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Discussion Paper WI-116

Customer Tracking in the Internet: New Perspectives on Web Site Controlling

by

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June 2002

in: Quarterly Journal of Electronic Commerce, 3, 3, 2002, p.235-245

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Customer Tracking in the Internet: New Perspectives on Web Site Controlling

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Abstract

Market pressure forces financial service providers to search for promising concepts to achieve success with private customers. The authors claim that it is reasonable to individualize financial solutions as well as interaction. The internet channel is suitable for this especially because of tremendous growth rates in usage and multimedia possibilities. Furthermore, due to economic reasons, financial service providers have to tighten control on their internet activities. Against this background, the authors show means for controlling web sites of the financial services industry. They have developed a system of measurements which helps to optimize web site operations. A central element is tracking the customer's behavior when interacting with the web site. By tightened controlling, furthermore, it is possible to individualize content and navigation according to the interests of individual users. The origin of this article is a project with a major German private bank. It also contains results of the FAN-project that the authors are members of. The FAN- project is sponsored by the national German research foundation DFG.

Keywords: web site controlling, web site management, web site individualization, customer tracking, web log mining, financial services industry

Introduction

This article is inspired by a project that the authors are currently doing with a major German private bank. The business of the bank is to provide individualized premium financial services to high net value customers. In the past these customers had individual consultants as predominant interface to the bank. In early internet times the bank had established a web site that offered information and interaction on a 'me too' level. The bank got aware of the fact that this will not be enough to meet customers' needs in the future and chose to go for a leading position in the FSI (Financial Services Industry) pear group. As a consequence, projects were started in order to improve the web site. With a rising number of projects, the success of projects got more important in order to determine in what direction the bank should go. Therefore, it was decided to develop a concept that was suitable to individualize the web site but also to control the usage of the web site. So the aim of this article is to show new means of managing web sites in respect of controlling and individualization. We will start by describing the market conditions that have led to a situation where individualization of communication with the customer and strict controlling of the bank's web activities is necessary. Then we will introduce our research framework. Goals and figures of web site controlling are subject of the next chapter. Thereafter, our focus will change to the use of data on customers for the individualization of the web site. Our article closes with an outlook on work that is still to be done.

Individualization as a Reaction to Market Developments in the Financial Services Industry

In the last years the business of (traditional) financial service providers has become more difficult. The internet lowered the barriers of entry as the importance of expensive branch

offices decreased. Innovative newcomers like e-trade (www.e-trade.com), netbank (www.netbank.com), consors (www.consors.de) etc. could easily enter the market. Consequently, prices for standardized products like brokerage or current accounts were beaten down dramatically. Additionally, the believe in high quality consultation through established players faded when a number of publications showed (e.g. Anonymous, 2000; Tennhagen, 2000) that low quality of consultation is not the exception but rather the standard. Being confronted with these developments the big and settled players realized that they have to overcome their old fashioned market treatment. Buhl et. al. (2001) who have described the development of markets in more detail recommend the production of individualized solutions instead of standardized products. Here individualization is meant as a kind of mass customization. Financial products are tailored to the individual customer's individual needs. The economic advantages which customers can gain from such individualized solutions have been calculated several times, e.g. in Wolfersberger (2002), Buhl et. al. (1999a) or Buhl et. al. (1999b). From the provider's point of view, this may lead to increased customer loyalty. The interaction and trust between customer and financial service provider has to be higher than with standard products. Tilmes (2000) estimates that the economic benefits of individualization in Germany for all involved parties could be worth about 750 million Euros.

The Role of the Internet Channel

When discussing banking and individualization it is also necessary to think about different channels of communication. Nowadays, the customer is able to interact face to face, by telephone, by www, etc. with his financial service provider. Thus, modern banking often is called "Multi-Channel Banking" (cp. Figure 1).

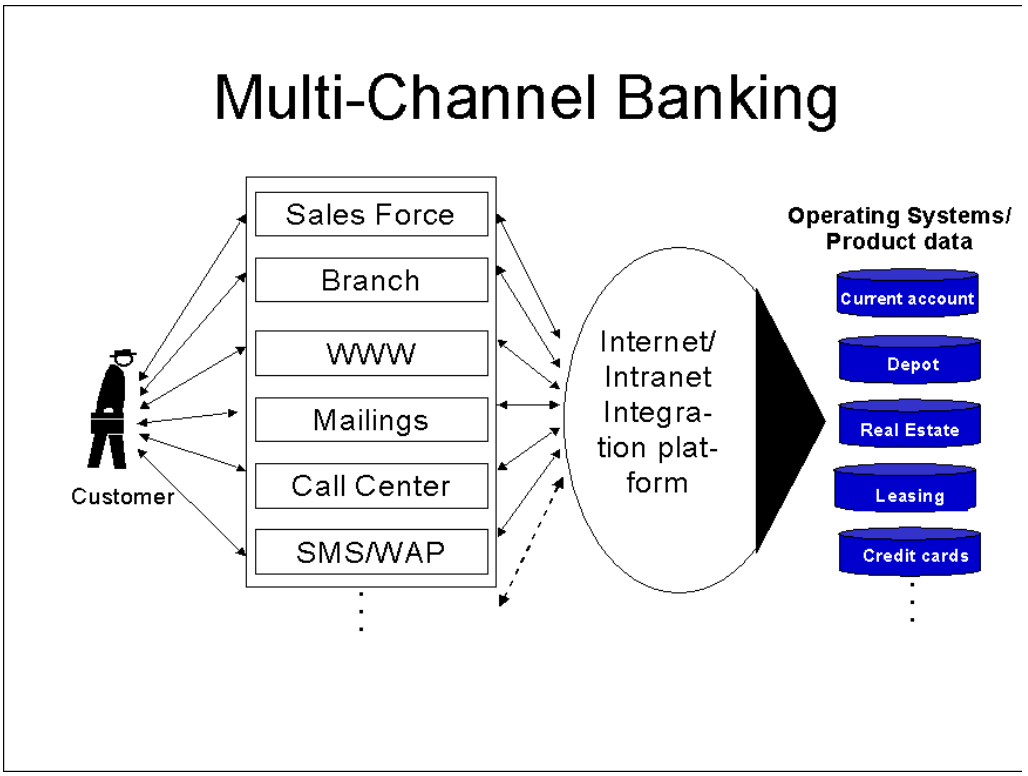

Figure 1: Multi-Channel Banking

In recent years, within the new channels the www has reached an outstanding position. The number of online banking accounts in Germany has nearly multiplied tenfold from 1997 to 2000 to a total number of ca. 15 million (Anonymous, 2001). Actually, more than 40% of all German internet users are doing online-banking (compared to 18% in the USA or 2% in France) (Kerridge, 2001). It may be reasonable to use the channels for different objectives, as they show different characteristics regarding flexibility in communication, speed, etc. Kundisch et. al. (2001) have developed a model that selects channels based on content characteristics. The internet channel ranks excellent regarding individual content because of high growth rates and multimedia abilities. Consequently, German financial service providers try to utilize the internet channel for individualization. Impressed by the internet hype, financial service providers did not evaluate the economic efficiency of internet activities for a long time. Since then, it became obvious that a lot of the highflying projections for the future of

the internet will not become true. Today, the efficiency of every single effort is in question. In result, individualization and controlling are the tasks for today.

The Need for Web Site Controlling as Reaction to Market Developments in the Internet Sector

Today, the design and management of companies' web sites is widely done by artists. This seemed right for a long time. Mainly creativity and intuition mattered: there were almost no rules that could be followed. What was modern today could be old fashioned tomorrow with much better solutions evolving in the meantime. The focus of work was to design revolutionary solutions. It seems like, this period of rapid revolutionary evolution is slowly coming to an end. In our opinion, the design of web sites is approaching a stage where it is more important to reuse and improve existing solutions instead of constantly designing new ones. Consequently, the tasks of creating and operating web sites will have to be done less by intuition and more by engineering and business administration in the future.

This trend is underlined by customers' interest in stable interfaces. In the beginning, web sites mainly were much like marketing flyers: they had to be appealing and eye-catching. Today, web sites especially in the FSI are instruments of everyday work. Customers need usability more than special effects. We think that more than sheer intuition is necessary to know what customers consider as usable.

Another dimension of web site management is the economic aspect: until now, it is fairly impossible to know anything about the cost-efficiency of minor changes or the whole site. That was not to bad in times when not money but time seemed scarce. As discussed before, economic aspects grow in importance as the boom comes down a little. In our opinion, a concept of web site controlling should be used to enable financial service providers to control their investments to match the utility that is generated. This concept should not focus on click

rates alone. If you, for example, take research information that is expensively bought, you could match the costs of a customer's usage with the revenues generated by this customer's related brokerage transactions. This enables the provider of financial services to decide to buy content not only considering the number of clicks but also the generated value. The provision of a content category with a relatively low number of clicks may be reasonable if the net-worth is high enough.

All in all: web site management has to change. Changes of organizational structures as well as controlling techniques are required.

The Concept of Customer Tracking – Our Research Framework

As mentioned in the introduction, we are developing an integrated concept for individualization and controlling of financial services web sites based on data about the customer and its behavior. Normally, in such cases 'web-log-mining' is the first instrument of choice. 'Web-log-mining' addresses the analysis of standard log files like shown in figure 2.

```
(...)
idefix.sda.t-online.de - - [01/Aug/1999:09:13:24 +0200] "GET /html/600sec_hand_10.html HTTP/1.0" 200 8911 "-" "Infoseek Sidewinder/0.9"
idefix.sda.t-online.de - - [01/Aug/1999:09:13:25 +0200] "GET /html/600sec_hand_11.html HTTP/1.0" 200 8899 "-" "Infoseek Sidewinder/0.9"
idefix.sda.t-online.de - - [01/Aug/1999:09:13:25 +0200] "GET /html/600sec_hand_12.html HTTP/1.0" 200 8898 "-" "Infoseek Sidewinder/0.9"

idefix.sda.t-online.de - - [01/Aug/1999:09:13:26 +0200] "GET /html/600sec_hand_13.html HTTP/1.0" 200 8913 "-" "Infoseek Sidewinder/0.9"
idefix.sda.t-online.de - - [01/Aug/1999:09:13:26 +0200] "GET /html/600sec_hand_14.html HTTP/1.0" 200 8904 "-" "Infoseek Sidewinder/0.9„
(...)
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Figure 2: Standard Log File

Information of this kind is helpful to get first and basic insights about the usage of a web site. In order to reach our goals we need to enrich the standard log files by additional elements that represent knowledge about customers. Furthermore, we have to integrate interaction information gained by other channels to ensure topicality, correctness and consistency of the customer data base. This multi-channel analysis of customer behavior is called *customer*

tracking and is one of the main ideas of our general approach of research in the area of individualized financial solutions. Our research team has established a set of models we will now describe briefly.

The work of our research team generally aims at developing concepts and solutions that enable automatic, individual, multi-purpose, and multi-channel customer care. The generation of individualized solutions makes it necessary to match information about the customer and his needs with solutions or components of solutions (content and product components) of the financial service provider. Additionally, the appropriate channel for communication has to be selected. Due to this, the approach of our research team integrates the customer-, content-, product- and channel model as basic components (cp. figure 3).

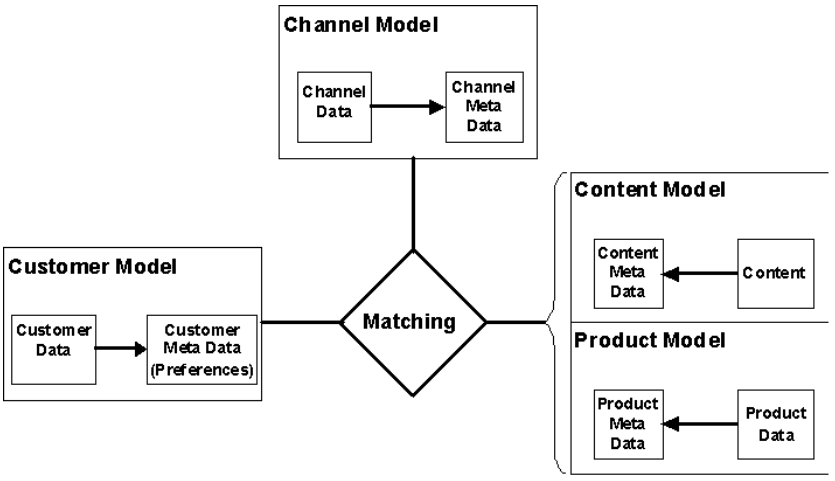

Figure 3: Research Framework

Customer Model

Our way of customer modeling was developed in Fridgen et. al. (2000a) and refined in Fridgen et. al. (2000b). It is currently used for web site individualization of the news area at our partner's site. Since the 70ies, different approaches of user modeling have been introduced (Fridgen et. al., 2000a). As far as we know, most of them focused on the development of one isolated application. In contrast to this, the ability to enable multi-purpose models was

the goal of our work. The main idea is to provide an extra layer of abstraction. Traditional systems use AI concepts to deduce the required adaptations directly from interaction data. In our systems the data is collected throughout the channels, then consolidated by a special inference process and finally stored in an appropriate repository (Fridgen et. al., 2000a). This repository provides a semantically defined and stable interface that can be used for different purposes on different channels.

Content and Product Models

The content and product models are designed similarly to the customer model. They are highly domain-specific, are used in a broad variety of applications, and shall not be topic of this article. All of the applications match customers with content and/or products in order to find solutions that fit the customers' needs. Kundisch et. al. (2001) describe a content model designed for news in the field of financial services.

Multi-Channel Model

The last component of our framework is the channel model. We model every channel that is used in a certain context. The matching process starts at the channel with which the customer addresses the service. Nevertheless, the different characteristics of the available channels are taken into account and another one may be chosen for the appropriate reply.

Controlling as Strategic and Operative Process

As we have shown before, controlling of web site-operations is becoming a vital task. This is also true with our project partner. So we enhanced our framework by a concept for controlling that we are currently implementing.

In our simple approach (web site-)controlling consists of the following components:

- A sound system of fundamental goals the organization aims at.
- Organizational know how on ways to reach the goals and on means to know whether a goal is reached.
- A system of figures that incorporates the latter know how and is suitable to show to which extent goals are reached.
- Organizational structures that define responsibilities and power with roles and persons so that know how leads to actions. Furthermore a concept that ensures that every organizational entity receives appropriate (neither too little nor too much) information.

The Fundamental Goals

There are different valid reasons for establishing a web site. In the FSI the following ones are essential:

- Provide Services to customers in order to
  - Earn money
  - Intensify customers' satisfaction and thus loyalty
- Gain new customers

The natural goal of every business operation is to earn money. In contrast to this, web sites rarely are a sustainable business activity if seen isolated, today. In fact, there are business activities that do not lead to cash inflows directly but will be of positive net present value in the short, middle or long range because of delayed returns or because they are contributing to other activities that lead to direct inflows. We showed that internet services are an integral part of a successful multi-channel strategy in the FSI. The above listing represents this aspect by mentioning the goal to intensify customers' satisfaction and loyalty. This also

is true with our project. However, the importance the bank attaches to direct revenues grows in the long range.

This kind of goals makes it hard to measure the utility of activities. We have stated that sheer intuition decided on means in the past. In the project as well as in general, we have to deal with the problem of underdeveloped know how. Hence we will have to try and measure: by measuring we will acquire know how. This know how will be consolidated and stored in organizational memories.

A System of Figures

As stated above, there still is a gap in scientific know how considering the relevance of figures. One of the goals in our project is to close this gap empirically. So we are starting with a wide view. The catalogue of candidate figures was achieved by the review of literature (e.g. Schwickert, Wendt, 2001) and through interviewing prospective users. We identified the following domains of measurements as relevant for the purposes of web site controlling:

- System-measurements
- Usage-measurements
- Financial measurements
- Economic measurements

System-measurements include information on system-availability and performance. The main data sources within the bank are system monitoring tools that are located at different points in the system architecture (e.g. the web servers, the application servers, different backend systems). Figures can be generated for the web site as a whole and for the components of the architecture. The purpose of system-measurements is to assist in ensuring appropriate availability of the technical infrastructure.

Usage-measurements are derived by monitoring the customers' usage of the web site. This is mainly done by analyzing log files generated by web servers and application servers by means of standard tools. We are working on concepts to expand the range of information that is present in log-files. We will use an XML-language that illustrates the semantics of page-elements. Currently we are concentrating on the following aspects:

- The 'site traffic' category contains the classic figures from page views and visits to site stickiness. Figures are generated on different levels of aggregation i.e. for the whole site as well as for site components such as the transaction area.
- The 'actions' category focuses on a finer granularity and a different point of view: the bank's web-projects frequently aim at special functionality. This functionality often is distributed throughout the site. In this category the customers' usage of such functionality gets documented.
- The 'customers' category contains information like the amount of first time visitors per period of time or the registration rate that illustrates to what extent the bank's customers are also users of the web site. That information as well can be given at different levels of aggregation e.g. by the customers' regional origin.
- The 'actions' and 'customers' categories meet in 'scenarios'. Scenarios are series of page views that can frequently be seen with many customers. These scenarios are especially interesting for evaluation because they are results of the site-structure as well as of customers' interests. 'Good scenarios' have to be separated from 'bad scenarios'. The former lead to a result that the customer wanted to reach, the latter are discontinued before a reasonable result is reached. Both can be subject to optimization: the good ones could be shorter (i.e. the customers reach the goal with less clicks) or more frequent (e.g. if they are easier to find), the bad ones rarer.

Financial measurements reflect the cost and revenue side of the web site. See below for components of the cost side. Each of them can be given for the site as a whole, for site-areas or for actions (as defined above).

- The costs of construction are derived from the bank's accounting of project costs.
- Maintenance costs reflect the costs of maintenance projects. Naturally, the amount of necessary or desirable maintenance varies with actions.
- The operating and indirect costs are extracted from regular accounting and contain general administrational costs as well as specific components such as the costs for content generation or purchase.

The revenue side is split up in direct and indirect revenues. Direct revenues are easy to declare and emerge from pay-per-use offers like stock transactions. Whereas, indirect revenues reflect the partnering of channels. It is extremely difficult to estimate the latter. That is true even if the utility effects we discussed above are kept out.

The economic measurements are aggregated from the other categories. They reflect the cost vs. utility consideration that drives economic decisions. In our project, we installed a customer and an action oriented analysis. Both allocate costs, revenues, and profits onto customers respectively actions. Again, both can be generated on different aggregation levels. Moreover, combinations (i.e. costs a specific group of customers generates by a certain action) are possible.

Organizational Structures and Management Reports

In our opinion, this is a very important part in order to succeed in the project. Most of the usage tracking projects just generate information without assisting in the process of using that information. If we fail to enforce the projected organizational changes our figures will just

add to the pile of paper on the bank's desks. Therefore it is extremely important to demonstrate the usefulness of the new tool. We developed a concept for the generation of management reports that shall make sure that everyone receives just the information he needs and/or wants. There are also alert mechanisms that allow hierarchical escalation if certain limits are exceeded and a concept for organizational feedback in order to validate the relevance of certain figures.

Individualization in the Financial Services Industry

The Relationship of Individualization and Controlling

In a world in which strategic as well as operative decisions should be made with having the individual customer in mind, the measurements suggested above are insufficient. They do not provide what is needed to enable individual treatment. As ever, appropriate actions require substantial knowledge on customers' individual needs. Individualization in that sense is nothing more than consequent controlling based on detailed knowledge on individuals combined with appropriate processes that transfer this knowledge into web site improvements.

It will become clearer what that means when we reconsider what we said on individualization in the FSI above. As argued there, nowadays financial services are 'one size fits them all' and that will not be true in the future anymore. Insurances, mortgage loans, etc. probably will not be standard products anymore. In order to produce really individualized solutions that comply with customers' needs, customers' characteristics (regular income, capital structure, attitude towards risk, etc.) have to be taken into account. Individualization also has to consider solutions that were chosen by a customer in the past. Their ongoing payment- and taxation-effects have influence on the utility of current options. Schackmann et. al. (2000) summarize this by asking for (amongst other things) complete information about the custom-

ers´ characteristics (= demographic information and details about the financial situation) as a precondition for generating perfectly individualized solutions. Beside producing individual financial solutions, individualization in the FSI nowadays should also include the provision of adequate information. This is especially true if customers – e.g. in the field of brokerage – tend to produce the solutions themselves (here: buy and sell stocks) and therefore need adequate information.

In the context of our current project we are working to individualize the internet channel based on customer tracking and therefore have to decide what individualization shall mean to this channel. It is clear that the main objective, namely the production of individualized solutions, remains unchanged. In an abstract view, a web site consists of two kinds of components: content and navigation. Hence, not only the content but also the user interface can be individualized towards the different characteristics and needs of each customer. Therefore we define as follows: individualization of a web site (in the FSI) means to provide every single customer the content and user interface that perfectly fits his characteristics.

The Role of Customer Tracking for the Individualization of a Web Site

As shown before, the financial service provider should know about the characteristics and needs of every single customer. Fridgen et. al (2000a) state: ”Information on customers is not scarce even if distributed throughout the bank from central databases to the customers’ individual consultant, (…).” The work that admittedly has to be done to exploit and consolidate these characteristics is described by Fridgen et. al. (2000b) and is not subject of this article. What is much more interesting in our context is the use of tracking-information as expression of a customer’s needs. Two customers with (almost) identical characteristics may be interested in totally different content, e.g. customer A is interested in stocks of the utility sector and customer B in high-tech stocks. Additionally, customer B prefers to read just the ab-

stracts of articles while customer A likes to read the detailed versions. Observing a customer's interaction with the web site makes it possible to tell what he is interested in. In reaction, content and navigation can be individualized. In order to be able to do this, the semantics of the customer's mouse-click has to be tracked. In the following, we will show some thoughts on this topic.

The Usage of Content Semantics for Content Individualization

We have to attribute adequate semantics to every of the customer's mouse clicks (the only way for him to interact with the web site) in order to be able to identify the type(s) of content that the customer is interested in. Therefore, reasonable categories for the classification of content have to be identified. Basically, we track textual and non textual aspects of content and whether content was received and useful or not. In order to categorize according to the textual dimension we plan to develop a hierarchy of product or solution categories like capital building, insurance, etc. Additionally, we plan to add content dimensions like language, length, level, etc. in order to enable to measure non textual attributes of content. As an example for reasonable non textual aspects you may have a look at Kundisch et al. (2001). The authors have developed a set of content dimensions for the financial news area.

We recommend to measure the kind of reception of content by recording the time reading normally takes. Content will only be counted as received and valuable if the next click (that leaves this content) is within a valid period of time (cp. figure 4)

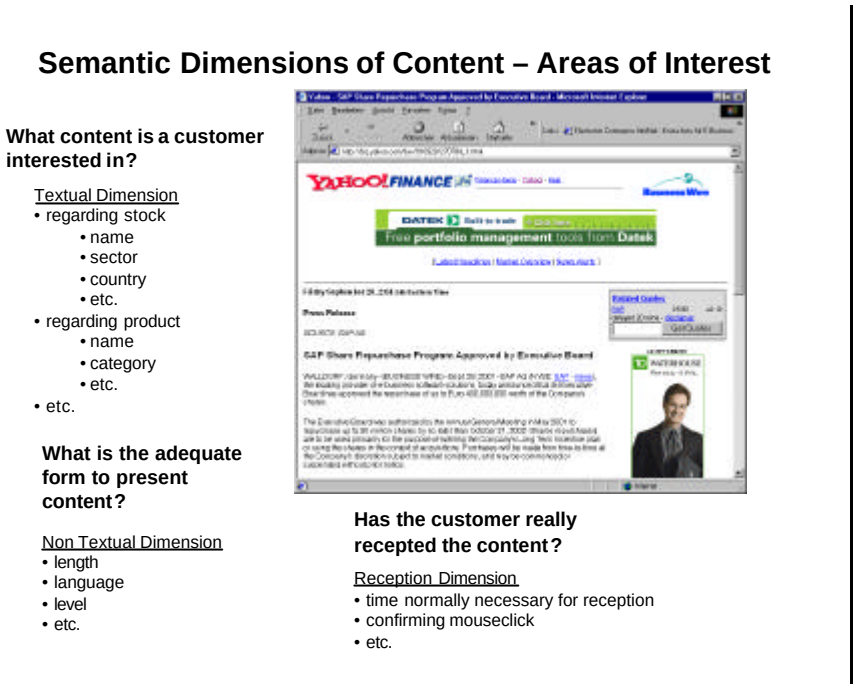

Figure 4: Semantic Dimensions of Content

Changes in a customer's interests should result in changes to the web site. If, for example, a customer's number of clicks into the mortgage loan area leaves an expected range, further action to test the customer's interest should be taken. Such actions can be taken using any of the existing channels. Maybe a letter could be sent that informs on the advantages of a mortgage loan that is individualized towards his characteristics.

Preferences regarding non textual aspects of content can be used in order to individualize the page according to the customer's attitudes. The customer may e.g. primarily get short texts that are written by a special author.

Additionally, the bank could select content based on assumptions about a typical customer-lifecycle. A customer-lifecycle describes an idealized life of a bank's customer. The customer's lifetime is divided into relevant sections based on typical requirements in different parts of life. Information about lifecycles is gained by theoretical considerations, assumptions or empirical studies. E.g. if a customer is identified as being young and a job-starter, it seems

to be reasonable to supply content that matches his situation. Maybe information on insurances that protect against the financial risks of disability could be valuable.

The Usage of Content Semantics for Individualized Navigation

Financial service providers supply a wide range of products and services. In result, their web sites normally are composed of a very high number of single pages. This often results in web sites that use highly complicated link structures. Thus, it is very hard for the customer to find a navigational path that leads him to the content he is interested in. The more steps (=clicks) the customer has to do the higher is the likelihood to get lost. We are aiming on web sites that use the information on customers in order to provide individualized concepts for navigation. Thus, it will be possible to reduce the length of navigational paths.

Conclusions

Customer-tracking has proven to be a powerful tool. In our projects we are using it as a data source for controlling and individualization. The customer's mouse click can be used in a wide range from simple and well-known to complex usage-measurements. These measurements play an important role in our concept for the management of companies' internet activities. We think, you can build a powerful means of controlling your web site operations by combining these measurements with information on technical- and accounting-aspects. The acquired information can also be used for individualizing the web site according to the interests of single customers. We have learned with our projects that processes matter more than technical aspects.

As said before, we have to do further steps to bring down all of the outlined ideas to working systems. Herby, one of our next tasks will be to establish a more powerful system of

semantic categories. Besides that, we will have to learn from our experiences. Our current measurements and the proposed ways of using them are little more than candidates.

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