival information. A customer may have the assembly and operations manuals for the product at the time that the product is removed from the box, but how many times have you found that your customer needed to refer to these materials at a later time when the manuals are nowhere to be found? The customer cannot necessarily be relied upon to maintain these materials. In the end, the customer ends up frustrated and the problem comes back to the distributor or manufacturer of the product. The web can provide the solution to these problems.

Figure 5: Example Applications in Configuration & eCommerce

Applications in Configuration & eCommerce

A third set of applications that we have found for visual simulation applies to configuration and ecommerce (see Figure 5). In an age where we increasingly rely on the objects that surround us to define ourselves, companies are finding increased demand for "personalized" products, which may be configured by the customer. For example,

- Dell computer's web site allows you to "build your own computer" by choosing the hard disk, RAM, and other components.
- Santa Cruz Bicycles has a web-based configurator to allow you to choose the color, fork, rear shock, etc.
- The Volkswagen web site allows you to choose the color, interior styling, and other options of your particular model

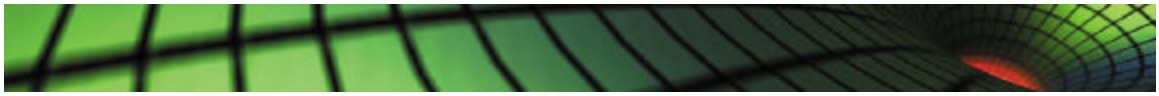
One of the difficulties involved in this sort of process is that if there are number of different customization options, then the number of permutations of these options grows exponentially. Using conventional web techniques, a company would have to assemble each of these possible configurations, photograph the product configuration, and then integrate this collection of images into the online configurator system. Since the number of product permutations can easily run into the hundreds, thousands, or even millions, using conventional techniques obviously becomes a practical impossibility. When a 3D graphics simulation process is used, however, the graphics are generated on the fly instead of being pre-recorded which means that it becomes possible to show an infinite number of product permutations.

Part 3: Implementing a Visual Solution

Given the need to produce a visual solution to a particular customer service problem, it will be necessary to consider the various forms of visual communications that are possible. Unfortunately, for visually oriented customer service problems, the options available to your company are somewhat limited (see Figure 6).

Figure 6: Channels Of Customer Communications and their Capabilities

Channel	Visual	Interactive
Field Personnel	Yes	Yes
Call Center Representative	No	Yes
Automated Phone System	No	No
Mail	Yes	No
E-Mail	No	No
Web Site	Yes	Maybe



The solutions that are most commonly implemented today are based upon telephony, a completely non-visual medium. Often, the optimum solution is to dispatch a field agent to the on site location of the customer so that the customer service agent can actually show the customer the solution to the problem. Obviously, this solution is far too expensive for the vast majority of customer service applications. That leaves the web.

Options for Visual Web-based Solutions

There are a number of web techniques that may be evaluated for the types of applications that we have described. However, we have found that traditional media types often result in an unsatisfactory web experience. The specific reasons for this are explored below.

Static Images

Enhancing a web site with static images is the most obvious first approach to building a visual web solution. A picture is worth 1000 words, they say. At first glance, this would seem to be an effective solution since it echoes the approach that has been taken with printed customer service materials since the birth of the printing press. We are all familiar with how graphics are incorporated into assembly manuals. Yet, how effective is this approach? Many of the concepts that need to be communicated relate to a process rather than simply a static object. A static visual may be fine for a simple task like "locate the parallel port on your laptop computer". But static visuals fall short for illustrating dynamic processes. We built an assembly manual for a gas grill that illustrated this problem. One step in the assembly called for the grill to slide into its frame in a way that required it to follow a complex path through space. Communicating this through a series of arrows is practically impossible and in fact, we assembled the grill the wrong way when working with the printed manuals the first time. While this sort of trial and error approach may be deemed acceptable for consumer products, medical or aerospace products are a different matter entirely. Given a choice between an illustrated assembly manual and a telephone based customer service representative, many people will simply pick up the phone. The reason? Printed materials are non-interactive. At least some form of interactivity is essential for getting the point across. We most effectively learn by doing.

Issues with Static Images:

- No animation
- Fixed viewpoint
- No interactivity

Video and Vector (Flash) Animation

It may seem that to incorporate video or flash animation into a visual customer service solution would overcome most of the shortcomings of still images. In fact, we find using video adds as many problems as it solves. Video imagery and animation does allow for dynamic processes to be illustrated and complex spatial relationships and motions to be depicted. However, you are still left with a fixed viewpoint and no interactivity. Even worse, the files associated with video tend to be huge which means that after waiting through an insufferable download, you are left looking at a tiny image with poor resolution. This tends to leave consumers feeling frustrated and unhappy.

Issues with Video and Vector Animation:

- Huge file sizes / long downloads
- Fixed viewpoint
- No interactivity

The experience of downloading video on a slow connection can be almost like a cruel joke to those unfamiliar with the process. You wait, sometimes for minutes on end, for the data to download. Your expectations increase with every second that you have to wait. Finally, the video begins to play and you find yourself watching a tiny, postage stamp sized window filled with a grainy, ill-defined image. For a generation of users who have grown up with television and high-resolution video games for comparison, the experience of web-based video can be highly disappointing.

3D Simulation

When used for the right applications, 3D simulation is the ideal tool for communicating instructional information related to products and processes, which are after all 3D in nature. It is best used to show "how things work". The most serious shortcoming with 3D graphics is that since it is by nature a simulation, it does not depict reality absolutely exactly. This is important when creating graphics for ecommerce applications. For these applications, people expect to see a photographic image of a product or else they may feel as if they have been misled. For example, to show how the lighting looks inside of a piece of real estate, it's better to show a photograph of the real thing. Since most customer service interactions deal with the functional aspects of a product, this is a relatively minor limitation.

Issues with Simulation:

- Imperfect photo realism

Part 4: A Complete Solution

In this last section, we would like to illustrate the different ways in which a company can use 3D simulation to interact with a customer. This section goes beyond the typical implementation of a customer care center and explores what we consider to be the ultimate goal in using the web to bring a company and its customers closer together.

Multiple Channels of Communication

First of all, we would like to emphasize that we have focused upon the visual aspect of the customer care solution but that component is not complete by itself. We see a complete solution incorporating many different channels to the customer (see Figure 7). These channels would include one or more of the following:

Low Bandwidth:

- 3D simulation
- Text based chat
- Conventional telephony

High Bandwidth:

- Internet telephony
- Teleconferencing

Each of these different channels serves to enhance the function of the others. There is no one perfect means of communication for all people and all applications. Working together, these different channels will serve to bring the customer and the company together in such a way that it will be almost like being together in the same place.

Figure 7: Multiple Web-based Channels Of Customer Communications

Conclusions

We foresee a bright future for both customers and also the companies that serve them. Using techniques such as 3D simulation, the barriers that separate consumers from the information they need will increasingly be eroded away by the web just as the telephone has brought companies and their customers closer together. Customers will come to expect a high level of service and availability of information. Highly advanced visual techniques such as those described here will come to be expected just as a web presence and telephone support is expected today. 3D simulation will be an integral tool employed to forge a bond between a company and its customers, which is the very essence of a business.