PERSONALIZING E-COMMERCE APPLICATIONS IN SMES

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Abstract

Personalization of E-Commerce applications is an issue that is gaining increasing importance with the advancing maturity of such systems. There is already E-Commerce software on the market offering integrated E-Shop and personalization functions. However, the available software is too time-consuming and expensive for SMEs. With this in mind we saw a need to investigate the potential for personalization from the particular angle of SMEs. This paper presents the results of a research project about personalization of E-Commerce applications run by SMEs. The project started with an empirical study about the current state of personalization in E-Commerce applications run by SMEs. The findings encouraged us to start the development of a project method for the development of standard personalization components in ERP systems. The method builds on a personalization framework which forms the basis for the requirement analysis and the consecutive extension of ERP II systems. Our discussion is structured around the basic steps of the customer profile life cycle: modelling customer profiles, data input, data processing, and information output.

Keywords: Personalization, e-commerce, e-business, integration, SME, ERP, ERP II

Introduction

The paper presents the results of a longitudinal, publicly funded research projects about "personalization of e-commerce applications run by SMEs". The quality of E-Commerce applications has been constantly improved over the last few years. Especially the major suppliers run websites which are of noticeable usefulness and which are reliable enough to assure the customer's trust [Schubert/Dettling 2001]. This is confirmed by continuously positive growth figures in online business.

Personalization is always targeted at the fulfillment of a special requirement. It can be aimed at people as well as organizational roles in companies (e.g. a purchasing agent). Personalization in our understanding starts AFTER THE LOGIN. The mere speculation about a user on the basis of local cookies on the client PC which has the smack of spying on someone does not fall into the scope of our discussion. Personalization is context sensitive (regarding output for a certain user) and requires learning (by the system). The interface between the customer and the system is called "point of interaction" (POI).

For the personalization of E-Shops there are integrated software packages available, such as, e.g. One-to-One (Broadvision), Dynamo Relationship Commerce Suite (Art Technology Group), Personalization Manager (Net Perceptions) or ADAPTe (ResponseLogic), which already supply the full range of E-Commerce applications. These products are expensive applications which are generally destined for use in large companies. The standardized online shops partially used in SMEs only contain rudimentary tools for the personalization of transactions.

We believe a separate consideration of these companies is meaningful because SMEs differ from corporations in many respects. In the context of the personalization of E-Commerce applications the specific features of SMEs become particularly relevant. SMEs are generally characterized by the fact that they have limited resources and compared with corporations show the benefits and drawbacks of scale. With regard to using E-Commerce applications above all limited financial resources, poor conceptual knowledge, lacking IT resources and low economies of scale can all have a negative effect. The low economies of scale result primarily from the small size of the company because the usefulness of E-Commerce applications increases with the number of transactions completed and the volume of turnover generated. In a small market segment SMEs offer specialized, qualitative high

value products which are tailor-made to customers' needs (product differentiation). It is precisely for this reason that elements of personalization should also be applied in E-Commerce.

Bearing in mind the established opportunities offered by personalization at the beginning of the project we had to examine which essential technical preconditions are fulfilled in SMEs and how much demand there is for personalization. The potential of personalized E-Commerce applications in SMEs as well as the requirements for the development of a personalization tool result from these three aspects.

The paper starts with the description of the research design and a literature review on personalization. The following sections presents the findings of an empirical study. The main part of the paper is about the framework for the personalization of e-commerce applications in SMEs. We summarize the findings and draw some conclusions for the currently emerging potential for the implementation of personalization software in SMEs in Switzerland.

Research Design

The research findings presented in this paper stem from a project which has been carried out since 1999 together with different SMEs in Switzerland. The reason for the start of this project was a perceived disadvantage regarding personalization possibilities in E-Business applications which are suitable for SMEs compared to the possibilities of big companies. As mentioned earlier there are software packages for personalization available on the market but those systems are too expensive for SMEs. The situation is comparable to the adoption of SAP in big companies and "light-weight ERP solutions" like Abacus in SMEs. SMEs need "easy" solutions – preferably standard software – which is cost-effective and can be customized according to the company's special purposes.

As shown in Figure 1, the project started with an empirical survey in the region. The result encouraged the authors to proceed with the project. SMEs attribute a high value to their relationship with the customer and recognize the potential of the electronic relationship which comes with an E-Shop. On the other hand, the survey showed that the situation for the implementation of personalization (state of know-how, existing hard and software, willingness to invest, etc.) is not very favorable in most SMEs. One important result was the need for setting a focus on the further development of existing ERP systems which were already in use by SMEs (→ ERP II).

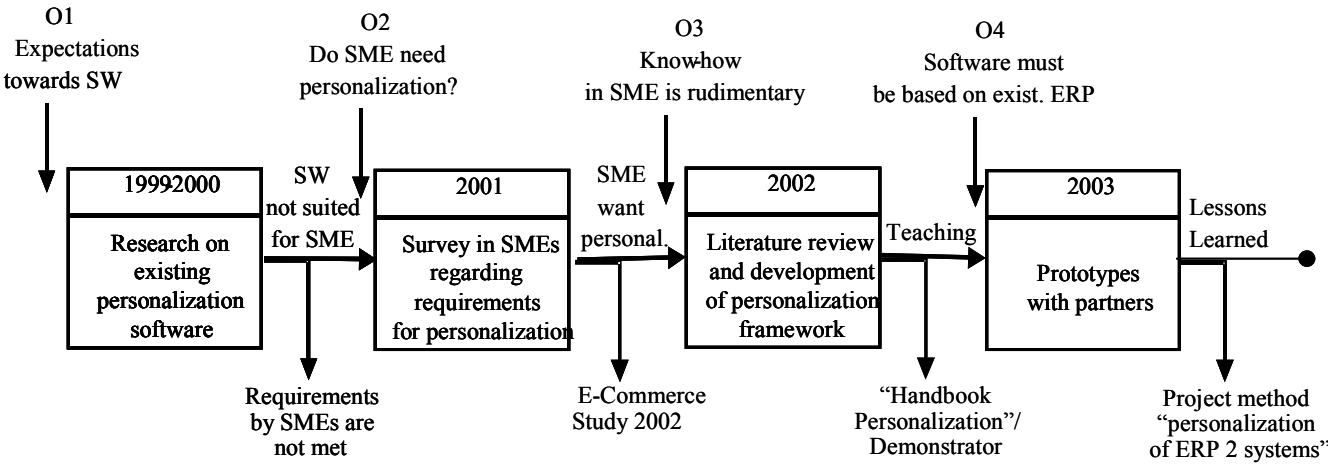

Figure 1. Steps and Results of the Longitudinal Research Project

For the illustration of the potentials of personalization we created a "handbook personalization" which shows the possibilities from a perspective which we thought adequate for SMEs [Schubert/Leimstoll 2002]. Additionally, we built a "software demonstrator" which is publicly accessible on the Internet. It displays the possibilities in a graphical form. The following development of the personalization framework was the basis for the current development of prototypes of ERP extensions with four industry partners. The last objective was the development of a generic project method for the introduction of personalization of E-Commerce

applications on the basis of ERP II systems. ERP II is a term coined by Gartner Group which they define as an application and deployment strategy to integrate all things enterprise centric. It is basically the further development of the inherently internal ERP system into a boundary-spanning system which integrates into its peer systems run by business partners and customers. Figure 1 shows the steps of the projects with its premises (01-04) and its milestones.

Literature Review on Personalization

Personalization is about selecting or filtering information objects or products for an individual by using information about the individual (his customer profile). The information displayed on the screen is specifically tailored for the user. From a technical point of view meta-information of products or information objects is matched against meta-information of users (stored in the customer profile). Personalization can be tailored to a person group or to a specific individual. In the latter case, where the information or products are only customized for one single individual we speak of individualization as a special form of personalization. Personalization uses information about customers. The general term for stored customer information is "user profile" or in the context of electronic shopping "customer profile". There are various ways how e-shop operators can cultivate customer profiles e.g. "historically" by storing (1) interaction with the web site (click stream) or (2) purchase transactions or "explicitly" by (3) asking for preferences or (4) ratings or by recording (5) contextual information (e.g. time, date, place). What formerly seemed to be possible only for the corner shop whose storekeeper knew all her clients personally, reaches a new potential in the online medium where every client leaves traces and thus "teaches" the system how to treat him differently from the other customers. This form of mass customization becomes feasible with the use of predefined rules, which can be built into E-Commerce environments. These automatic personalized web sites do not achieve the high quality of corner shops but they help to establish a personal dialogue with the customer tying him or her closer to the electronic offer. Additionally, the time spent by the client to "teach" the system leads to increased switching cost. The underlying precondition is that the customer really wants to be addressed personally.

What Makes Personalization Possible?

The ability to deliver personalization rests upon (1) the acquisition of a "virtual image" of the user, (2) the availability of product meta-information and (3) the availability of methods to combine the datasets in order to derive recommendations for the customer. In this section we will review the main concepts and systems that make (automatic) personalization possible in today's businesses. These driving forces can be categorized by disciplines, which are involved in personalization. The consideration of personalization ranges from a technical view in computer sciences to the economic principles of information management and marketing as far as to the global perspective of sociology. Figure 2 displays a matrix of disciplines in which personalization plays an important role.

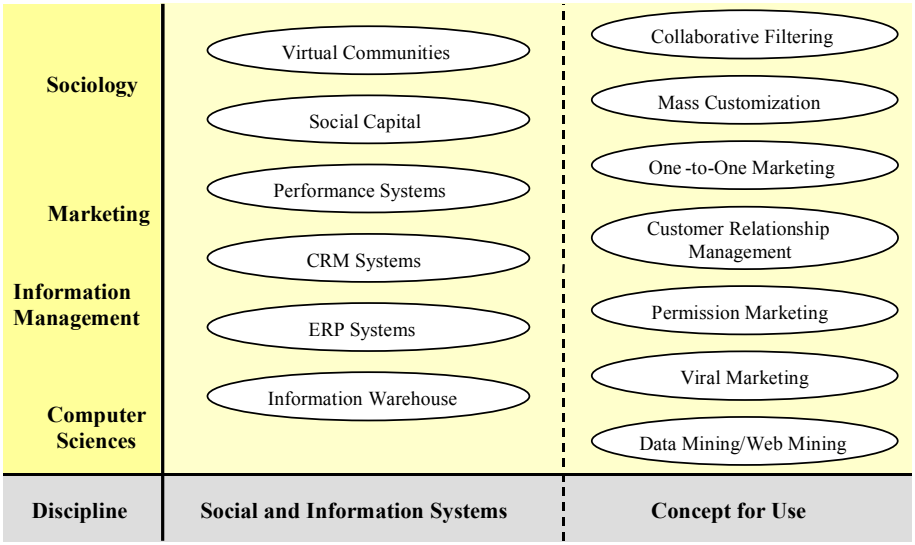

Figure 2. A Multi-Disciplinary View of Systems and Concepts in Which Personalization Plays an Important Role

Virtual communities are groups of people who come together on Internet-based platforms for communication and collaboration around a common topic of interest. These community platforms gather community knowledge (stored in customer profiles), which according to Peppers and Rogers is the following: "Community knowledge comes from the accumulation of information about a whole community of customer tastes and preferences. It is the body of knowledge that a 1:1 enterprise acquires with respect to customers who have similar tastes and needs, enabling the firm actually to anticipate what an individual customer needs, even before the customer knows he needs it." [Peppers & Rogers 1997, 231] In this way knowledge about the community can help to customize and even personalize the service for an individual member.

Social Capital was defined by Pennar [1997] as "the web of social relationships that influences individual behaviour and thereby affects economic growth". The existence of social capital is the basis of many virtual communities. An example for this is the Internet Chess Club (ICC). The ICC is a virtual gaming platform in the Internet, where a large part of the leading chess masters and more than 45'000 paying members are interacting [Ginsburg/Weisband 2002]. A large number of volunteers is contributing to the smooth operation of this community. The information of all members of the community – moderators, chess masters and other active members – forms the social capital of the community. Another example is the Internet auction platform eBay [Schonfeld 2002]. Social capital enables eBay to make use of the creativity of millions of entrepreneurs (the sellers and buyers) on their web site. By adding information themselves and by publishing their own marketing the users take on the main work on the platform. Social capital additionally leads to the subjective feeling of objectivity, which Peppers and Rogers call "agent objectivity": "*Every customer wants genuinely objective, unbiased advice in a commercial transaction, and every customer knows that sometimes this advice will run counter to the seller's own interests.*" [Peppers/Roger 1997, 244] If the recommendations of a seller are only based on the comparison of customer feedback, then this information is objective and without bias – it represents the subjective attitudes of other customers. Amazon.com also uses this idea in their customer reviews. The result is the development of an "objective agent", an intermediary, that just provides opinions of others on its platform.

Performance Systems were developed by product vendors in the 1990s as a solution for differentiating their own products from the competition [Belz et al. 1991]. Performance systems bundle the core product or service with different additional products or services in order to propose a specific solution for individual customers or specific target groups. They thus rep-resent a "personalization" of the standard set of products which a company offers. Peppers and Rogers [1997] call those combinations "product-service bundles". The additional services make the product unique and attractive for the customer. To design this product bundles an information basis is needed that allows the anticipation of the customers needs. An electronic offer could additionally enable bundles that include complementary products of other manufacturers, delivery, installation and training, service and an emotional customer experience. Ratings or experience reports supplied by the virtual community can e.g. be seen as such additional services.

Customer Relationship Management systems are enterprise information systems which support the relationship with the customer. They are used to communicate with the customer or to assist communication with the customer. CRM systems store all kinds of information about the customer ranging from basic information such as name and address to the full history of company-customer interaction (e.g. inquiries, purchase transactions, claims). The databases contained in CRM systems are a valuable information source which can be harnessed for personalization. Most CRM systems are built upon existing software for Enterprise Resource Planning (ERP).

ERP systems comprise a whole class of software products which are geared at the automatization and control of business process throughout the whole company. They supply software modules which support almost all critical business processes and departments (e.g. accounting, procurement, human resources, sales, production, logistics). ERP systems can be found as core systems for supply chain management, customer relationship management and E-Business applications. These more specialized information systems often source their data from the ERP databases which contain the critical company information namely product catalogs, customer database, sales figures, accounting, and the like. In recent years, ERP systems have been further developed to meet the requirements of the Internet. In the last three years, traditional ERP functionality has been extended into the Internet environment. Customers can directly access data in the ERP system using specially developed E-Business interfaces. ERP systems which have been equipped with these new E-Business interfaces (for E-Shops) have been labelled "ERP 2" by Gartner Group. Within the scope of our SME project we are striving to further develop SME-suitable ERP systems into ERP II systems.

An *Information Warehouse* as a result of a data mining process is an additional – extended, improved and optimized – representation of sales and customer data. They are usually used to process raw data for later use in executive information or decision support systems (EIS or DSS). In the context of our study of E-Commerce applications these databases are an important source for personalization and digital marketing.

Where Is Personalization Used?

After having looked at different information systems with their respective data bases serving as "enablers of personalization" we now will review the different concepts for the "application of personalization".

In electronic business media *mass customization* can be implemented by a pre-defined rule system which combines the advantages of mass production (the same e-shop and the same product catalog for all clients) with the strength of made-to-order production (personalized web pages and customized products). One-to-One Marketing is the embodiment of personalization in marketing. The underlying idea is to serve and address every customer according to his or her specific needs. Customer Relationship Management has already been implicitly described in the section about CRM systems. It aims at supplying every employee (or even the client himself e.g. in an e-shop) with the relevant information about a customer at the right time to be able to offer him an individualized service. Permission Marketing is the idea to give the customer the chance to select the kind of marketing message he or she wants to receive [Godin 1999]. The customer grants a company "the right to supply him with marketing information" in a preferred category. Regarding electronic communication it is a means to prevent spamming.

Viral Marketing uses the net of (social and business) relationships which a customer has. A marketing message is sent to one customer with an incentive to forward this message to his friends and/or business contacts. Every time the message is for-warded to more than one person it is multiplied, a process which reminds of the outbreak of a disease (thus the word "viral"). The idea is similar to what we know as "chain letters". Data mining is the process of storing and interpreting data recorded in business processes, e.g. a POS transactions. Companies are interested in generating information warehouses which are sources for executive information systems. Whereas data mining addresses all kind of real-world business processes, web mining focuses especially on data accrued from the Web. Data mining is the extraction of interesting and potentially useful information from user activity on the Internet [Kimball/Merz 1996; Spiliopoulou 2000; Adomavicius/Tuzhilin 2001].

Findings of an Empirical Study

Before starting with the development of the project method we had to investigate the requirements of the SMEs. For this reason we carried out an E-Commerce survey as part of our project. In the light of the Internet situation in Switzerland, the general starting position for the introduction of personalized E-Commerce applications in SMEs in Switzerland appears comparatively favorable.

The interests of SMEs were in the forefront of the survey, which was carried out in summer 2001. On the one hand the study was meant to give information about whether there is a demand on the part of SMEs for personalized E-Commerce solutions and how their exploitation can be evaluated. On the other the study was meant to show which technical and organizational preconditions are already met in the companies surveyed. For the recording of the primary data a standardized questionnaire was developed and repeatedly tested in pretest interviews. The regional chamber of commerce sent the printed questionnaires to 1250 randomly chosen SMEs in the region. Excluded from the survey were several freelance professions such as doctors and other companies whose main function is construction and utilities. The questionnaire was directed to members of management and those responsible for IT in SMEs.

Besides SMEs the survey was also meant to reach providers of IT services and management consultants, so as to record additional expert opinion. To that end the questionnaire was slightly modified and provided online. The experts were to answer it from the point of view of a company well known to them. The following table summarizes the most important details about the design of the survey.

Table 1. Design of the Survey

Collection period	August/September 2001
Collection area	Basel-City and Basel-Country
Collection method	written survey with standardized questionnaire
Size of companies	SMEs with from 1 to 250 employees
Target group	mainly managers and those responsible for IT in SMEs in addition to independent IT service providers and management
Returns	271 questionnaires, 216 from SMEs and 55 from experts; rate: 16%

The explanations that follow are an excerpt from the whole study, primarily setting out the results of the SME survey. The 'expert' opinions will only be listed explicitly if they deviate significantly from those of the SME representatives.

In the SMEs the survey reached primarily *owners or managing directors* (53%) and *people responsible for IT* (25%). The remaining questionnaires came from people who fulfilled *both functions* (6%) and from people who had *other leadership functions*. Amongst the experts chiefly *providers of IT services* or *management consultants* (45%) were addressed. A further number of the experts are *owners or managing directors* of the company (29%) from whose point of view they answered the questionnaire. The others hold *several* or *other functions*.

In the sample almost all areas are represented, mainly from the industrial (22%) and services (20%) sector. Trading companies account for 12% and IT/telecommunications firms for 8% of the sample. Grouping the companies according to size categories illustrates clearly that the SMEs are chiefly represented by companies employing between 21 and 200 employees. They account for 57% of the SMEs. A further 37% are made up of small firms with between one and 20 employees. Larger firms with more than 200 employees are barely represented.

In the expert group the size distribution looks different here there are a lot of small firms with between one and ten employees. They account for 35% of the companies evaluated by the experts. Noticeably high is the share of firms with more of 200 employees (20%). The high proportion of small as well as large companies in the sample of experts can be explained by the fact that the IT and telecommunications field is strongly represented in this sample. Firms in this sector are often very small (e.g. IT service providers) or very large (e.g. telecommunication corporations). This relationship is also expressed in the number of customers. The SME group shows a far more balanced distribution of customer numbers.

Especially on the basis of the distribution of company size the sample cannot be seen as representative. It should also be assumed that there is a preponderance of participation in the survey by those companies which are already tackling the E-Commerce issue, or at least intend to in the near future. The following sections contain only a part of the findings due to limitations in space.

Additional Functions of Personalized E-Commerce

E-Commerce solutions support and offer a number of further functions. Figure 3 compares the opinions of SMEs and experts regarding the useful application of these additional functions. The questions were formulated abstractly to find out which additional functions future E-Commerce solutions should offer in order to provide effective back-up to marketing and sales processes.

Both groups in the comparison mentioned the following functions most frequently: *Newsletter via E-mail*, *analysis of customers' surfing and purchasing behavior*, *evaluation tools* and *cross-selling functions*. However, the frequency of these answers is far lower among the SMEs than among the experts.

Classified among the not-so-frequently mentioned answers in both groups we find *information exchange between customers* (a community function), *customer creation of E-shop structure* and *rankings of favorite products*. Clearly only a few companies can imagine the positive effects on the marketing and sales process. However, *rankings of favorite products* is mentioned by 31% of the expert-companies.

The results of the comparison between SMEs and experts clearly indicate that the SMEs are more skeptical towards the opportunities of personalized E-Commerce solutions. Possibly they cannot imagine how the application of a personalization tool can be concretely implemented. The purpose of a newsletter is certainly the easiest to understand. Nevertheless, the experts' statements plainly show that the personalization of E-Commerce will have a thoroughly positive effect on the marketing and sales processes of SMEs.

For certain functions of an E-Shop, such as online access to inventory or the direct start to processing the order immediately after receipt, integration into an existing ERP system is necessary. For this reason the companies were also asked which system they use for the planning and control of internal processes.

The findings make it obvious that there are very many different ERP systems on the market. The high proportion of the category 'other provider' (64%) makes this abundantly clear. Mostly in use are applications specific to the particular field. *ABACUS*, *SAP (R/2 or R/3)* and *NAVISION* are the only systems which are widely used in SMEs. In the expert-companies *SAP* and *ABACUS* dominate, with 15 and 13 percent of mentions. The heterogeneity of the systems applied suggests the development of the functions of a standardized personalization tool for SMEs independent of the ERP-software used.

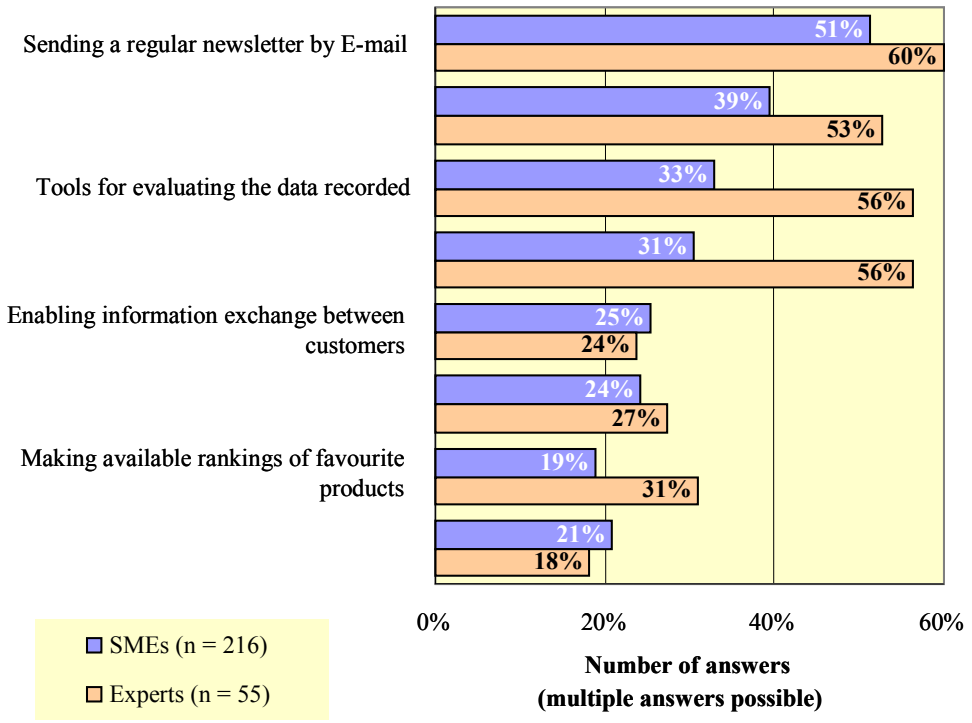

Figure 3. Additional Functions of E-Commerce Applications to Support Marketing and Sales Processes, SMEs and Experts in Comparison

Online shops have not been very extensive in SMEs up to the present. 64% of SMEs and 47% of the experts state that they are not using any E-Commerce software. It is not possible to find any one E-shop system which could be considered a market leader. Systems developed in-house make up the greatest share of E-shop systems carried out to date. Amongst companies which already have an E-shop and have supplied information on it, 59% use *individual software* and 41% *standard software*. This applies equally to both groups in the comparison. With these findings it has to be taken into account, however, that the description 'individually-programmed software' may also include individually-parameterized shops which are based on a standard application.

In the future only 43% of the replying SMEs and only 31% of the expert-companies want to do without an E-shop. The other companies plan to invest substantially in their E-shop in the next two years; most of these companies (15% of SMEs and 24% of experts) have opted for an investment sum ranging between 10'000 and 50'000 CHF per year (6'600 and 33'000 EUR).

Framework for the Personalization of E-Commerce Systems

The framework for personalization was developed as a basis for the project management (method) and the visualization of the potentials of personalization to the company owners involved in the project (teaching). The framework includes the different steps of personalization and visualizes the personalization cycle between input and output. It serves as a systematic representation.

Personalization Steps

As presented at the beginning of this chapter, the basic idea of personalization is to learn something about the customers and to use this information to tailor offers for services or information to the needs of the customer. On a technical level personalization therefore can be reduced to four simple steps:

- Step 0 – Modelling Customer Profiles (Requirements Analysis)
- Step 1 – Data Input
- Step 2 – Data Processing
- Step 3 – Information Output

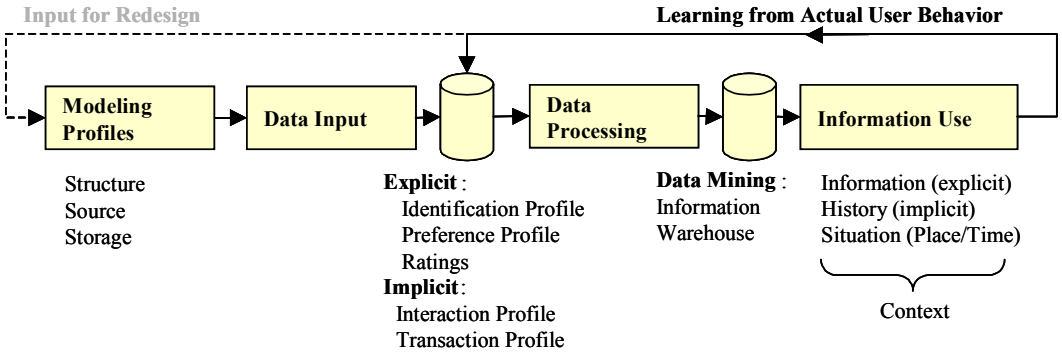

Figure 4. Customer Profile Life Cycle

Step 0 – Modelling Customer Profiles (Requirements Analysis)

The entire information about customers is usually combined in a data set called „customer profile". This data set includes all information directly requested from the customer and the information implicitly learned from Web activity. E-Commerce systems track and store compound profiles which contain parts of the profiles shown in Table 2. Depending on the personalization methods used, there are different requirements to the contents and the representation of the profile. Therefore it makes sense to think about a customer profile model before digging into issues of customer interaction.

Table 2. Different types of profiles [following Schubert 1999]

Profile	Content
Explicit profiles	
Identification Profile	user name, role, contact information, personal browser settings, address, payment information, IP-address, etc.
Preference Profile	self-revealed preferences (product meta data)
Socio-economic Profile	self-categorization in predefined classes (age, gender, hobbies, etc.)
Ratings	three types of ratings: of products, of reviews, of pages [scale e.g.: I like it – not for me]
Relationships	Relationships to other users/customers [e.g. "soul sisters"]
Reviews/Opinions	Plain text, images, videos and other material
Implicit profiles	
Transaction Profile	transaction log, product purchases linked to product meta data (purchases, inquiries, payment, etc.)
Interaction Profile	click stream (pages viewed are linked to product meta data [preference categories])
External data	Information procured from other sources [e.g. weather report, local news, events, credit rating]

The products in the product catalog have to be annotated using a chosen category with appropriate attributes. The annotation of products or information objects is a prerequisite to the matching of preferences with specific purchase transactions or interactions with the Web site (pages viewed). Figure 5 shows the link between a preference profile, meta information, and a transaction profile. It also displays the interrelation between two types of ratings: one for products on the other for reviews written by other customers (a typical community feature).

Up to now, customer profile models have always been defined for one particular application of the profile models – for one particular system. In the future it will become increasingly interesting to make user profiles available for different applications in the same application area or even in different application areas. Some research work currently focuses on (organizationally and technically) separating the customer/user profile storage from the applications which are using it. This allows for the accumulation of customer information gathered in different places. This initiative represents a marketing viewpoint as e.g. taken by Microsoft Passport. It leads to an increased level of control for the customer regarding her profile [Koch/Wörndl 2001]. Some work about abstract modelling of user profiles and user profile servers can be found in [Fink/Kobsa 2000].

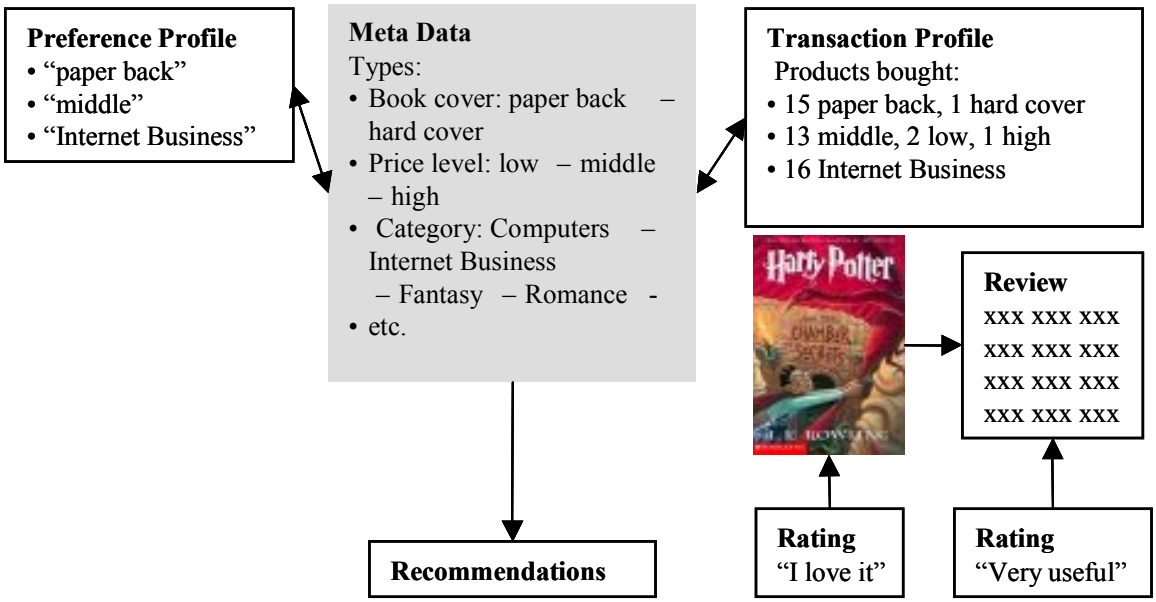

Figure 5. Matching Preference Profiles and Transaction Profiles Using Meta Data

Step 1 – Data Input

The techniques for capturing customer profile information vary and require the active engagement of the customer at different degrees. We can distinguish between asking the customer (fill-in-profile, explicit feedback or ratings) and watching the customer, analysing the data using data mining or web mining (click stream or transaction analysis).

There are different possibilities to acquire information about the interests of a user: (1) user maintains profile (explicit information input), (2) the system monitors the user in her browsing or shopping behaviour and determines her interests from using information clustering techniques.

1) Explicit information input (also called "reactive approach")

On way to gather data is to explicitly ask the customer to fill in her preference profile. This can be done by selecting preferences from an ontology provided by the Web site or by explicitly rating products or information items from which the likes and dislikes can be derived. Examples for services offering personalization based on explicit information inputs are MyYahoo and the Amazon Recommendation Center.

Besides the use of explicit customer inputs for the derivation of interests this information can additionally be made available to other customers. Examples for this procedure are the acquisition and publication of explicit ratings and comments about products on the Web site.

2) Recording customer activity (also called "non-reactive approach")

Shops usually record transactions in a database. This can be done both online and offline. Large offline retail shops like Safeway, Migros or Coop have introduced membership card programs to identify customers during their purchase transactions and to keep an identified log on their transactions (e.g. Migros Cumulus card). In addition to information about transactions, online shops store information about the browsing behaviour of customers. Page visits can be tracked and the time a customer spends on a particular page can be stored. The main problem with tracking the browsing behaviour is the identification of the customer. Since the information about the IP address of the requesting client is often insufficient for identification due to the use of dynamic IP addresses (e.g. different proxy applications or dial-ups) current sites try to solve this problem with the help of setting local browser cookies.

Customers can even help to establish a new categorization scheme. If specific products are simultaneously bought by a number of customers one could suspect that they serve a similar purpose and that it would make sense for other clients to know about the existence of the other books when buying one of the books from this cluster. An example for this "community-enabled categorization scheme" can be found at Amazon in the section "Customers who bought this book also bought …".

Step 2 – Data Processing

The data collected from watching the customer (transaction or browsing histories) usually is not suitable to be used in information filtering algorithms directly. So different data mining or web mining techniques are used to cluster and filter the data. In these processes, a customer usually is classified in different stereotypes or (interest) groups. The derived information is stored in the customer profile for further processing. Data mining techniques can be applied to extrapolate trends noticed in the (large) database. This information can be used to improve and personalize the individual offer which a company presents to a client [Fischer et al. 1999]. Unfortunately, as above, it can also be used to share customer data among a community of buyers without the customer's permission.

Opportunities for personalization range from customization of the application interface to the customization of the product bundle itself. Virtually every information-based product can be tailored to the customer's needs. In addition to data mining, data processing is also about interactively learning from past interactions.

In their paper "Motivating Human-Agent Interaction: Transferring Insights from Behavioural Marketing to Interface Design" Spiekermann and Paraschiv [2002] point to the fact that personalization of user interfaces depends on the intensity of the interaction with the user interfaces. The more information about preferences is available from the user the better the computer can react. The benefit which a customer can take from an EC service depends largely on the readiness of the customer to actively provide information. If a customer provides false information, the recommendations derived from this data tend to be useless. Spiekerman and Paraschiv investigate what motivates a user to provide data. They mainly identify the following functionalities that can lead to demotivation if they are missing:

1) Learning through user interaction ("feedback process in the profile life cycle")
2) Adaptation to the experience level of the customer ("customer literacy")
3) Recommendations from the whole set of data ("large database of interlinked profiles")

The main reason for demotivation is the missing "learning" from user interaction. Transactions that appear several times have to be simplified by features like the automatic fill-in of parameters. Examples for this are standard shopping lists for different days of the week or for different events (e.g. a raclette dinner with twelve people) as offered by Le-Shop or Migros (Swiss Internet retailers).

Such helpful features like pre-defined shopping lists are currently developing from motivational factors into must-haves in online shops. This observation was confirmed by a recent Web Assessment study. Online bookshops which do not offer the possibility for customer comments were badly rated by assessors [cf. Schubert/Dettling 2002].

Step 3 – Information Output

> "*The whole purpose of places like Starbucks is for people with no decision-making ability whatsoever to make six decisions to buy one cup of coffee - short, tall, light, dark, caf, decaf, low-fat, nonfat etc. So people who don't know what the hell they are doing or who on earth they are can, for only $2.95 get not just a cup of coffee but an absolutely defining sense of self.*" [Tom Hanks as Joe Fox in "You've got mail"]

Not everyone wants to take one hundred decisions when buying a product as simple as a Cappuccino. In his book "Die Multioptionsgesellschaft" Gross [1994] addresses the problem of today's individuals who are confronted with too many options. In marketing, the existence of different variants of a product is usually seen as a possibility to differentiate one's own products from competitors' products. For the pragmatic customer the obligation to specify her wishes can be an obstacle. Say Peppers and Rogers [1997, 135]: "[...] but for the busy customer who wants just what he wants, choice can actually prove to be a stumbling block to purchase." Personalization based on transaction and preference profiles enables a customer specific selection from the wide range of options. The "burden of choice" is taken from the customer. Imagine a customer has already configured and bought a car, which also pleases another customer with similar taste – it is easier for the second customer to just order "the same

configuration" than to run through the whole selection process again. Even if the customer wants to make some adaptations it is easier to start with the recommendation of a more or less fitting configuration than to start from scratch.

In this section we will address methods to combine customer profile information and meta information of products or information objects. The goal of matching methods is to select something for the customer based on his or her profile. In general, the selection can be about content (to be displayed), interaction (how to interact with the user) or media usage/configuration (on which channel/using which media). As already presented before, there are two general methods for selecting/matching: content based filtering and collaborative filtering. The main difference among these methods is that content based methods make use of information about the products or information objects, collaborative methods only make use of information about the relation of users to products but do not look inside products.

Content based filtering is based on annotating content objects (documents) with meta information or deriving the meta information automatically from the content of the objects themselves. A query specifies which values the meta information of matching documents should have. The comparison can be done directly, through affinity measures like vector space models or though neural networks. The shortcut of content-based methods is that the indexing (annotation with meta information) is an extra effort that has to be invested. Additionally, when using automatic measures, the results are usually not sufficient when the query is targeted at "quality" of information, e.g. for books that may please a specific user.

In contrast to content based filtering collaborative filtering tries to match users with a similar taste. Customer profiles can provide personalization functions without a specific customer having an extensive history of transactions. Based on information of like-minded people "matching" documents are recommended. The basic idea is to electronically support the principle of the "word of mouth". There are two forms, the first being interactive collaborative filtering where people interact directly (we will address this later when talking about community communication for customer support) and automatic collaborative filtering where users rate items and the system automatically calculates correlations and recommendations.

> "Community knowledge comes from the accumulation of information about a whole community of customer tastes and preferences. It is the body of knowledge that a 1:1 enterprise acquires with respect to customers who have similar tastes and needs, enabling the firm actually to anticipate what an individual customer needs, even before the customer knows he needs it." [Peppers/Rogers 1997, 231]

In a brick-and-mortar setting most business customers are not aware of one another. The same applies today in basic electronic shopping environments. Clients are carriers of information that could be shared with others for the benefit of all interested parties. Uniting buyers in a virtual community of buyers, harnessing the potentials of the underlying IT-infrastructure, can help to exploit community knowledge. The technical challenge is to declare a strong semantic infrastructure for the product lines and map the semantics to the buying community, in order to achieve:

(1) accurate trapping of historical buying activity, by individual and by (implied) buying group (demographics)
(2) accurate predictive models of future buying behaviour, again by individual or by the implied group, and
(3) iterative mechanisms to correct semantic weaknesses within and across product lines.

Collaborative filtering is exactly about using information provided by other customers to improve the offer for an individual customer.

Peppers and Rogers [1997] call sub-communities of customers with similar taste "affinity groups". By linking affinity groups with recorded purchase transactions of a big numbers of customers a knowledge bases emerges which can be used for the prognosis of future buying behaviour of individuals. The shoe chain "The Custom Foot" uses a similar mechanism for their the shoe sales: customer rate shoes on a scale from one to five. This information is stored in large databases where customers with similar patterns are combined into affinity groups. Based on the buying behaviour of the respective peer group, customers receive recommendations for future shoe purchases without even the need to look at a broad range of shoes.

Preference and transaction profiles can also support buyers regarding recurrent purchases. Once individual settings (such as preferred airplane seat, choice of menu, kind of rental car, etc.) have been stored any future transaction can consist of only one "confirmation click" of the compiled product.

Developing a Standardized Project Method for Personalization Projects in SMEs

In the current project phase we are working on a project method for personalization projects with different industrial partners. The project involves four ERP solution provider who want to expand their ERP systems into ERP II systems (offering E-Business interfaces to functionality and data in the ERP system).

Each workshop follows a strict agenda. One of the project methods used is the so called "meta plan technique" were we collect ideas from company representatives and try to cluster similar ideas in joint groups. Figure 6 shows the original result of such a brainstorming session in the form of a mind manager graphic (in German language).

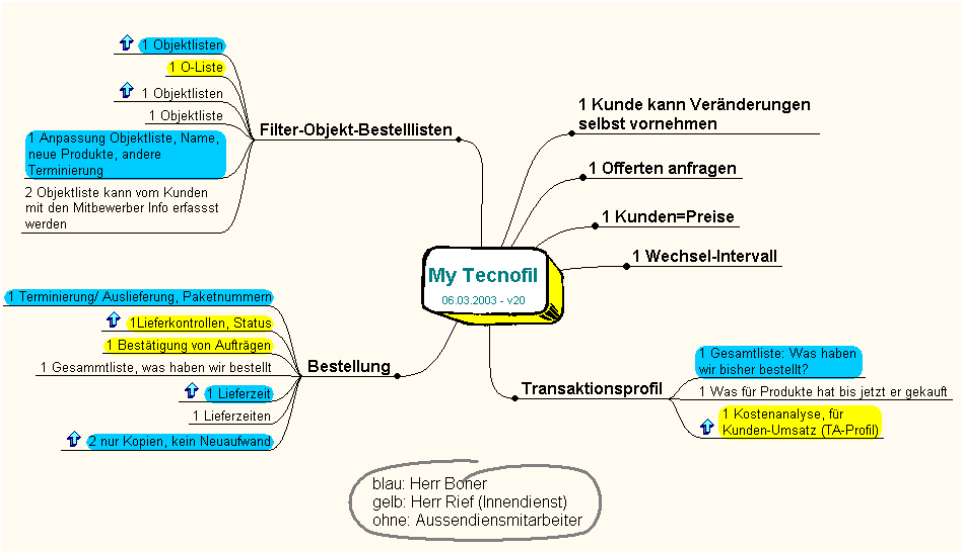

Figure 6. An Example for a Meta Plan Result (Source: Company Workshop)

The results of the brainstorming sessions are later aggregated and the most important objectives are identified. The personalization mechanisms are derived and priorities for implementation are set. In order to visualize the final objectives for the responsible people in the SME we developed a method for "rapid screen design". In a subsequent workshop screens are interactively designed using the inputs of representatives of the SME, the software vendor, and the academic consultants. The screens are the template for the Web application and indicate the different stages of personalization for identified users. Figure 7 shows an example of such a screen. The visualization helps to make sure that SME representatives and ERP vendor are talking about the same functionality of the new, extended ERP software.

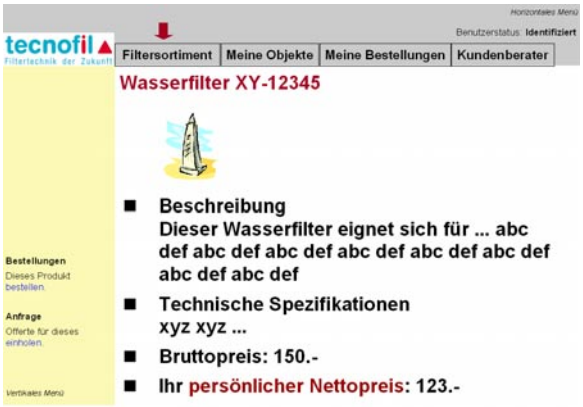

Figure 7. An Example for "Rrapid Screen Design" (Source: Company Workshop)

Conclusions and Future Research

In this paper we have presented results from the three phases of the longitudinal research project about personalization of E-Commerce systems. We have shown how we approached the special requirements of SMEs in an empirical study. From the extensive literature review we developed a personalization framework which was also the basis for an understandable, easy to read handbook about personalization for SMEs. Finally, we presented some aspect of the project method for the development of personalization features for ERP-based E-Commerce systems.

Some interesting statements about the need for personalization tools in SMEs can be deduced from the findings of the survey. SMEs value very highly – independently of E-Commerce – marketing and sales-related success factors: customer advisory service, delivery reliability and close customer relations are, according to their statements, of extreme importance for the success of the company. In the marketing and sales area the strengthening of customer relations and the quality of customer information are crucial. Altogether the results show that it is precisely personal customer address that SMEs consider to be a key function for company success. Wherever E-Commerce applications can be used at the interface to the customer personalization can play an important role.

The findings of the study show that the development of personalization software is no easy undertaking. Reality shows, however, that a world of widely-differing systems is being used by internal systems (ERP) on the one hand, and by E-Commerce applications (E-Shop software) already in use on the other. The operating systems used also differ greatly. Furthermore, the majority of SMEs do not operate their own web servers, but have outsourced this task to an Internet service provider. The only possible approach is that **we involve ERP solution providers** which develop easily integratable standard modules to extend their existing systems. In an initial project we developed a project method for the definition of requirements for personalization of ERP-based E-Commerce solutions. The project method combines a set of useful creativity tools, elements of classical project management together with a method for rapid screen design. The most important issue is to make sure that people in SMEs and ERP vendors understand each other and manage to jointly develop a new generation of SME-suitable ERP II systems which include customizable, easy to use personalization features. Continuing with our research, we have initiated further projects with SMEs and their respective ERP vendors were we constantly apply and refine the method.

The difficulty in the development of a software lies in the fact that SMEs are today cautious about the use of such systems, and the technical preconditions are not optimal due to the wide difference in the systems employed. Nevertheless, over the next few years, substantial investments are planned in this field by many companies. All in all the, study findings have confirmed us in our assumption that a need for standardized, inexpensive personalization software for SMEs exists based on existing ERP systems, or will arise within the next few years.

References

Adomavicius, Gediminas; Tuzhilin, Alexander (2001): Using Data Mining Methods to Build Customer Profiles, in: IEEE Computer, Vol. 34, No. 2, Feb. 2001, pp. 74-82.

Belz, Christian, Bircher, Bruno, Büsser, Mark, Hillen, Helmut, Schlegel, Hans Jörg, Willée, Clemens (1991): Erfolgreiche Leistungssysteme, Stuttgart: Schäffer Verlag für Wirtschaft und Steuern GmbH, 1991. Berrymann et al. (1998)

Fink, Josef; Kobsa, Alfred (2000): A review and analysis of commercial user modeling servers for personalization on the world wide web, in: User Modeling and User Adapted Interaction, Vol. 10, pp. 209-249, 2000.

Fischer, Rudolf; Fisseler, Dirk; Rüeger, Brian (1999): Fünf Faktoren definieren den Erfolg im E-Commerce, in: ioManage-ment, No. 12, 1999, pp. 74-79.

Ginsburg, Mark; Weisband, Suzanne (2002): Social Capital and Volunteerism in Virtual Communities: The Case of the Internet Chess Club, in: Proceedings of the 35th HICSS Conference, Hawaii, 2002.

Godin, Seth (1999): Permission Marketing: Turning Strangers into Friends and Friends into Customers, New York: Simon & Schuster, 1999.

Gross, Peter (1994): Die Multioptionsgesellschaft, Frankfurt am Main: Suhrkamp, 1994.

Kimball, Ralph; Merz, Richard (1996): The Data Webhouse Toolkit: Building the Web-Enabled Data Warehouse, New York: Wiley & Sons, 1996.

Koch, Michael; Wörndl, Wolfgang (2001): Community-Support and Identity Management. In: Proceedings of the European Conference on Computer-Supported Cooperative Work (ECSCW2001), Bonn, Germany, pp. 319-338.

Schubert, Petra; Leimstoll, Uwe (2002): Handbuch zur Personalisierung von Electronic-Commerce-Applikationen, Basel: Arbeitsbericht Nr. 7 des IAB, Fachhochschule beider Basel (FHBB), 2002.

Pennar, Karen (1997): The ties that lead to prosperity, in: Business Week, December 15 1997.
Peppers, Don; Rogers, Martha (1997): Enterprise One to One: Tools for Competing in the Interactive Age, New York: Ban-tam Doubleday Dell, 1997.
Schonfeld, Erick (2002): eBay's Secret Ingredient, in Business 2.0 , March 2002. [Access: 17.02.2002].
Schubert, Petra (1999): Virtuelle Transaktionsgemeinschaften im Electronic Commerce: Management, Marketing und Sozia-le Umwelt, Lohmar - Köln: Josef Eul Verlag, 1999.
Schubert, Petra (2000): The Participatory Electronic Product Catalog: Supporting Customer Collaboration in E-Commerce Applications, in: Electronic Markets Journal, Vol. 10, No. 4, 2000.
Schubert, Petra; Dettling, Walter (2002): Extended Web Assessment Method (EWAM) - Evaluation Of E-Commerce Applications From The Customer's Viewpoint, in: Proceedings of the 35th HICSS Conference, Hawaii, 2002.
Spiekermann, Sarah; Parachiv, Corina (2002): Motivating Human-Agent Interaction: Transferring Insights from Behavioral Marketing to Interface Design, in: Special Issue of the Journal of Research in Electronic Commerce, 2002 (forth-coming).
Spiliopoulou, Myra (2000): Web Usage Mining for Web Site Evaluation, in: Communications of the ACM (CACM), Vol. 43, No. 8, August 2000, pp. 127-134.