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Petra Schubert
University of Applied Sciences Basel

Michael Koch
Institut für Informatik

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THE POWER OF PERSONALIZATION: CUSTOMER COLLABORATION AND VIRTUAL COMMUNITIES

Petra Schubert

Institute for Business Economics
University of Applied Sciences Basel
p.schubert@fhbb.ch

Michael Koch

Technische Universität München
Institut für Informatik
kochm@in.tum.de

Abstract

Using electronic media for interaction with customers enables enterprises to integrate customer activity and knowledge about customers resulting in a high-quality relationship thus turning buying processes more efficient. In this paper we review the basics of personalization – how it works, where it can be used (the applications) and what makes it work (the enablers). Our discussion is structured around the four steps of the customer profile life cycle: modelling customer profiles, data input, data processing, and information output.

Introduction

Digital marketing calls for new marketing paradigms and places some of the existing rules in a new light. It is of vital necessity that Internet companies should also take these paradigms into consideration for their Internet business. In the online medium, where customers are only a mouse click away from comparable offers, distinguishing characteristics are the only means to bind customers long term to one's own offer. The most important thing in digital media is to concentrate above all on features which are only possible online. One possibility, for example, is the setting up of customer communities (Schubert 2000), which pool their knowledge and their profiles for communal use and render economies of scale effective in a new way.

The paper gives an overview of the basic concepts of customer collaboration and virtual communities with a special focus on personalization. The use of electronic media for economic transactions adds a new potential to the vendor-buyer relationship. It gives the customer a voice, an input channel where he or she can participate in a number of activities such as product development, feedback, support for other customers, recommendations, sharing of digital goods etc. This can be an active participation or simply an indication of preferences shown in the interaction with the platform or the service. The structuring and organization of this participation may empower the customers and may result in new kinds of dynamics in collaboration. This includes the issue of interaction design within and among customer communities and the social, political and economic impacts of customer collaboration and the platforms and services that facilitate customer collaboration.

The introductory chapter describes the link between customer collaboration and virtual communities (Chapter 2). The following main chapter is dedicated to a systematic approach towards personalization. We first look at the prerequisites for personalization (Section 3.1) and the potentials for its application in E-Commerce applications (Section 3.2). We then present the four steps of the customer profile life cycle (Section 3.3): the modelling of customer profiles, the actual recording of data, the conversion of the input into something which is fit for use for personalization and finally the actual use of the refined information for personalization features.

Virtual Communities and Customer Collaboration

Bringing buyers and sellers together in the arena of electronic commerce can stimulate three major potentials: (1) the building of trust, (2) the collection and effective use of community information and (3) the economic impacts of accumulated buying power.

The groups of customers who are drawn to the Internet in order to perform online purchase transactions are often referred to as “Virtual Communities of Transaction”. We argue that these communities are a source of valuable data (generally addressed using the term “customer profiles”) that can be used to support individual customers and that can be harnessed by the operator of an electronic transaction platform. Customer profiles are the basis for different kinds of personalization by making use of techniques such as collaborative filtering, data mining, and personalized user interfaces as described in the following chapter. Platforms for communities of transaction result into an enriched product catalog which has been termed “Participatory Product Catalog” by Schubert and Ginsburg (2000).

In this context it is important to note when buyers and sellers are brought together, there may be very little value-sharing in and between these two groups in contrast to the classic interest-based communities discussed by authors like Rheingold (1993), Iacono & Weisband (1997) or Erickson (1997). But even when the hype around communities as glorified by Hagel and Armstrong (1997) has recently faded, the knowledge-oriented view of buyer communities still seems very promising and its full potential for personalization is only at its beginning. We argue that applications, which realize personalization strategies based on members' data represent a key strength of these communities.

Successful examples for Web-sites that are highly enriched with information gathered from the customer community and where all the information is presented in a highly personalized way based on the customer profiles are Web-Shops like amazon.com. However, aggregation of customer data is not feasible unless there are low barriers to communicate between the customers. Communities of transaction enable the communication among the customers and provide intermediation mechanisms for the settlement of purchase transactions. Usually, such community platforms (E-Commerce servers) are operated by electronic merchants or intermediaries. Typical forms of communities of transaction are (Berryman et al. 1998):

- (1) "Seller controlled": Community is being created on the EC-Platform of a single vendor or an aggregator who unites the offers of multiple vendors (e.g. Amazon.com or Expedia.com)
- (2) "Buyer controlled": Multi-vendor catalogs which are tailored to the individual needs of one customer (e.g. procurement systems such as Ariba or CommerceOne) or customer-induced aggregator platforms which combine the purchasing power of many customers (e.g. letsbuyit.com, NewView.com or Yellostrom.de)
- (3) "Neutral": Communities in the form of open electronic markets operated by an intermediary who mediates between multiple merchants/vendors and their respective customers (e.g. ebay.com, conextrade.ch or ricardo.de).

The study of community profiles requires a brief discussion of the terms "data", "information", and "knowledge". One reasonable approach is to place these terms in a spectrum (Davenport & Prusak 1998): data is "a set of discrete, objective facts about events" and information is a message with a sender and a recipient, or "data endowed with relevance and purpose". Knowledge acquisition is a subjective update of the recipient's value system, which requires information flow. The term knowledge plays an important role in the sense of shared collective knowledge of communities. Community knowledge serves as the basis for the collaborative use of information (e.g. collaborative filtering) and the resulting retention of the bond within virtual communities (e.g. by building trust). We have to keep in mind that the community is likely to be quite information intensive and it is essential to provide metadata clues as to the information's quality. Without a sense of quality, it is very hard to know which messages to apply to the knowledge base.

In summary, we believe that the perspective of forming virtual communities of transaction is quite useful in the analysis of establishing trust in virtual environments and gaining advantage from customer profiles. As electronic markets continue to evolve, along with their infrastructure and communication models, so will the complexity and importance of the social structures which attach themselves to these markets. The understanding of these social structures will be key to designing a socially and technically efficient market space to best suit the needs of buyers and sellers alike and to meet the challenges of the underlying technical infrastructure.

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.

For E-Commerce Web sites, we identify three different levels of personalization as displayed in Fig. 1.

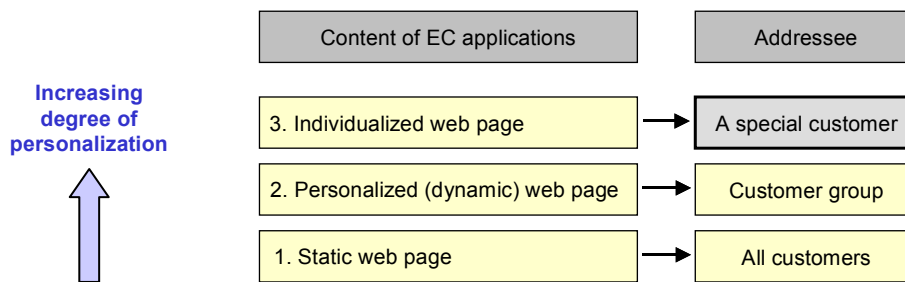


Figure 1. Degrees of Personalization

(1) Identical presentation to all customers

The simplest way of Web page design is a collection of static web pages. The presentation is the same for every customer for all steps of the transaction. There is no automatic user identification and the system does not make use of an existing user profile.

(2) Personalization by Categorization

The personalization of Web sites can be realized in two different ways: menu-driven (explicitly by manual user input) or tracking-based (implicitly by system logs). A first approach towards personalization of Web Applications is the categorization and classification of customers in different groups of interest. This mechanism leads to a mere personalization which is tailored to groups and not to individuals. While assigning people to certain categories, profiles emerge which contain socio-economic, preference or community related information. These profiles serve as the basis for offers tailored to the needs of the respective interest group. Examples for this kind of information are residence, gender, age, interests, etc. A Web system that is known for this kind of profiling is Firefly.

(3) Individualization

Individualization goes even one step further. In the beginning, users state their preferences either through a direct input (menu-driven) or indirectly by monitoring their click stream (tracking-based). A personal customer profile stores the information and serves as a basis for the presentation of dynamic Web pages which are specifically tailored to the interest of one single client. Over time a Web site can gather more information about a customer and become increasingly powerful in the choice of the presentation of Web sites or products/services. A customer who visits an information Web site always looking at exchange rates at first will find this information on the entry page after a while. The compound customer profile can be composed of socio-economic, community or interaction profiles.

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. Fig. 2 displays a matrix of disciplines in which personalization plays an important role.

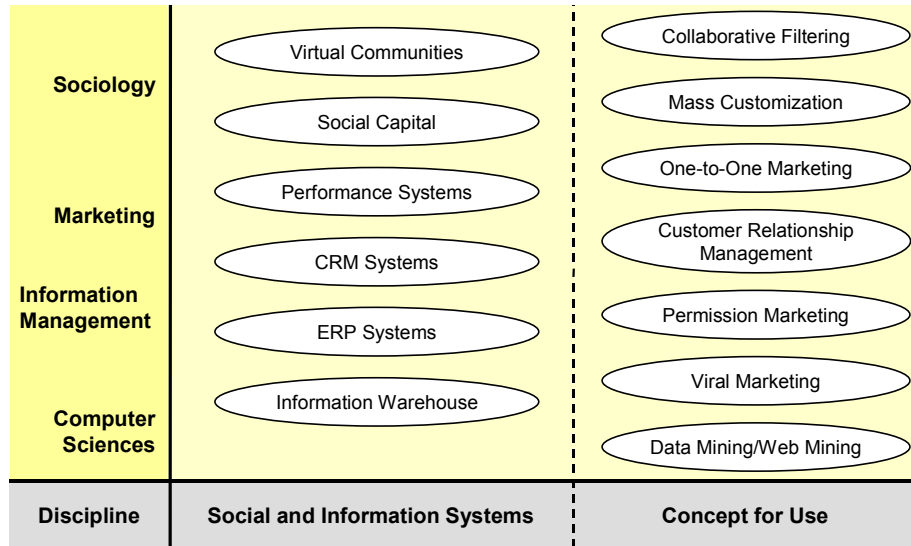


Figure 2. A multi-disciplinary view of systems and concepts in which personalization plays an important role

As discussed above *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 represent 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.

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 forwarded 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).

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

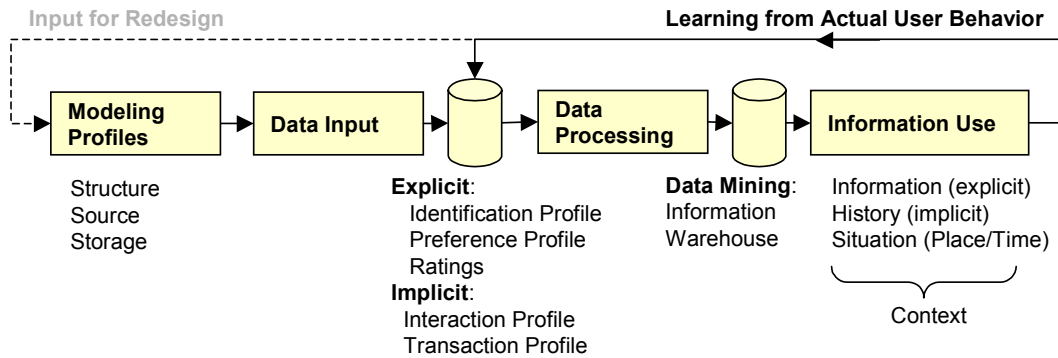


Figure 3. Customer profile life cycle

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 1. Depending on the personal-ization 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 1: Different types of profiles (following Schubert 1999)

Profile	Content
Explicit profiles	
<i>Identification Profile</i>	user name, role, contact information, personal browser settings, address, payment information, IP-address, etc.
<i>Preference Profile</i>	self-revealed preferences (product meta data)
<i>Socio-economic Profile</i>	self-categorization in predefined classes (age, gender, hobbies, etc.)
<i>Ratings</i>	three types of ratings: of products, of reviews, of pages [scale e.g.: I like it – not for me]
<i>Relationships</i>	Relationships to other users/customers [e.g. “soul sisters”]
<i>Reviews/Opinions</i>	Plain text, images, videos and other material
Implicit profiles	
<i>Transaction Profile</i>	transaction log, product purchases linked to product meta data (purchases, inquiries, payment, etc.)
<i>Interaction Profile</i>	click stream (pages viewed are linked to product meta data [preference categories])
<i>External data</i>	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). Fig. 4 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).

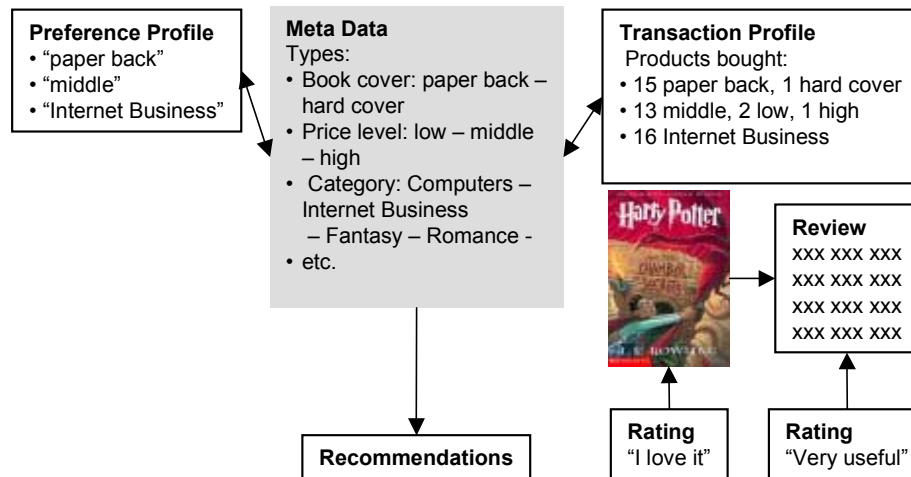


Figure 4. Matching preference profiles and transaction profiles using meta data

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).

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”)

One 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 functional-ities 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.

Following Glazer (2000) customers expect the following three features in electronic shops:

1. comfort
2. participation
3. anticipation

All three issues can be addressed by personalization as described above.

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.

There is already a broad range of methods and tools for filtering information of which the full text query is the most simple but most commonly used one. Work in information filtering is mainly presented under the labels "information retrieval" and "knowledge management". For the personalization of Web content and online-shops, there are integrated software packages available, such as One-to-One (Broadvision), Dynamo Relationship Commerce Suite (Art Technology Group), Personalization Manager (Net Perceptions) or ADAPTe (ResponseLogic). Taking a look at the general methods that can be used for personalization, one can distinguish between content based filtering and collaborative filtering (Goldberg et al. 1992; Resnick & Varian, 1997).

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 through 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 (cf. Fig. 5).

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.

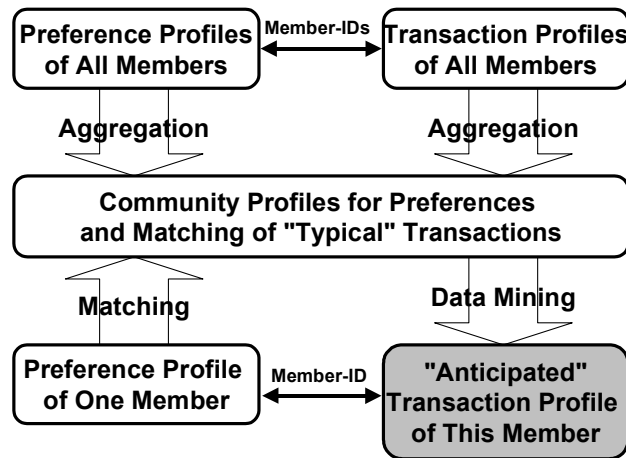


Figure 5. Collaborative Filtering: Building Affinity Groups

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.

Current Research

There are various examples in the Internet using automated personalization. The largest set of different methods can be found on the Amazon Web site. At this point we want to briefly describe three projects in which the authors are currently working on advances in personalization models and technologies.

One project is about developing a concept for a standardized, inexpensive personalization tool for SMEs (Small and Medium-sized Enterprises). In contrast to large companies which can afford expensive personalization software SMEs have to deal with the integration of their existing ERP systems and E-Shops. This leads to demanding technical requirements about technology integration in the usually heterogeneous systems.

In another project with the Stiftung Lebensqualität, a German NGO which has the goal to provide support for customers to choose products which help them to obtain a higher quality of life, researchers are working on the usage of user profiles for customization of different services and products around quality of life. Interesting issues here are reuse of user profiles for diverse areas (ranging from selecting foods to recommending fitness exercises or wellness hotels) and the acquisition of high quality meta information about the products. For the latter the NGO is going to install and adapt certification systems.

Finally, we have a project where we are integrating two aspects of personalization. The project aims at using information about specific customers to help them design or select personalized products. The motivation for the effort is, that in addition to the problems in manufacturing and logistics the emerging individualization of physical products and services (mass customization, see (Pine 1993; Piller 2001)) also produces an information problem. It becomes increasingly difficult for customers and sales staff alike to select from the large set of product possibilities.

All projects described here have in common the need for more generic customer profile models and some architectural issues towards separation of profiles and application or integration of personalization application into different user interaction components.

Conclusions

An ever-increasing number of people use the Internet as a new medium for interactive, multimedia communication spanning time and distance. In this context new business potential emerge which should be harnessed. Worldwide, there is an increasing battle for customer attention (= time which the customer spends on reading a marketing message) and those who want to be successful in the market must know about the basic requirements of their clientele.

In this paper we presented an overview of personalization looking at its enablers, its application in the field and the processes which make it work. There are two important lessons to be learned which are not stressed appropriately in technology and marketing literature yet. (1) Personalization and community are closely related. Communities are the source for collecting comments and user profile information that are needed for personalization, and personalization is needed to make the information collected in anonymous customer communities useable. (2) Personalization is not about grabbing information from the customer, using it to provide a personalized offer but it is rather concerned with building a long-term relationship between customer and online merchant where the electronic platform (Web site) learns about the customer thus establishing trust and better catering to the customer's individual needs. Neither collecting customer data and feedback nor providing customized interfaces to single user does establish a virtual community. But collecting customer data and feedback and providing it to other customers in a personalized way can be seen as the seed from a successful Virtual Community of Transaction.

Strategically, it is advantageous to design effective personalization schemes for E-Commerce Web sites; the following advantages can be derived:

- (1) Besides the incentive of forming a large customer base, the collection of customer feedback is an important aspect for the creation and maintenance of a community. Merchants can derive valuable marketing and service information from discussion among clients. They hear about factors of dissatisfaction, possibilities of improvement, comparisons with the competition, technical flaws, etc. The community might be a source of valuable information that manufacturers usually seek to obtain from expensive customer interviews. Business intelligence engines can be used to give more or less weight to various comments depending on their attributes.
- (2) As demonstrated, there are multiple applications for the Virtual Communities of Transaction. Useful examples can be found in the areas of (1) the personalization of Electronic Commerce interfaces as well as (2) in the creation of completely new products tailored to the needs of an individual or a group of individuals whose revealed preferences can be mass-processed by the electronic platform.
- (3) Examples like Amazon.com, Colony City, Tripod and others illustrate that Internet users are potentially ready to spend time and engagement in a community membership. It is up to the imagination and the creativity of the entrepreneurs to design their business applications in a way that makes full use of this potential for the benefit of all participating parties. It is also up to the selling firms to respect and adhere to good business practices with respect to customer privacy.

The future of electronic commerce will be in best serving the customer according to his or her current needs. This does include explicit information ("I want ..."), implicit information ("what did I want in the past...") as well as situational data ("where am I ...", "what's the time"). The idea of location-based services will heavily rely on the effective use of customer profiles and contextual information (as indicated in Fig. 6).

We have deliberately excluded the discussion of privacy concerns in the context of personalization since this would be a topic for yet another research paper. Merchants in the online world should bear in mind that they are always acting within a given legal framework and that they should seek the consent of the customer before they store and use any personal data for their electronic services.

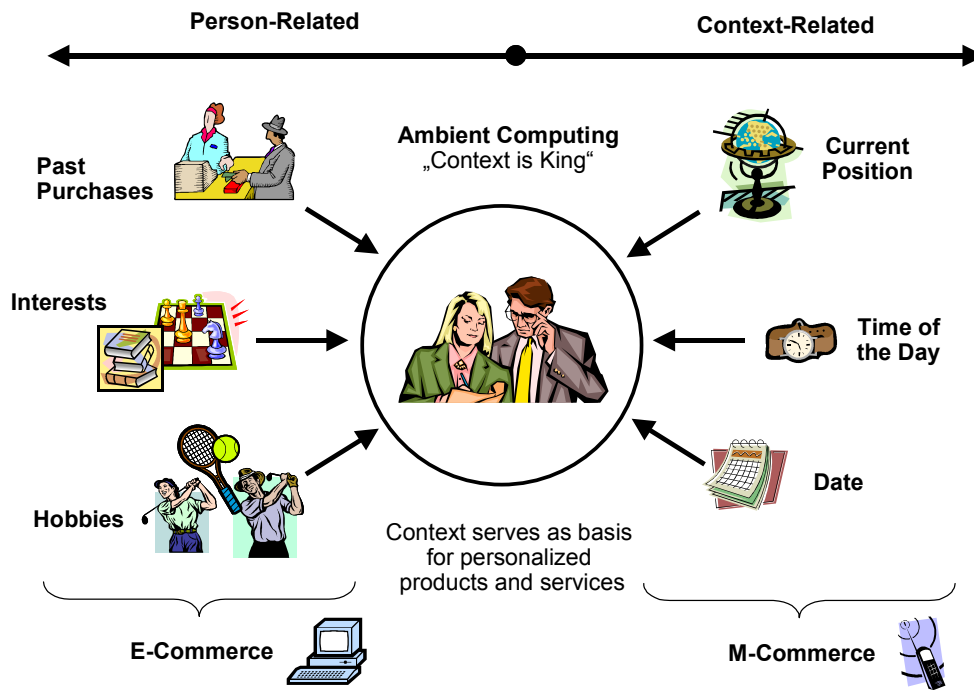


Figure 6. Personalization is key to ambient computing

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