An Example of Trust-Based Marketing and

Customer advocacy in E-Commerce

by

Min Zhang

Submitted to the Department of Electrical Engineering and Computer Science

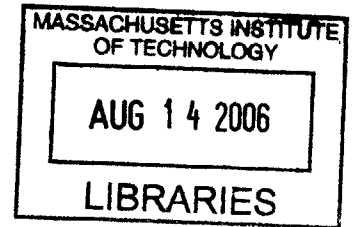in Partial Fulfillment of the Requirements for the Degrees of

Bachelor of Science in Electrical Engineering and Computer Science

and Master of Engineering in Electrical Engineering and Computer Science

at the Massachusetts Institute of Technology

May 23, 2006

Copyright 2006 Min Zhang. All rights reserved.

The author hereby grants to M.I.T. permission to reproduce and
distribute publicly paper and electronic copies of this thesis
and to grant others the right to do so.

Author_____ _____
Department of Electrical Engineering and Computer Science
May 17, 1998

Certified b _____
Glen L. Urban
Thesis Supervisor

Accepted by _____
Arthur C. Smith
Chairman, Department Committee on Graduate Theses

BARKER

Abstract

Professor Glen L. Urban at MIT Sloan advocates a new style of marketing based on trust-building. One way to build this trust is to use an advisor to have a conversation with the customer rather than talking *at* the customer. The purpose of the Suruga Bank project is to test the effects of an advisor-based system in Japan. A loan advisor for Suruga was built which contains two versions: a female person advisor and a cartoon advisor. Additionally, a loan competitor advisor was built comparing Suruga to other Japanese banks. The purpose of the loan advisor is to measure the effectiveness of advocacy and trust on another country, namely Japan. Now that the implementation of the advisor is almost complete, the project is ready to be moved into the market research phase and the results will be obtained by Fall of 2006. The Suruga project has enlightened me on some of the differences in marketing internationally vs. domestically. Through solving the technical PHP and other web-programming issues during this project, I have also become a much more proficient web programmer. In the future, Dr. Urban hopes to continue the project to study marketing in Japan and perhaps add additional features to the site such as morphing.

Thesis Supervisor: Glen L. Urban
Title: David Austin Professor of Marketing

General Background

In today's world, the customer has much greater power because of the internet. The

customer can compare the available options online and decide which one is best.

Because of this new customer power, Dr. Glen Urban at MIT Sloan recommends using a

style of marketing based on *trust* and *customer advocacy*. This style involves earning the

customers trust rather than fighting the customers or pushing them into using your

product. From his book, Don't Just Relate—Advocate, Professor Glen Urban states that:

> *Customer advocacy* means faithfully representing your
> customers interests. It means giving them open, honest,
> and complete information 9because they'll discover the
> truth no matter what you do). It means talking *with* them,
> not at them. And it requires a massive transformation in
> both your culture and your processes. (Urban, 2005)

Professor Urban has projects with several different companies to implement this trust-based marketing idea, including Suruga Bank, British Telecom, General Motors, and Intel Corporation.

Traditional Push/Pull Marketing

Urban believes that traditional "push/pull" marketing no longer works, and that smarter companies are exploring customer advocacy as a new route to higher margins and competitive advantage. Urban states that "push/pull" marketing involves "increased pull by media advertising, aggressive push by price promotions (perhaps with higher initial prices or hidden fees to maintain profits), and potentially misleading one-sided communications" (Urban, 2003). However, he argues that the internet not only allows customer access to more information about the product and its alternatives, but it allows them to make direct transactions and communicate with other customers through a message-board system as well. Because of this, the traditional "push/pull"-based marketing system will no longer work, and a model based on customer advocacy would be more effective.

Trust and Customer Advocacy

In contrast, Urban's model is built on trust and customer advocacy. To build trust, he argues that you must strengthen relationships with customers by providing them with accurate and honest information, even if it includes information about your competitors.

3

Advocacy involves faithfully representing the customers' interests and giving them the advice to find the best products. Urban believes that if your company is distorting the truth, the customers will detect this and act accordingly (Urban, 2003). He also emphasizes that advocacy does not mean speaking at your customers, but opening a two-way dialog of communication with the customer.
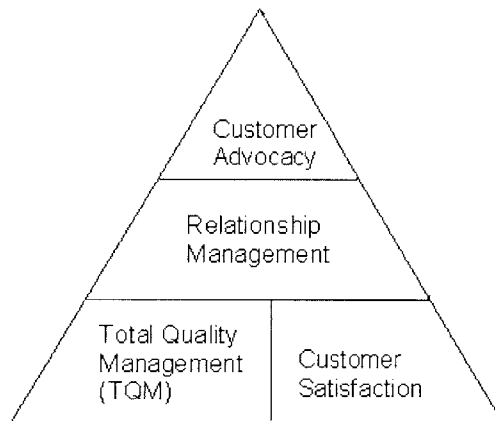

Figure 1: The Advocacy Pyramid (Urban, 2003)

The Advocacy Pyramid shows that Total Quality Management (TQM) and customer satisfaction are at the base, meaning that if the company must make sure its products are good enough to recommend to its customers. Customer Advocacy is then supported by Customer Relationship Management (CRM) because CRM provides the tools needed to personalize the company's advocacy relationship with each individual customer. The CRM concept that Urban advocates is different from the CRM used in the past. The old CRM involved targeting promotions but the new CRM would involve building trusted relationships with the customers. Finally, at the top of the pyramid is customer advocacy which is supported by the other items in the pyramid.

4

One great example Dr. Urban provides of this trust-based marketing scheme is eBay. eBay allows customers to rate each other and give feedback after a product has been purchased. The percentage of positive comments is displayed to the seller to give him/her a good idea on how reliable the seller is. The behavior of customers on eBay illustrates the profitability of creating trust. The most trustworthy eBay sellers are the ones with the highest ratings, and they are able to charge higher prices for their products. This trust-based system has allowed eBay to connect millions of anonymous buyers and sellers in the world (Urban, 2003).

The General Motors Project

My Auto Advocate was a project done last year for General Motors to implement this trust-based marketing scheme. The site involved using an advisor to communicate with the user and build trust. It involved allowing the customer to have a conversation with the advisor to find the best car for him/her. The following is a screenshot of the site:
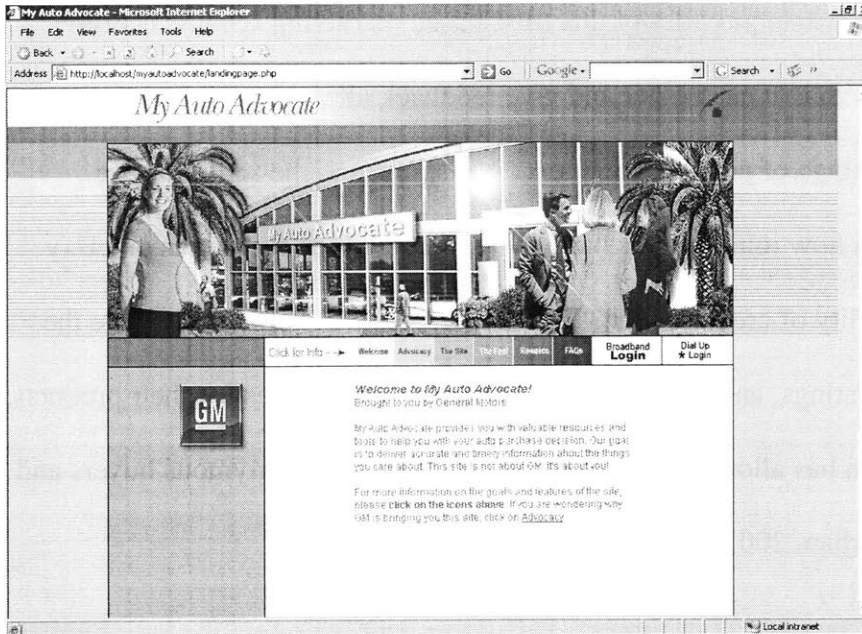
Figure 2: *My Auto Advocate* **Homepage**

The initial homepage of the site provided information about the site, advocacy, and the

rewards program. After the user logged in, he/she could view a panoramic virtual

showroom which simulated a 360-degree view.
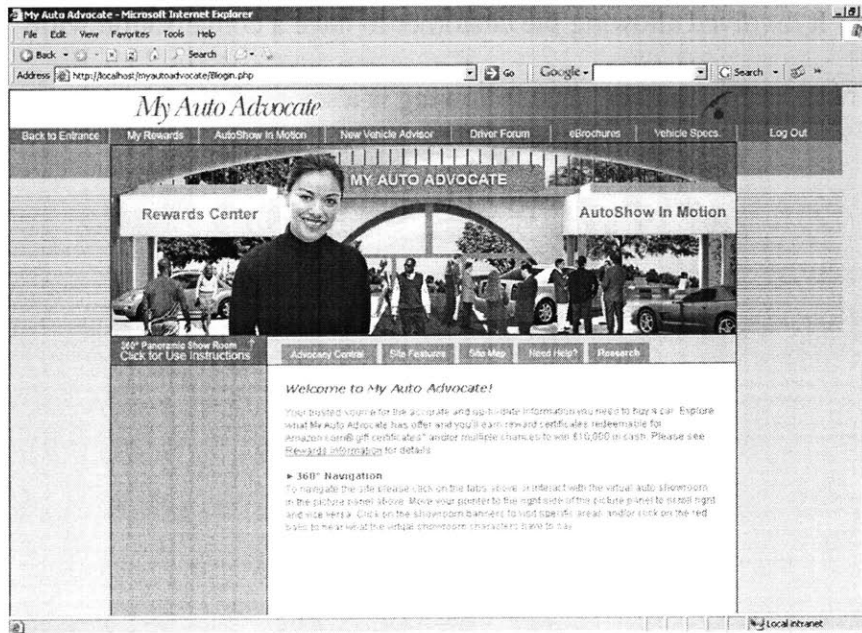
Figure 3: *My Auto Advocate* **Panorama**

Within the panorama, the primary image is of Jen, the *My Auto Advocate* virtual advisor. Jen introduces herself with a bubble of text and helps provide a dialog with the customer. The site then provided different booths that the customer could go to, including Brochures, Vehicle Specifications, Rewards Center, and Driver Forum. One very unique booth was *AutoShow In Motion*, which allowed the user to schedule test drives for cars. Advocacy Central provided frequently asked questions and the answers to those. The site was designed with the purpose of advocacy in mind, meaning to provide the customer with open and honest information in order to help GM establish a positive relationship with the customer.

Although the GM project was put on hold this past year, the site was maintained and Dr. Urban maintained the relationship with GM. The General Motors project will continue next year, and the site will be tested at the dealer level. Dr. Urban and Clarence Lee, a research assistant for next year, recently attended a meeting in Phoenix with GM. The meeting discussed how the project would continue in the coming year.

Purpose of Thesis

The project this past year dealt with Suruga Bank, and was an extension of the General Motors project. Similar to GM, The Suruga project implements the advocacy methodology discussed by Dr. Urban. However, in contrast to GM, the Suruga project was done in an international setting, namely Japan. One cultural difference is that in Japan, it is common to use a cartoon as an advisor rather whereas in the United States,

almost every site contains pictures of human beings. The Suruga project thus examined the effects of a human picture vs. a cartoon picture in establishing trust with the customer. Furthermore, in Japan, it is often looked down upon to display the products of your competition whereas this is common practice in the United States. Thus, the project tested another variable which was whether to include an advisor comparing Suruga to its competition.

The thesis is organized into several parts. It began with background information regarding marketing, trust, and customer advocacy using concepts from Dr. Urban's book Don't Just Relate—Advocate. It then discussed the GM project which was the precursor to the Suruga project. The focus of the thesis is on the Suruga project and it goes on to discuss the main features of the site, including the panoramic image and the different booths. After that, it focuses on the primary feature—the Loan Desk—in which we built a complete loan advisor. It discusses the different types of loans Suruga offers and the features of the loan advisor including the loan calculators. Next, it explains the competitor advisor which compares Suruga to other banks. Finally, it discusses the five different version of the site for the market research study. The next section afterward addresses some of the major technical challenges of the project. It then wraps up with a summary and acknowledgement section

The Suruga Bank Project

Suruga Bank is a Japanese-based commercial bank that offers a variety of products and services. Their business model is that although their interest rates may be slightly higher than that of other banks, they offer loans to the largest range of customers (including high-risk customers), and provide the best and most honest advice for their customers. Their model seemed to follow concepts similar to Dr. Urban's ideas on customer advocacy, making them a good candidate to implement a trust-based advisor.

The increased popularity of the internet and of e-commerce has caused many companies to develop online services. Most American commercial banks such as Bank of America, Citizens Bank, and JP Morgan Chase have online banking services allowing consumers to manage their accounts and make payments online. This project involves developing a website for Suruga Bank located in Japan that would allow customers find the best loan for them online. Suruga Bank's website is located at http://www.surugabank.co.jp/. The new site we built for Suruga will be an linked from current website, giving Suruga Bank an advisor-based system to allow its to apply for loans.

From *My Auto Advocate* to *My Suruga Advocate*

This same concept was applied to *My Suruga Advocate*, an advisor designed for Suruga Bank, a Japanese bank. Suruga Bank aimed to makes its loan recommendations available to customers by having them fill out a simple questionnaire. Using similar concepts as *My Auto Advocate* of the advisor and trust-based marketing, we designed *My Suruga*

Advocate to find the best loan for the customer, whether that loan was at Suruga Bank or even one of its competitors. The following is a screenshot of the *My Suruga Advocate* homepage
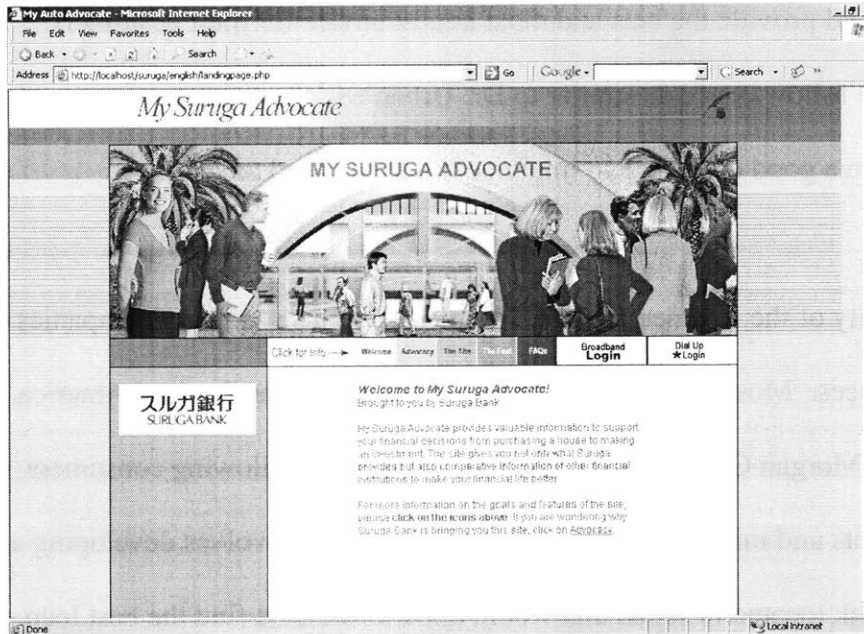
**Figure 4:** *My Suruga Advocate* **Homepage**

My Suruga Advocate provides valuable information to customers to support their financial decisions. The site tells the user not only what Suruga provides but also comparative information of other financial institutions to make his financial life better. Suruga's mission is to give direction and a timeframe to customer goals as a "life and business concierge bank." The site will offer "advocacy", the act of giving advice in favor of something or someone that you believe in. It will allow Suruga's customers to have access to reliable and up-to-date information about the products it sells and the products that its competitors sell. For Suruga, "advocacy" means to support the customer's financial needs in various life scenarios in a fair and transparent manner. *My*

Suruga Advocate provides self-financial support to gain financial knowledge for choosing the most appropriate products and services to meet the customer's financial needs.

My Suruga Advocate also brings together resources that helps customer make informed decisions about financial products that they want to purchase. Many other financial sites are built with only sales in mind. However, the goal of *My Suruga Advocate* is not just to post high sales, but also to give Suruga's customers honest and complete information so they can be truly confident about their financial decisions. Financial products vary from simple deposits to complex investments and mortgage loans. *My Suruga Advocate* resolves the ambiguity for confusing financial products and services.

Site Design

The homepage of *My Suruga Advocate* is similar to that of *My Auto Advocate*. The page contains some information about the site, about advocacy, and about the look and feel. After the user logs in, clicking on the "Broadband Login" or "Dial-Up Login" button, there is a new panoramic image displayed showing a bank rather than the old auto-show. The user is able to move from one side of the panorama to the other as before and click on the booths to link himself to specific parts of the website. The panorama uses the same background image as *My Auto Advocate* but with different imagery inserted such using desks to replace cars.
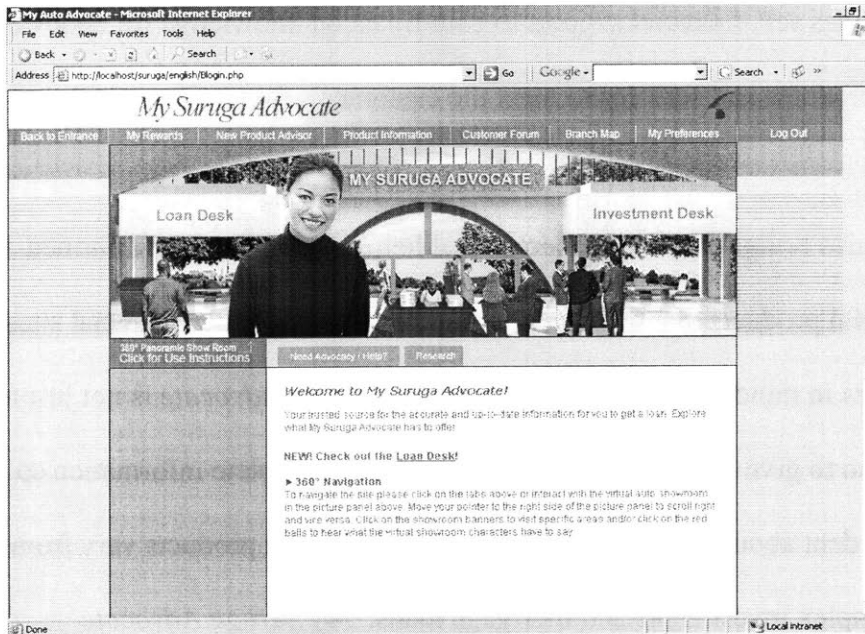
Figure 5: *My Suruga Advocate* **Panorama**

The site was designed with the look and feel of a virtual branch. This way, the customer

is in control of what he wants to see, how he wants to see it, and who he wants to talk to

about his financial decisions. Once the customer logs in, he can click on the various

menu tabs or explore the panoramic virtual bank image and click on the various banners.

My Suruga Advocate is designed to bring customers into their closest branch from their

home. The concierge navigates the customers to much needed information in the 360-

degree panoramic image, giving the customer the feel of a live branch.

Panoramic Image Booths

My Suruga Advocate includes seven types of booths in the panoramic image. These

booths provide links to the specific features of the site such as loans and investments.

The seven booths are listed below:

Advocacy Concierge Desk: provides frequently asked questions about the site in general. It will answer questions related to why the user should use *My Suruga Advocate*.

Financial Advisor: allows the user to search for advice in making financial decisions. It will provide a search through many different types of loans, investments, or anything else the user is looking for.

Teller: is simply a link to online banking, allowing the user to manage his account online by examining its current activity and making payments.

Loan Desk: links to the loan advisor, allowing the user to find the best loan to suit their needs and also examine loans from other banks.

Investment Desk: allows the user to make investment decisions online and transfer funds from one form on investment to another, from savings accounts to certificate of deposit (CD's) and more.

Foreign Exchange Desk: allows the user to exchange his currency online.

SME Desk: stands for small to medium enterprises and allows the user to handle the loan and investment decisions for a small to medium sized-corporation.

The goal of the project this year was to implement only the Loan Desk feature. The other features may be implemented later depending on the performance of the Loan Desk in market research.

Loan Desk

The loan desk is the primary focus of the Suruga Bank project this year. Since loans are extremely common, it was one product that could be easily tested in Japan. The loan desk in the panorama links to the *My Suruga Advocate* loan advisor.
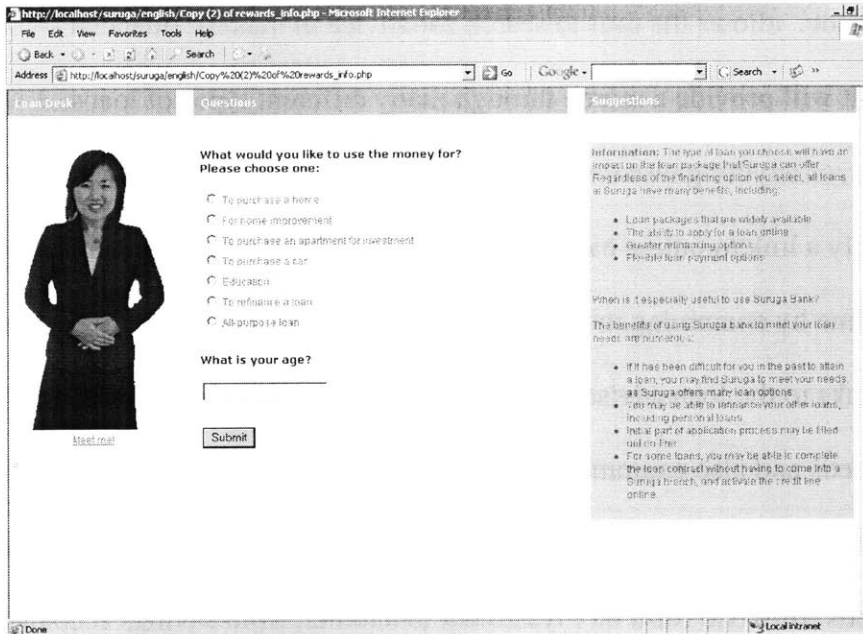
Figure 6: Loan Advisor Homepage

The loan advisor opens up with a picture of a woman, Yuki Tsurumi, an employee of Suruga Bank. Yuki serves as our loan advisor, providing advice about the loan. There is a link below her picture that provides additional information about her. The pictures were taken at Suruga Bank in Japan and sent over here electronically. After editing them in Macromedia Fireworks to smooth out the edges, they were ready to be displayed on the site.

Notice on the right-hand side, there are suggestions regarding the type of loan to choose and why it is useful to use Suruga Bank. By offering these suggestions, we hope to establish trust with the customer. After selecting the type of loan and answering a

question about the age, the customer then goes to the next page which is a customized set of questions depending on the type of loan he/she selected.

Home Loan

Home loans or mortgages are one of the most common types of loans. They were ideal for adding additional features because of their widespread use, and because they were the most complex loan product that Suruga provided. The home loan questionnaire is significantly longer than the other loans because more information is needed about the customer to find the right home loan for them.
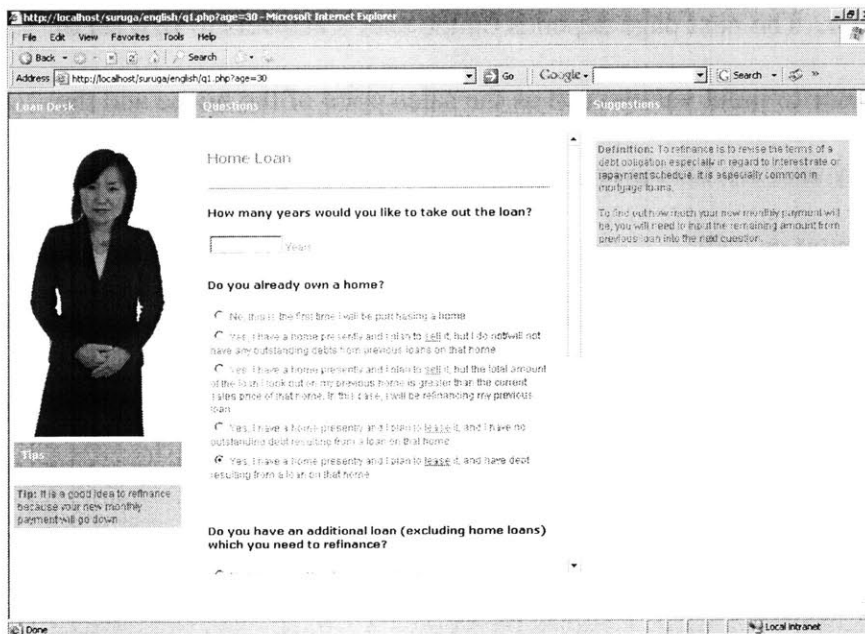

Figure 7: Home Loan Questionnaire

The first page of the questionnaire asks the user questions about the how long he/she would like the loan, whether he/she already owns a home, needs to refinance an

additional loan, and asks him/her to check off conditions which may qualify them for

certain types of loans. As the user clicks on the different answer choices, the text on the

right-hand "Suggestions" table changes and provides the user with information about

each of the choices. On some answer choices, a tip below the picture of Yuki is

displayed as well, offering more key points. By showing a picture of a woman who

works at the bank and offering tips and suggestions, we hoped to establish trust with the

user. The advisor was aimed to be conversational rather than talking at the user,

following Dr. Urban's advice on how to market to customers today.

On every page, there is also a home and back button that allows the user to navigate more

easily around the advisor. The next page depends on the user's answers to first set of

questions. It asks the user to input values such as the sales price of the house and the

down payment, and may also ask for the amount of debt to pay off of a previous home

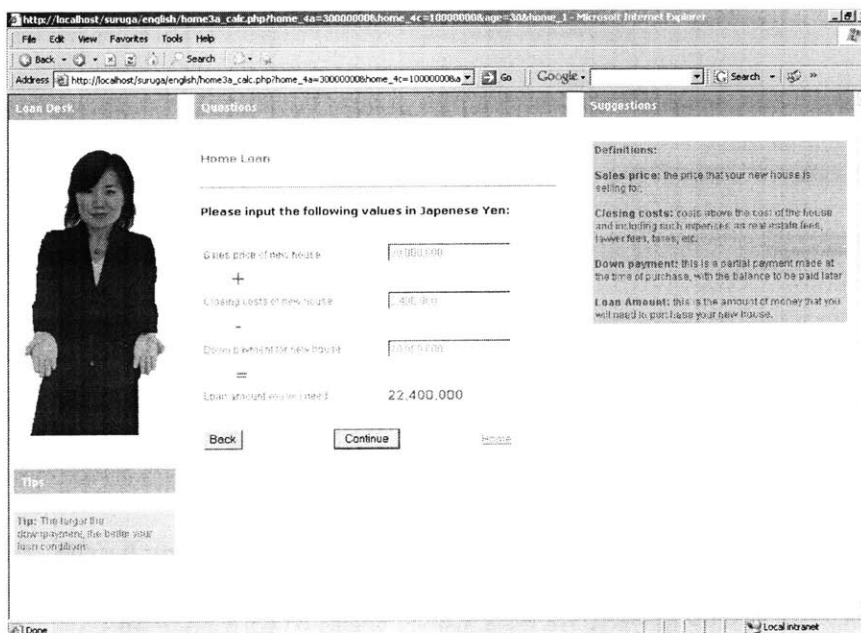and the refinancing amount as well.

Figure 8: Loan Input Values

The closing costs are estimated to be 8% of the sales price. After these values have been entered, the total loan amount is calculated as shown in the screenshot above. On the right hand size, the terms are all defined for the user.

Loan Recommendation

Finally, based on the answers to these questions, Suruga is able to provide a loan recommendation to the customer:
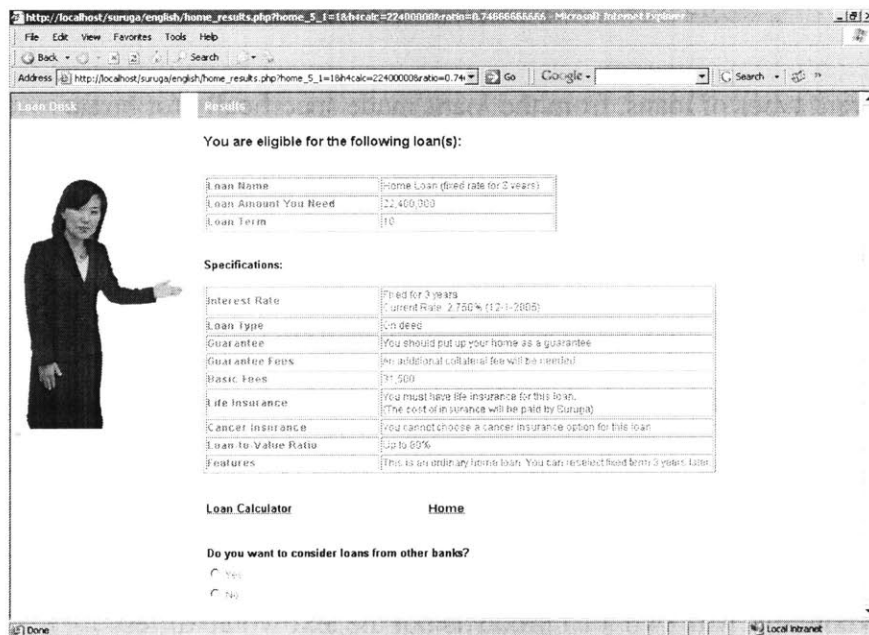
Figure 9: Loan Recommendation

The name of the loan, the loan amount, and the loan term are provided in the table at the top. The specifications are outlined below it as well which include:

> **Interest Rate**—the current interest rate of the loan and the length of the fixed
>
> period
>
> **Loan Type**—whether the loan is of type "on deed" or not

Guarantee—describes what assets need to be provided to back up the loan

Guarantee Fees—describes any fees associated with the guarantee

Basic Fees—includes all fees associated with the loan

Life Insurance—whether life insurance is required to take out the loan

Cancer Insurance—whether the loan provides a cancer insurance option as well

Loan to Value Ratio—the upper bound for the ratio of the loan amount to the
value of what you are trying to purchase

Features—describes any other features associated with the loan

Suruga has many different types of loans, from the loans made specifically for home mortgages to those for cars, education, etc. For the loan recommendation, Suruga would often recommend more than one loan for a particular customer or a combination of loans. In order to implement this feature, three different results pages were used depending on the number of loans that were recommended. For example, if only one loan was recommended for the user, the user would be directed to the page that displays only one column with one loan. If two loans were recommended, the user would be directly to a page that displays two columns with two loan products but the text would differ depending on whether Suruga recommended that the user used a combination of the two loans or should choose either one of the two loans.

At the bottom of the page, the advisor asks the user if he/she would like to consider loans from other banks as well. If the user selects yes, the loan advisor takes them to the loan competitor advisor; otherwise it thanks them for completing the questionnaire. By

offering the customer a choice to examine the competitors, we hope to establish greater

trust and ensure that Suruga is providing open and honest advice for its customers.

Loan Competitor Advisor

Unlike the United States, in Japan, it is often looked down upon to display products from

the competitors for comparison. We wanted to test whether having the loan competitor

advisor was actually helpful for building trust so we created multiple versions of the site,

some of which included the competitor advisor and some of which left it out. The

purpose of the loan competitor advisor is to provide the customer with open and honest

advice regarding Suruga's competitors. The first page of the advisor reminds the

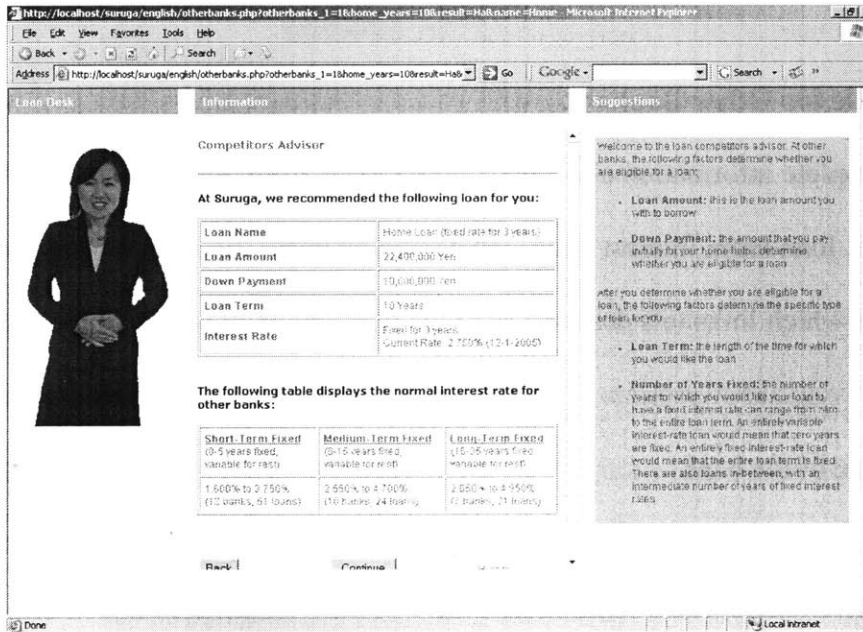customer of the loan that Suruga has recommended for him/her.

Figure 10: Loan Competitor Advisor Page 1

The important terms such as loan amount and down payment are defined for the user on the right. The second table displays the range of interest rates for other banks depending on the length of the fixed term. The user can click the cells in the table to find the detailed chart of loans at other banks:

L-S

	Bank	Loan Type	Fixed Term	Loan Term	Regular Rate	Campaign Type	Campaign Spread	Actual Rate
Graph	TM-UFJ	variable	N/A	2-35	2.375%	C	-0.700%	1.675%
Graph	TM-UFJ	fixed	1	2-35	2.050%	C	-0.700%	1.350%
Graph	TM-UFJ	fixed	2	2-35	2.100%	C	-0.700%	1.400%
Graph	TM-UFJ	fixed	3	3	2.350%	D	N/A	0.850%
Graph	TM-UFJ	fixed	3	3-35	2.350%	C	-0.700%	1.650%
Graph	TM-UFJ	fixed	5	5	3.050%	D	N/A	1.450%
Graph	TM-UFJ	fixed	5	4-35	3.050%	C	-0.700%	2.350%
Graph	Mizuho	variable	N/A	1-35	2.375%	C	-0.700%	1.675%
Graph	Mizuho	fixed	2	2-35	2.000%	C	-0.700%	1.300%
Graph	Mizuho	fixed	3	3-35	2.250%	C	-0.700%	1.550%
Graph	Mizuho	fixed	5	4-35	3.000%	C	-0.700%	2.300%
Graph	SMBC	variable	N/A	1-35	2.375%	C	-0.700%	1.675%
Graph	SMBC	fixed	2	2-35	2.100%	C	-0.700%	1.400%
Graph	SMBC	fixed	3	3-35	2.350%	C	-0.700%	1.650%
Graph	SMBC	fixed	5	4-35	3.050%	C	-0.700%	2.350%
Graph	Resona	variable	N/A	1-35	2.375%	C	-0.700%	1.675%
Graph	Resona	fixed	2	2-35	2.100%	C	-0.700%	1.400%
Graph	Resona	fixed	3	3-35	2.400%	C	-0.700%	1.700%
Graph	Resona	fixed	5	4-35	3.050%	C	-0.700%	2.350%
Graph	Shinsei	variable	N/A	1-35	N/A	C	N/A	N/A

Figure 11: Loan Table for Other Banks

The table provides complete information about each of the loans from other banks including the loan type, loan term, interest rates, and campaign rates. Each of the column heading can be clicked which links to a description of the term and they include the following:

Bank: the name of the bank

Loan Type: either fixed or variable depending on whether the loan has a fixed

term

**Loan Term**: the length of the loan period

Regular Rate: the interest rate of the loan before any adjustments are made

Campaign Type: certain customers are eligible to qualify for campaigns which may provide them with a discount on the interest rate.

Campaign Spread: the interest rate discount provided by the campaign type

Actual Rate: the interest rate after the campaign spread has been applied to the regular rate

On the left-hand side, we provide links to graphs for each of the different types of loans so the customer can view the time-interest rate of the loan visually:
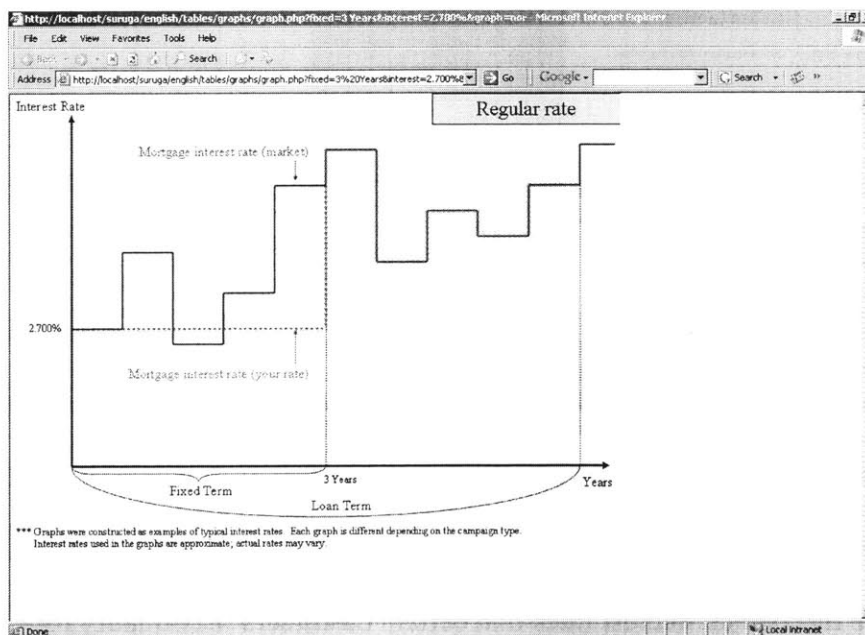

Figure 12: Loan Graph

The graph displays how the interest rate varies with time. For this particular graph, the fixed term is three years, and the interest rate is fixed at 2.700% for those years. After the fixed term, the interest rate will vary during the variable term. The dotted red line describes the interest rate during the fixed period and that the interest rate will stay the same regardless of what the market rate (blue line) is. However, after the fixed period

21

end, the interest rate of the loan follows the market rate. There is also a warning at the bottom of the page saying that these graphs simply reflect estimates and that the actual rates may vary.

As the user continues with the loan competitor advisor, the next table displays similar information except for the campaign rates:
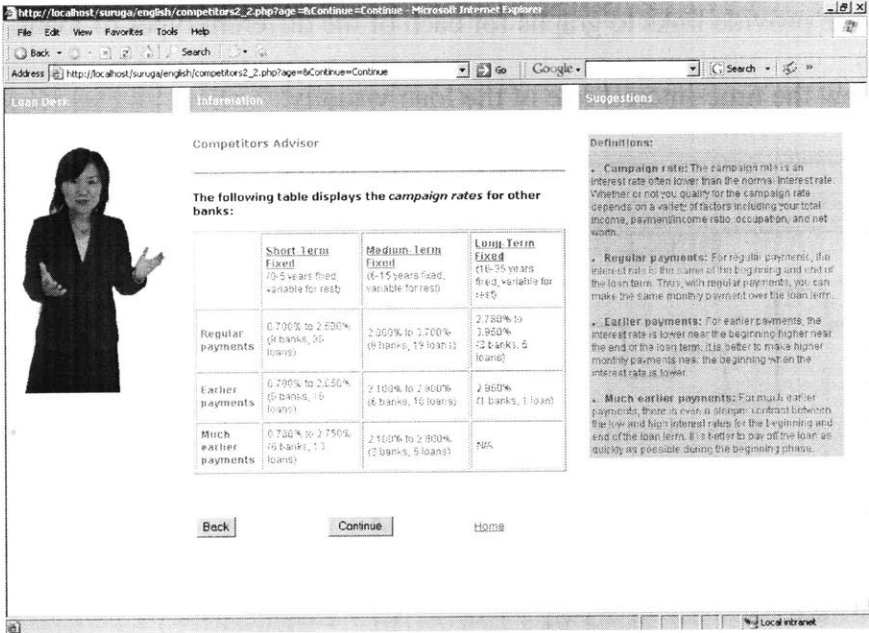
Figure 13: Campaign Table

The campaign rates are discounted interest rates that certain customers may qualify for based on their total income, payment/income ratio, occupation, and net worth. The customer can also specify whether he would like to pay off the loan with the same monthly payment every time or pay off the loan earlier. Different sets of loans are provided for those who would like to pay off their loans earlier, because the interest rates will vary. Like the other normal interest rate table, the user can click on the cells of this

table as well to find out more detailed information about the loans from other banks, and click on graph links to view a graph for each specific loan.

On the last page of the loan competitor advisor, we provide links to Suruga Bank as well as all of its competitors. By offering the user links to other banks' sites, we hope to again stress that we are providing open and honest information, and want the best loan for the customer, not just for Suruga's own gain. We do, however, state the advantages of using Suruga Bank such as providing loans to a wider range of people.

Loan Calculators

There are two types of loan calculators that we provide: the regular loan calculator and the refinance calculator. On the loan recommendation page, we provide a link to the regular loan calculator. In this calculator, using the loan that we recommended and a few

additional user inputs, we provide the user with his monthly payment information.
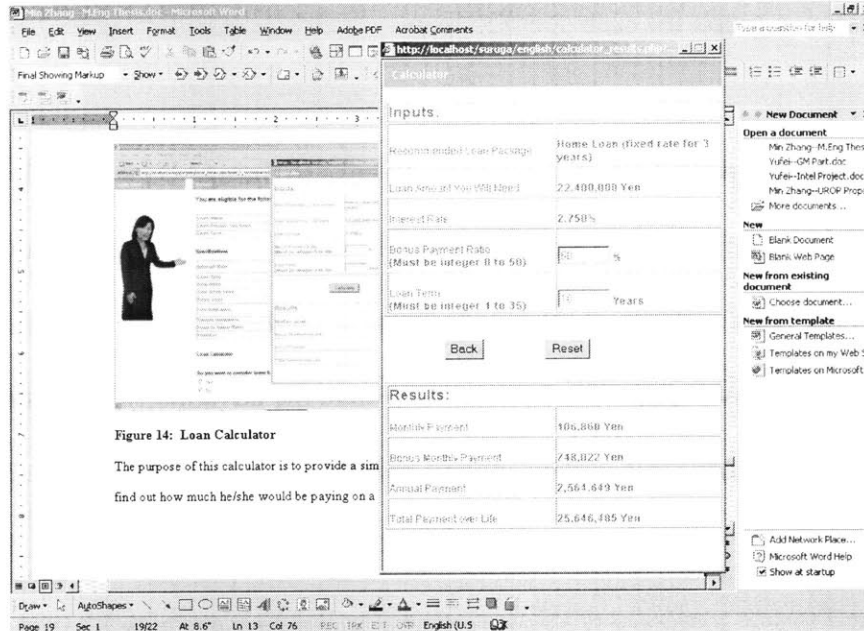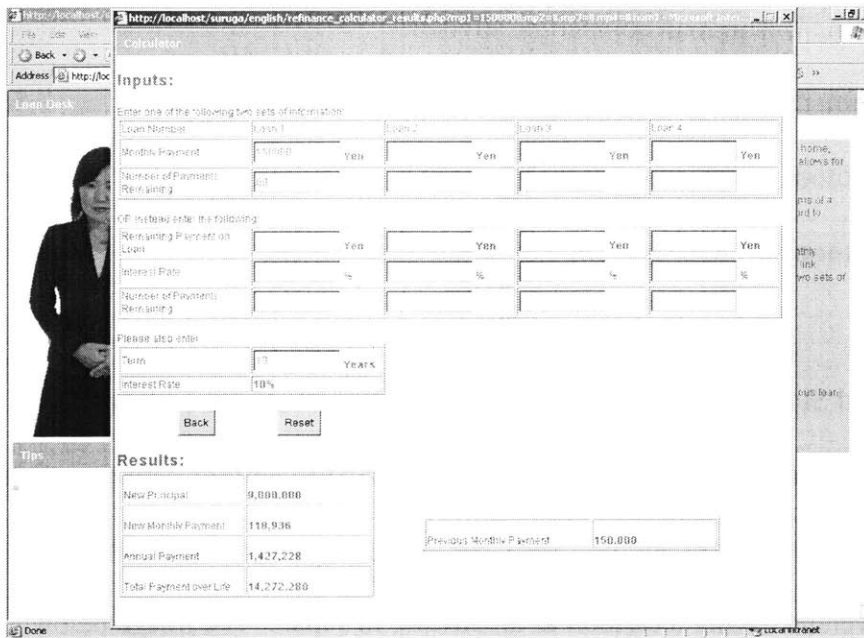

Figure 14: Loan Calculator

The purpose of this calculator is to provide a simple and effective way for the customer to find out how much he/she would be paying on a monthly basis. The customer can vary the bonus payment ratio and loan term to examine how they affect the monthly payment.

The other calculator provided on the site is the refinance calculator. The refinance calculator applies only to cases where the customer would like to refinance an existing loan. If the user clicks that he needs to refinance an existing loan on the first page of the home loan questionnaire, a link is provided on the right-hand side to the refinance calculator.

Figure 15: Refinance Calculator

In the refinance calculator, the user can input values for up to four different loans. After these values have been put in, the user can click "calculate" to find the new principal for the loan and the new monthly payment. They can then compare this to the previous monthly payment. Like the loan calculator, the refinance calculator provides a way for the customer to numerically qualify how much they would be paying for a loan, and change the inputs to see how it would affect his/her monthly payment and loan principal.

Four Versions of the Home Loan Advisor

For the market research study, there will be four different version of the home loan advisor. The two variables that will be altered are whether or not to include the competitor advisor, and whether to use the image of the woman or an image of a cartoon as the advisor. The four versions would be:

1. Image of woman, with loan competitor advisor

2. Image of woman, without loan competitor advisor

3. Image of cartoon, with loan competitor advisor

4. Image of cartoon, without loan competitor advisor

In contrast to the United States, cartoons are often used in place of people in Japan when it comes to websites. On the actual Suruga Bank website, they use various cartoons when describing their products rather than people. Thus, we want to test the effect of having a person as the advisor versus having a cartoon as an advisor in Japan. The image below shows the first page of the loan advisor but in place of the woman is a cartoon:

The other variable is whether or not to include the loan competitor advisor that links from the loan recommendation page. In Japan, it is often viewed upon negatively to directly compare your bank to other banks whereas this is openly acceptable in the United States. However, in order to provide open and honest advice, we would like to include information about the competitor as well. We want to test the effect of this variable in Japan as well.

The Control and the Tests

In addition to the four versions of the home loan advisor, we also designed a control:

Figure 16: Suruga Site Control

The control is simply a section of the current Suruga Bank site, located at:

http://www.surugabank.co.jp/surugabank/01/05/10/0105100000.html. It does not link to

our advisor. In order to allow the user to navigate the control locally, the sections of the

site deemed necessary were saved as HTML, and modified using Dreamweaver get rid of

excess imagery or text. The links were all preserved as well.

For the four different test cells, the image is shown below:
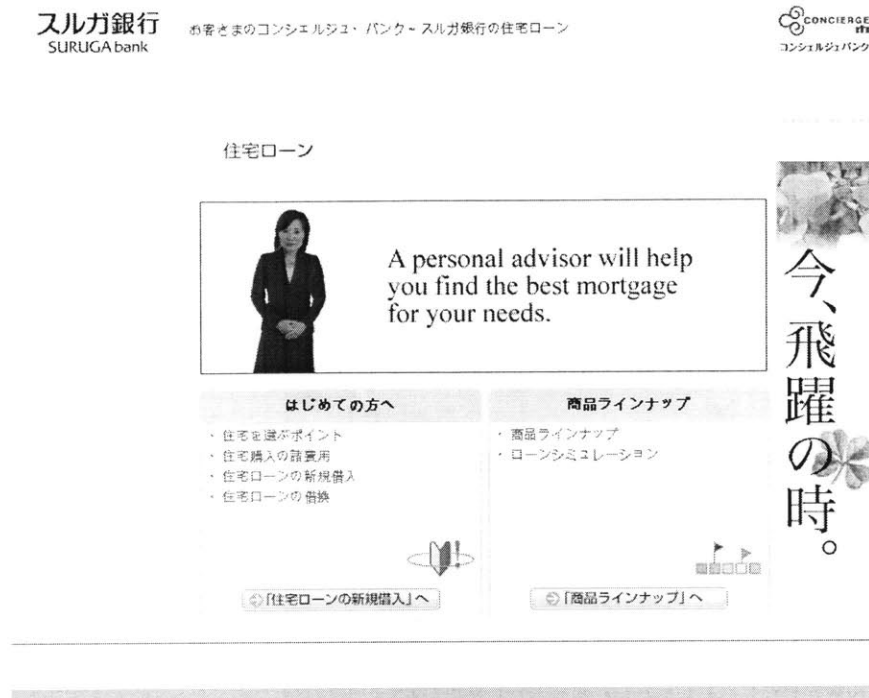
Figure 17: Suruga Site with Human Advisor Link

Notice that the center image has changed. Instead of linking to the Suruga Bank site, it links to the loan advisor. Two of the tests will use this image while the other two tests will use the cartoon image:

住宅ローン

A personal advisor will help you find the best mortgage for your needs.

今、飛躍の時。
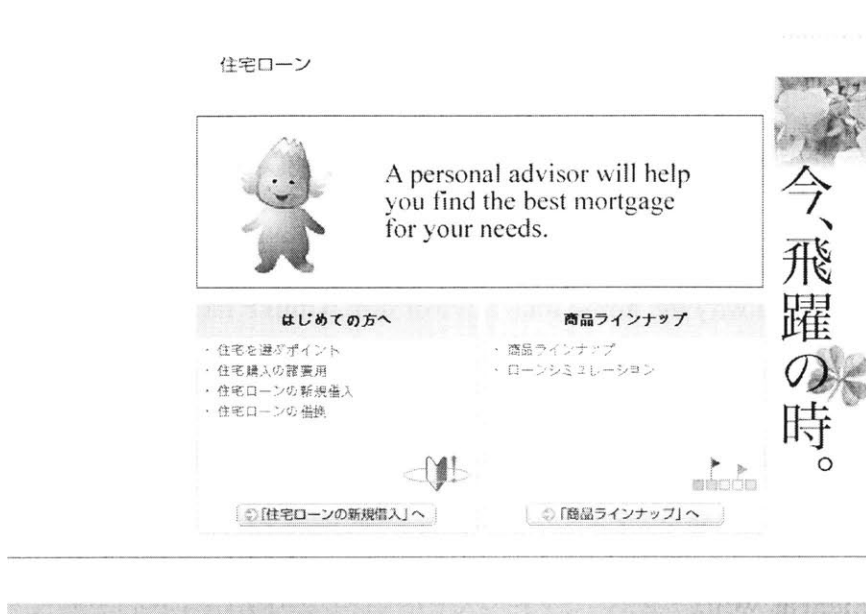
Figure 18: Suruga Site with Cartoon Advisor Link

The only difference here is that an image of a cartoon is used in place of the image of a person.

Other Types of Loans

While home loans were the primary focus of this year's project, we designed advisors for all the other types of loans Suruga offered as well, including loans for:

Home Improvement

Purchasing an Apartment for Investment

Purchasing a Car

Education

Refinancing an Existing Loan

All-Purposes

These loan advisors follow a similar structure to the one for home loans but are generally simpler and ask fewer questions. Most of these advisors simply ask two to three questions inquiring about the loan amount, whether the customer is currently taking a long with Suruga, and whether the customer will be using any Suruga loans in the future. Based on the answers to these questions, it is able to come up with a loan recommendation similar to the way the home loan advisor did. Unlike the home loan advisor, the advisor for these loans does not offer a competitor advisor after the loan recommendation. The competitor advisor was done only for home loans because its effectiveness is still being tested. In the future, competitor advisors for the other types of loans may be implemented as well.

Market Research

Since the Suruga site implementation is almost complete, the next step is to test it in a market research study. To do this, we designed a market research questionnaire which asked the user to rate the site in a variety of categories. Our target was to get 1000 subjects for market research. The first 200 will use the control which is an unmodified version of the current Suruga Bank website. The other 800 will be split even among the four different sites:

1. Image of woman, with loan competitor advisor

2. Image of woman, without loan competitor advisor

3. Image of cartoon, with loan competitor advisor

4. Image of cartoon, without loan competitor advisor

Once we obtain the results of this study, we can measure each of the four tests against the control, as well as measure their performance against each other. It will help us conclude whether an image of a woman or cartoon is more effective in building trust, and whether having the competitor advisor is helpful as well.

Methods and Challenges

Session Variables

Throughout the design of the sites, there were many challenges. One challenge was to capture a variable from one page to the next without submitting the page. For example, we want every page to know whether to display the picture of the woman or the cartoon depending on one variable set in the homepage. In order to do this, the best approach was using **session variables** in PHP. Session variables can be stored on any page and accessed on any other page. The only thing required is to perform a: session_start() on each page that uses a session variable. The following code below provides an example of how session variables are turned on and how they are set:

```
session_start();
$_SESSION["image"] = "person";
```

Every page then contains an *if* statement to determine whether to display an image of a woman or a cartoon:

```
if ($_SESSION["image"] == "cartoon") {
        echo "<img src=\"Images_Suruga/Cartoon/cartoon1.gif\"><br>";
} else {
echo "<img src=\"Images_Suruga/Loan_Advisor/DSC00823.jpg\"><br>";
}
```

31

The first line says to check if the session variable "image" is equal to "cartoon. If this is true, it displays the image of the cartoon; otherwise, it displays the image of the person.

Include Files

One very useful feature of PHP was the include feature. "Include" allows PHP all the code from a particular file. The reason this feature is useful is that is allows the files to be much more modular. On the homepage, we have: include("LoanHeader.php"); as we do on many other pages as well. We can simply "include" one header file on all the pages, and if we wanted to make a change to this header, we would only need to change the header file instead of changing all the files which call the header file.

HTML Forms and Hidden Inputs

HTML forms were used to design the questions for the site. The forms included features such as radio buttons, input boxes, and provided a simple way for HTML pages to communicate with one another. When moving from one form to the next, a "Submit" was performed, allowing the next page access to the answers of the questions on the previous page. As the questionnaire continued onto the third page, the third page would sometimes need access to variables on the first page. This was done in two different ways: one was to use session variables as discussed earlier and the other way involved using hidden inputs. This method is shown below:

```
<input type="hidden" name="age" value=<?php echo $_REQUEST["age"];?>>
<input type="hidden" name="home_1" value=<?php echo $_REQUEST["home_1"];?>>
```

```
<input type="hidden" name="home_2" value=<?php echo $_REQUEST["home_2"];?>>
```

Note that on this page, the values for "age", "home_1" and "home_2" are passed to the next page when the form is submitted. Thus, the next page would have access to these three variables in addition to all the questions answered on the previous page. Hidden inputs provide an alternative to session variables in order for HTML pages to communicate with a page was not directly before it.

Dynamic Text

The text on the right hand side of the loan advisor, under the "Suggestions" section, needed to change constantly to reflect what the user has clicked. First the table needed an ID to identify it. This ID was set using the id= attribute within a table cell. In order for the contents of the cell to change, we used a Javascript function within the HTML form:

```
<input type="radio" name="home_1" value="1" onClick="setSuggestions1_1()">
```

The above code describes a radio button. When it is clicked, the function setSuggestions1_1() is called, which modifies the text in the suggestions column. The code for setSuggestions1_1() is shown below:

```
function setSuggestions1_1() {
        var suggestionsData=document.getElementById('suggestionsData');
        var text1_1 = "<b>Information: </b>For first time home purchasers, Suruga
                offers attractive home loans and friendly service to meet your needs.";
        suggestionsData.innerHTML = text1_1;

        var tipData=document.getElementById('tipData');
        tipData.innerHTML="";
}
```

The function modifies the table by getting the tableId, which is suggestionsData. It then

modifies the innerHTML within that table. For this particular radio button, there is no

data in the "Tips" section below the picture of the advisor, so the tipData HTML is set to

an empty string.

Validators

The Suruga site required the user to input many different values, from input boxes to

specify their age or loan term, to radio buttons to indicate which answer choice

corresponds to their situation. If the user skipped the question or did not input the value,

we want to be able to check for this and not continue the questionnaire until the user has

finished the current questions. Validators in Javascript were used to check for this. A

validator is simply a function written to check if the user has completed a certain question

in the document; namely it checks if that field is empty or missing. The following is an

example of how validators were used on the first page of the home loan questionnaire:

```
<script type="text/javascript">

function validate(thisform) {

        // Validate loan term
                if (thisform.home_years.value.length == 0) {
                alert("Please enter the loan term");
                return false;
        }

        // Validate question 2
        completed = -1;
        for (i=thisform.home_1.length-1; i > -1; i--) {
                if (thisform.home_1[i].checked) {
                        completed = i;
                }
```

```
}
if (completed == -1) {
        alert("Please indicate whether you already have a home");
        return false;
}

// Validate question 3
completed = -1;
for (i=thisform.home_2.length-1; i > -1; i--) {
        if (thisform.home_2[i].checked) {
                completed = i;
        }
}
if (completed == -1) {
        alert("Please answer if you have any additional loans to refinance");
        return false;
}
</script>
```

Note that the first line says that the following code will be javascript. The first question asks for the loan term and checks that this field is not empty. Otherwise, it outputs an error message saying "Please enter the loan term." The second and third validator perform the same check except for the next two questions instead. These two both use radio buttons so instead of checking for an empty value, it looks to see if the radio button is checked. The following below is an example of the validator in action:
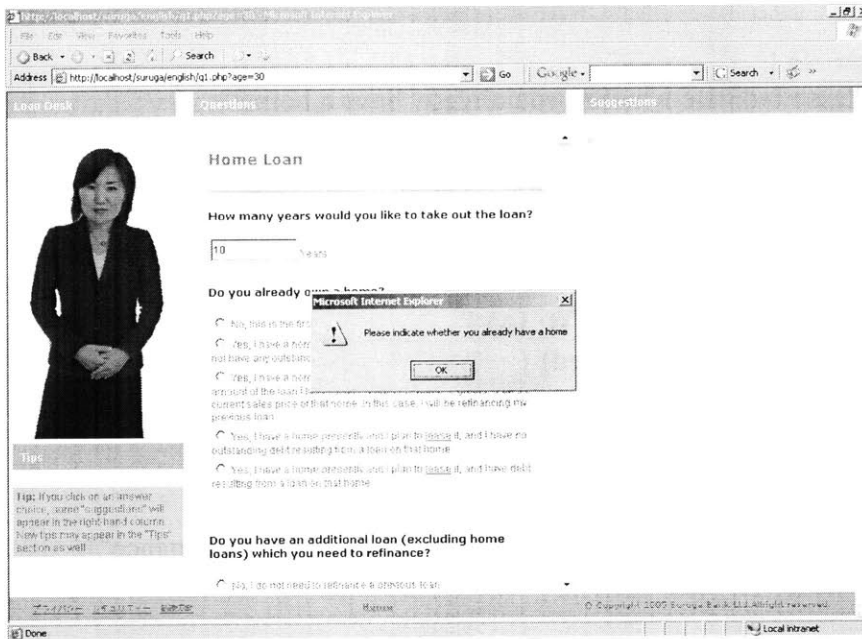
Figure 19: Validator Example

In this case, the user has put in the loan term but has not answered the next question about whether he/she already has a home. The validator first checks if question 1 is answered which it is. Then it checks to see if question 2 is answered and after looping through the radio button, it sees that none are checked, throwing the error message. The user must then answer question 2 before continuing with the questionnaire. Validators are extremely useful in making sure that the user completes the form so that there are no errors later in the questionnaire when other values will depend on the user's answers to these questions.

Loan Graph Generation

Another one of the challenges of the Suruga project was generating the graphs for all the different loans from other banks. There were several different types of graphs depending

on whether the loan type was fixed or variable and depending on the campaign. If the customer qualified for a campaign, he/she would be eligible for a campaign discount, effectively lowering their interest rate. There were 14 campaigns, lettered A through N with varying effects on the interest rate. To simply the way the graphs were generated, we decided to make represent each campaign with its own graph but to use the same graph for the loans within each campaign, only changing the label on the axes.
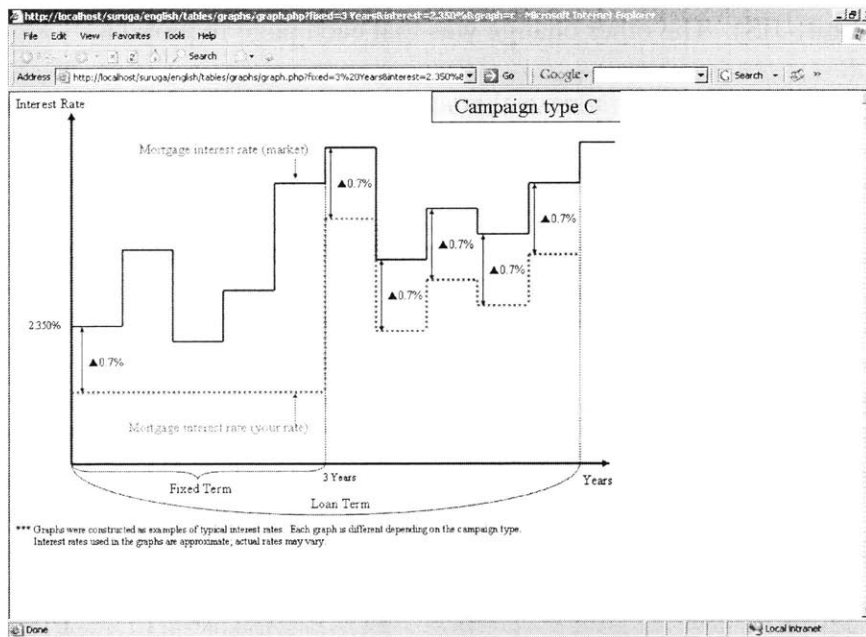
Figure 20: Campaign C Fixed Graph

The graph above is for a loan with a fixed interest rate of 2.350% for the first three years and is a campaign C type. The other loans within campaign C would use the same graph, except the label for "Fixed Term" and the initial interest rate would be different. Since some of the loans were extremely complex, the graphs were vital because they provided a way for the user to visually how the interest rate of the loan varies with time.

Translation

37

Because the Suruga site was to be tested in Japan, the entire site needed to be translated to Japanese. Yoshio Tokoro, an employee of Suruga Bank, performed the translation for all the text in the site. In order for Internet Explorer and other browsers to render Japanese text, a few changes in the code needed to be made to every page. The first one was within Dreamweaver, to perform a Modify-->Page Properties and to change the encoding to Japanese (Shift-JIS). The other change was that each page required a <meta> tag to identify that it was using Japanese characters. Thus, the following tag was included on every page:

```
<META http-equiv=Content-Type content="text/html; charset=Shift_JIS">
```

This tag sets the charset to Shift_JIS, indicating that the text in this page would include Japanese characters. After Yoshio completed the translation of the text, the english text could simply be replaced by Japanese text using copy/paste once these settings were in place.

Software and Programming Languages

Designing the Suruga website involved the use of several different kinds of software. The web design was done in Macromedia Dreamweaver. Macromedia Flash allowed us to generate the panoramic image, giving the user the feel of a live branch inside our virtual branch. Macromedia Fireworks and Adobe Photoshop were used to edit the

38

images for the site. WinSCP is used to transfer files from a local machine to the server, allowing us to update or copy specific files in the website with ease.

The web scripting language used to design the site was primarily PHP with HTML as well. Javascript was used in several instances as well. The British Telecom Project involved writing code in MatLab in addition to PHP and HTML.

Summary

It is important to note that although most of the work this year dealt with site implementation, the focus of Dr. Urban's research is on marketing. For Suruga, this involves testing an advisor and trust-based system of marketing on Japan. We also test the effect of a woman-advisor vs. that of a cartoon advisor. Due to the cultural differences, Japanese customers may have different reactions to having a competitor advisor, and thus we test this effect as well. The results of the market research study will be available approximately in September of 2006. The project will then continue and change based on the results of that study.

This thesis project helped me become a much more proficient web programmer. By solving the various problems outlined in the "Methods and Challenges" section, I've learned to use PHP, Javascript, and HTML at a high-level. Additionally, through solving some of these problems, I've become accustomed at using the online documentation and

performing various web searches to solve problems. The Suruga project has also taught me about the cultural differences between the US and Japan. Two key points which were examined in this project were the widespread use of cartoon images in Japan and the lack of a comparison to the competition because it was looked down upon in their culture.

From the weekly meetings to discuss the project and plan out the market research study, I learned about the marketing aspect of the project, in terms of how to plan out a study and implement a questionnaire. From this project, I hope to pass on a few of the key technical aspects such as using session variables, include files and validators. I also hope to pass on the experience of learning about another country and designing a marketing study to find the best way to establish trust with customers in another country.

Acknowledgements

The Suruga Bank project was led by Dr. Glen L. Urban at the Sloan School of Management. The MIT team consists of Dr. Urban and two other team members in addition to me: Tilli Kalinsky and Yoshio Tokoro. Kalinsky is a second-year MBA student at Sloan, and Tokoro is an employee of Suruga Bank who speaks fluent Japanese as well as English. Kalinsky focused on providing the text for the suggestions and tips on the site, and the syntax of the questions, in addition to designing the questionnaire for the market research study. Since Tokoro is a Suruga employee, he understands the products and provided slides outlining the specifications for many aspects of the advisor. My role was to code and implement all the features in the advisor, and build the site from the ground up. The imagery on the homepage and the panorama used many of the same items as the images developed by Kevin Thompson from the General Motors project.

The British Telecom project also led by Dr. Urban included in addition to me: Tilli Kalinsky, Guilherme Liberali, Aman Narang, and Farenna Sultan. My role on this project was much smaller since Narang was the primary research assistant in charge of developing the site. Kalinsky again helped design the text for the site and the market research study. Liberali created an algorithm in the R language that implemented a Bayesian method of morphing the site. My role was to bridge the connection between R, MatLab, and PHP in order to ensure that Liberali's algorithm would be compatible with the site. I also helped in creating some of the morphs for the site.

References

Urban, Glen L. Don't Just Relate—Advocate. New Jersey: Wharton School Publishing, 2005.

Appendix

The British Telecom Project

The British Telecom project was centered on testing the effects of morphing on customers. Morphing meant that the webpage displayed would be different depending on the set of user clicks. The following categories were examined:

> **Analytic vs. Wholist**: An analytic person means that he/she is more detail-oriented whereas a wholist looks at the bigger picture and doesn't worry too much about the details.
> **Dominant vs. Submissive**: A dominant person would like to read text that is more direct-sounding whereas a submissive person would like to read text that is more suggestive and not as direct.
> **Impulsive vs. Deliberative**: Impulsive means that the user has a shorter attention span and would like to look at fewer things if possible. A deliberative user has a longer attention span and looks at everything on the page.
> **Verbal vs. Visual**: A verbal person is more receptive to words. He/she would like to read text or listen to text. A visual person would rather examine pictures such as charts/graphs.

A number between 0 and 1 would be assigned for each of the four values, indicating which side they are closer to (for examine, 0 would mean dominant, 1 would mean submissive, and 0.5 would mean about half dominant/half submissive). Depending on what the user has clicked on, the website could increase/decrease the values of each of the variables. For example, if the user clicked on a picture, the site would increase the verbal vs. visual variable toward the visual side. Thus, future pages would probably contain more charts/graphs for the user since we have determined him/her to be more of a visual person. The idea is to create a website that is dynamically tailored for a specific user.

PHP-MatLab-R Connection

With Suruga, my role was to design the entire site from the ground up but my role on the British Telecom (BT) project was much smaller. I was in charge of implementing one very specific feature for the BT site, namely bridging the connection between PHP and MatLab. For the BT site, we wanted to perform the morph in two different ways. One involved using an algorithm based on averaging and the other used a Bayesian-based algorithm. The averaging algorithm was relatively simple to implement as it only required a few code changes in PHP. However, the code for the Bayesian-based algorithm was developed by Guilherme Liberali in a different language, R. The problem was connecting R to PHP so that we could send inputs to the algorithm in R, running the algorithm, and then feeding the outputs back to PHP.

The approach we decided to take eventually was to use MatLab to bridge PHP and R. Liberali found a connection between MatLab and R in which he could run R scripts from MatLab and capture the outputs. My role was to bridge the connection between PHP and MatLab. The solution involved using a COM interface in PHP to communicate with Matlab, and feeding in the inputs to MatLab as character arrays. After the values were inputed, the script could be run in MatLab but it was first forced to convert these character arrays to integers to perform the numerical manipulations. After connecting with R and receiving the output from the R algorithm, the integers would have to be converted back to strings in order for PHP to receive the outputs from MatLab. The PHP code for this connection is shown below:

```php
// Creates the MatLab COM Interface
$matlab = new COM("matlab.application");

// Changes the directory to where the file is located
$matlab->Execute('cd \'C:\MATLAB6p5\work\'');

// Assigns the inputs variables
$a1 = $_SESSION['ia'];
$a2 = $_SESSION['ip'];
$a3 = $_SESSION['iq'];

// Inputs the variables to MatLab
$matlab->PutCharArray('a1', 'base', $a1);
$matlab->PutCharArray('a2', 'base', $a2);
$matlab->PutCharArray('a3', 'base', $a3);
$matlab->PutCharArray('b1', 'base', 0.5);
$matlab->PutCharArray('b2', 'base', 0.5);
$matlab->PutCharArray('b3', 'base', 0.5);

// Executes the MatLab script on the inputs
$matlab->Execute('[a_result1, a_result2, a_result3, b_result1, b_result2, b_result3] = numbers(a1, a2, a3, b1, b2, b3)');

// Get the output from MatLab and puts it in PHP variables
$a_result1 = $matlab->GetCharArray('a_result1','base');
$a_result2 = $matlab->GetCharArray('a_result2','base');
$a_result3 = $matlab->GetCharArray('a_result3','base');
$b_result1 = $matlab->GetCharArray('b_result1','base');
$b_result2 = $matlab->GetCharArray('b_result2','base');
$b_result3 = $matlab->GetCharArray('b_result3','base');
```

The code above is commented outlining the steps for the connection. The connection was the key in allowing Liberali's algorithm to be used with PHP.