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Data Mining in Customer Value and Customer Relationship Management

Objectives:

- To understand the concept of data mining by comparing traditional marketing research with relationship marketing.
- To create separate portraits of individual customers.
- To secure a database and to examine the capabilities and effectiveness of various data mining techniques to determine the usefulness as related to the customer relationship management.
- To help organizational decision makers identify their most profitable customers.
- To deliver "ideal" customer-defined value at each customer interaction using CVM.
- To use the data mining for incentive allocation.
- To give an overview of what the (future) worker in the field of ERP can expect and has to have heard of when dealing with CRM.
- Linking a call center to the enterprise's network is to enable the agent to access, create, and change customer data.
- To feed a CRM system in order to make it effective, such as materials billing and order history, is often stored all over the enterprise and in the best case embedded in an ERP system.
- To provide high-quality information for the CRM programs, we must discover first rate customer-related data and evaluate them with suitable data mining techniques.

Abstract. Since data mining is a young discipline with wide and diverse applications, there is still a nontrivial gap between general principles of data mining and domain specific, effective data mining tools for particular applications.

Current technology has made available enormous amounts of multimedia data such as audio, image, video, sequence, and hypertext data that need to be analyzed. The main objective of the analysis is to extract (or mine) interesting patterns, associations, rules, changes, anomalies, and general regularities from the data to improve the process of decision making.

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Data mining is a promising and relatively new area of current research and development, which can provide important advantages to the users. It can yield substantial knowledge from data primarily gathered for a wide range of quite different applications. Financial institutions have derived considerable benefits from its application and other industries and disciplines are now applying the methodology to increasing effect.

The background of data mining, data warehousing, knowledge discovery in databases, a concept of customer relationship marketing, customer acquisition, customer value management, customer lifetime value, customer relationship management concepts are discussed in this section.

This section describes the concept of data mining by comparing traditional marketing research with relationship marketing. The background of data mining is discussed with special emphasis paid to the various terms in data mining such as *data warehouses* and *data marts* as well as *knowledge discovery in databases (KDD)* and *customer relationship management (or) marketing (CRM)*. Steps necessary for companies to implement successful data mining projects are enumerated and directions for further research are suggested.

For most businesses, the primary means of growth involves the acquisition of new customers. This could involve finding customers who previously were not aware of the product, were not candidates for purchasing the product (for example, baby diapers for new parents), or customers who in the past have bought from their competitors. Some of these customers might have been the customers previously, which could be an advantage (more data might be available about them) or a disadvantage (they might have switched as a result of poor service). In any case, data mining can often help segment these prospective customers and increase the response rates that an acquisition marketing campaign can achieve.

Also the features of the customer relationship management and customer value management are discussed. Even the comparison and various information regarding both are given. The way in which companies interact with their customers has changed dramatically over the past few years. A customer's continuing business is no longer guaranteed. As a result, companies have found that they need to understand their customers better, and to quickly respond to their wants and needs. In addition, the time frame in which these responses need to be made has been shrinking. It is no longer possible to wait until the signs of customer dissatisfaction are obvious before action must be taken. To succeed, companies must be proactive and anticipate what a customer desires.

16.1 Data Mining: A Concept of Customer Relationship Marketing

16.1.1 Traditional Marketing Research

Today the majority of companies that consider themselves market driven are still organized around their products. These companies position their products to a carefully researched segment of customers whose wants are unfulfilled. To virtually guarantee success, these companies believe that they must give additional value to the chosen segment by differentiating their product in

some unique way. Companies of this type emphasize the refining of internal processes and outputs to meet the needs of the mass market and customers are treated as a homogeneous and basically passive mass.

A number of companies attempted to change or redirect their efforts in the late 1980s and early 1990s. At that time "customer service" became a "hot" topic. Everyone from CEOs to brand managers to hourly employees was admonished to "Take Care of the Customer." Traditional surveys of what the customers want or the service they have received are what many companies rely on today. This traditional survey gives the company reliable information on what customers think they think or what they think they want, but it may not be what they really think or want. If we are only supplying what their customer wants or think they want today, we are not tapping into the unspoken needs and un-served markets that may be the key to the customer of today and the potential customers of tomorrow.

Companies that consider themselves market driven spend an inordinate amount of time differentiating their product through quality improvement. It is estimated that focusing on quality improvements is only about 10l of what we should be doing in the company. This overriding strategy of the past was to acquire customers and respond to their aggregate needs.

16.1.2 Relationship Marketing – the Modern View

Forward-looking companies of today believe that customers are what sustains any business and that they have "lifetime value" not just the value of a single sale. It is believed that customer groups, if managed and maintained, cannot be easily copied by the competition, i.e., they are one of the few "sustainable" competitive advantages open to the company.

Progressive companies of the future will know and understand the difference between knowledge of the customer and customer knowledge. For instance, knowledge of the customer is knowing how many hits a browser makes on their Web site, whereas customer knowledge is knowing what to do with the hits. To benefit from this "new" philosophy a company must change the entire business operation, so that research and development and marketing work seamlessly, and financial resources are allocated in the "right" places.

The producers and suppliers must be able to put together the right mix of service and information surrounding the differentiated or personalized products of the future. This mix will be customized, by creating very separate portraits of individual customers.

The technology to develop these portraits exists in today's data mining technology. Companies are able to take information from their own company's database and augment it with enhancement information provided by a data compiler and then apply a predictive model to the augmented data set using sophisticated data mining techniques. In this way we can understand some of the things the individuals in the year 2020 will want to achieve as customers. Namely:

(a) *To make better and easier decisions.* Data mining technology can help the supplier make use of more intimate knowledge to better target their offers. Goods or services, price, distribution channels, and communication tools can be adapted to give a near exact offer for a very targeted group of consumers. The marketer can tailor demographic data and response data to get close to one-on-one marketing.
(b) *To better manage pressure and anxieties.* It is expected by the year 2020 companies may respond to customer needs for stress reduction and time management by developing such innovative strategies as regular direct home delivery of necessities that customers will not spend time shopping for. This process may be so transparent that consumers will receive bathroom rolls, paper towels, detergents, and specific food items the very way we receive heating, oil, and electricity today.
(c) *To fulfill their "measured hopes".* Customers will be wanting to experience more things in their short amount of leisure time. Data mining techniques will enable service-oriented companies to provide engineered experiences for a consumer's leisure time. These engineered experiences will be similar to the ones provided today by Disney World and Disneyland.
(d) *To benefit from better and faster innovation and, above all, be treated as individuals.* By the year 2020 individual and personalized products will be so highly customized that they will adapt to changing needs and habits. The customer may not even be aware of the changing need, but the sophisticated data mining system will be able to detect them. It is predicted that in the next 30 to 50 years, customers will have such an enormous range of new products built on natural, biotech, and atomically manipulated materials that they (customers) will be in control of essentially everything in the marketplace.

16.1.3 Understanding the Background of Data Mining

Data Warehouse

With the reduction in cost of computing power, companies are collecting all kinds of data about their customers. The repository for this large amount of data has become known as a *data warehouse.* A data warehouse is designed for decision-makers strategic design support and is made up largely from parts of an operational database. This data warehouse can contain billions of records. Wal-Mart's warehouse maintained by NCR Corporation has 101 terabytes of information. With a terabyte containing 250 million pages of text, this data warehouse contains more than 25 billion pages of text. This data warehouse runs more than 30 business applications, supports more than 18,000 users, handles 120,000 complex queries a week, and receives 8.4 million update every minute during peak times. A complex data warehouse like the one described above can cost in excess of $10 million and take from one to three years to complete.

Data Mart

A specialized repository of data used by specific departments such as finance or sales and fed from an enterprise-wide data warehouse is called a *data mart*. Average cost to build a data mart is usually between $10,000 and $1 million and can be up and running in less than six months.

Knowledge Discovery in Databases (KDD)

In its broadest scope data mining is referred to as KDD. However, data mining is generally thought of as a particular activity of KDD that applies a specific algorithm to extract patterns that help convert data into knowledge. KDD has been performed in some form since the first business enterprise, but usually on an ad hoc, catch-as-catch-can role that supported decision makers. The difference in this past role and today is that the process is being continuously operated and is becoming central to the core of business operations.

Data Mining

Data mining has been defined as the process of sifting through large amounts of data to spot patterns and trends that can be used to improve business functions. Simply put, it is prospecting for profits in the depths of the company's database or "like looking for gold in our computer." It combines techniques from statistics, databases, machine learning, and pattern recognition to extract (mine) concepts, concept interrelations, and interesting patterns automatically from large business databases.

The difference between data mining and other analytical methods is the approach they use in exploring the data. Most analytical tools use the verification-based method – the user hypothesizes about specific relationships and tries to prove or refute the presumptions. Data mining uses what is called *discovery-based approaches* in which pattern matching and other algorithms are employed to determine the key relationships in the data. Actually it is nothing more than the analysis of existing data to extract new, previously unknown, or unrealized information. This analysis of existing data benefits both businesses and consumers as the growing capabilities of the new technique are realized.

Data mining is often referred to as having two scopes. The narrow scope is defined as the automated discovery of "interesting" non-obvious patterns hidden in a database that have a potential for contributing to the overall profit of the firm. This narrow definition encompasses computer-based or "machine learning: methods such as neural networks, genetic algorithms, and decision trees to extract patterns of information from data while requiring only limited human involvement."

The broad scope of data mining encompasses "confirmation" or testing of relationships revealed in the narrow scope. These relationships are confirmed to support the theories, models, and hypotheses formulated within

the narrow scope definition of data mining. Examples of procedures used include exploratory data analysis, ordinary least squares, regression, logistical regression, and discriminate analysis. The broad scope involves managers and analysis identifying important variables and structuring the investigation.

Data Mining: From Data to Knowledge

Collecting business or scientific data is a basic step toward achieving competitive advantage. In order for data to become a strategic resource it must be possible to extract knowledge from them about the system under study. Data mining techniques, rooted in the fields of artificial intelligence and statistics, jointly with appropriate computational power, allow knowledge to be extracted and synthesized by means of automatic learning from raw data. Knowledge, expressed in terms of decision trees, association rules, dependency structures, probability, etc. allows questions such as the following to be answered: What goods should be promoted to the customer? What is the probability that a certain patient suffers a given disease? How should a medical image be interpreted? What is the avalanche risk in a certain area? Will this customer default on a loan? What is the good that a certain customer is likely to buy given that he bought another? The data mining approach is viable when a convenient database is available and is largely independent of the specific application domain, not requiring experts' knowledge.

16.1.4 Continuous Relationship Marketing

As we consider data mining in its narrow and broad scope, it is important to understand the relationship of database marketing and data mining with the personal touch. Companies such as Hertz, USAA, Wal-Mart, and Nordstrom are successful, not because they have a gigantic data warehouse, but because they have figured out practical ways to gather information and act on it quickly. These successful companies understand their customer their competitive position and they understand profitability.

With the lower price of information technology (IT) markets can offer real customer relationships of the past, before mass markets, combined with greater variety and lower prices. This type of combination is known as the *continuous relationship marketing* (CRM) strategy. Several key rules are important to consider for use in the implementation of this strategy.

a) *Use the information that is gathered to serve the customers better.* Marketers can arrive at a customer lifetime value (CLV) calculation that sums the profitability of individual purchases to arrive at current customer value and factors in time to reflect the importance of customer retention.
b) *Continuous relationship marketing (CRM) strategy* is most effective when it concentrates on building relationships with customers who offer attractive lifetime value.

c) *Build customer relationships, not just databases.* It is not enough to have a customer's name in the database; this information must be used to build a stronger relationship with the customer.
d) *Be willing to treat customers differently.* Some customers may have a customer's lifetime value (CLV) often or even a hundred times greater than other customers, yet the company may not treat the more valuable customer differently from any other customer. Width dedicated ticket lines, priority upgrades and "early" boarding, airlines have perfected this "class treatment" better than most industries.
e) *Compete with skills, not capital.* The successful CRM practitioner analyzes data to understand customer behavior and identifies ways to serve customers better.

In short, continuous relationship marketing (CRM) is an approach in which a company seeks to build close relationships with its potential and current customers, so that both segments will be encouraged to concentrate a disproportional high share of their value with the company.

16.1.5 Developing the Data Mining Project

Companies that are successful in data mining efforts need (a) careful planning, (b) careful selection of the right data, (c) to be certain that data is in the proper format to be analyzed and (d) to have a clearly defined business objective. There are several steps necessary in implementing a data mining project. Namely:

1). A company needs to establish a research objective for the project. The researchers may ask themselves: why are we doing this? what problems are we addressing? what do we hope to accomplish? Data mining, like any other research, is designed to provide information that can be used to improve the current situation. A firm cannot just decide to mine its data and expect solutions to present themselves. It is necessary to decide what issues need to be addressed and then determine if data mining techniques are an appropriate solution.
2). After establishing an objective, it is necessary to select an appropriate data set. Many data sets include transaction data, demographic data, and lifestyle data. Just because data mining packages can handle large data sets, it is not necessary or prudent to include variables that have absolutely no relationship to the objective.
3). The next step in the data mining process is to cleanse and transform the data set. This step is vital to ensure accuracy and effectiveness of the outcome. Often times in large data sets customer records are incomplete or the same customer appears multiple times. Cleansing the data set includes deleting fields where data is missing or deleting duplicate records. Transforming data can involve converting data from one type to another

such as numeric to character or currency. The point of this stage in the process is to remove or transform any data that could lead to "dirty" or inaccurate results.

4). The last stage in the data mining project is to actually mine the data. After the research objective is determined and the data is cleansed appropriately and transformed, the researcher must select the appropriate way to mine the data. This involves deciding what type of data mining operation to use, selecting the data mining technique to support this operation and ultimately mining the data. Once the data is mined and the designed information is extracted it can be analyzed and interpreted with respect to the original research objective.

16.1.6 Further Research:

Here, we discussed the concept of data mining by comparing traditional marketing research with relationship marketing, providing an understanding of the background of data mining and guidelines for developing the data mining projects.

The next step for the further research in this area is to actually secure a database and to examine the capabilities and effectiveness of various data mining techniques to determine the usefulness as related to the customer relationship management. Value to the researcher could be obtained by attempting to evaluate a realistic managerial issue that a marketer might face. Data mining techniques could be employed to determine their effectiveness in addressing the issue. For example, historical transactions data could be examined utilizing data mining techniques to develop custom clusters and predictive models that could then be used to help organizational decision makers identify their most profitable customers.

16.2 Introduction to Customer Acquisition

The traditional approach to customer acquisition involved a marketing manager developing a combination of mass marketing (magazine advertisements, billboards, etc.) and direct marketing (telemarketing, mail, etc.) campaigns based on their knowledge of the particular customer base that was being targeted. In the case of a marketing campaign trying to influence new parents to purchase a particular brand of diapers, the mass marketing advertisements might be focused in parenting magazines (naturally). The ads could also be placed in more mainstream publications whose readership demographics (age, martial, status, gender, etc.) were similar to those of new parents.

In the case of traditional direct marketing, customer acquisition is relatively similar to mass marketing. A marketing manager selects the demographics that they are interested in (which could very well be the same characteristics used for mass-market advertising), and then works with a data

vendor (sometimes known as a service bureau) to obtain lists of customers who meet those characteristics. The service bureaus have large databases containing millions of prospective customers who can be segmented based on specific demographic criteria (age, gender, interest in particular subjects, etc.) to prepare for the "diapers" direct mail campaign, the marketing manager might request a list of prospectives from a service bureau. This list could contain people, aged 18 to 30, who have recently purchased a baby stroller or crib (this information might be collected from people who have return warranty cards for strollers or cribs). The service bureau will then provide the marketer with a computer file containing the names and addresses for these customers so that the diaper company can contact these customers with their marketing message. It should be noted that because of the number of possible customer characteristics, the concept of "similar demographics" has traditionally been an art rather than a science. There usually are no hard-and-fast rules about whether two groups of customer share the same characteristics. In the end, much of the segmentation that took place in traditional direct marketing involves hunches on the part of the marketing professional. In the case of 18-to-30 year old purchasing baby strollers, the hunch might be that people who purchase a stroller in this age group are probably making the purchase before the arrival of their first child (because strollers are saved and used for additional children). They also have not yet decided the band of diapers to be used. Seasoned veterans of the marketing game know their customer well and are often quite successful in making these kinds of decisions.

16.2.1 How Data Mining and Statistical Modeling Change Things

Although a marketer with a wealth of experience can often choose relevant demographic selection criteria, the process becomes more difficult as the amount of data increase. The complexities of the patterns increase both with the number of customers being considered and the increasing detail of each customer. The past few years have seen tremendous growth in consumer databases, so the job of segmenting prospective customer is becoming overwhelming.

Data mining can help this process, but it is by no means a solution to all of the problems associated with customer acquisition. The marketer will need to combine the potential customer list that data mining generates with offers that people are interested in. Deciding what is an interesting offer is where the art of marketing comes in.

16.2.2 Defining Some Key Acquisition Concepts

Before the process of customer acquisition begins, it is important to think about the goals of the marketing campaign. In most situations, the goal of acquisition marketing campaign is to turn a group of potential customers into actual customers of the product or service. This is where things can get a bit fuzzy. There are usually many kinds of customers, and it can often take

significant amount of time before some one becomes a valuable customer. When the results of an acquisition campaign are evaluated there are often different kinds of responses that need to be considered.

The responses that come in as a result of a marketing campaign are called *response behaviors*. The use of the word *behavior* is important because the way in which different people respond to a particular marketing message can vary. How a customer behaves as a result of the campaign needs to take this variation into consideration. A response behavior defines a distinct kind of customer action and categorizes the different possibilities so that they can be further analyzed and reported on.

Binary response behaviors are the simplest kind of response. With a binary response behavior, the customer response is either a *yes* or *no*. If someone has sent a catalog, did they buy something from the catalog or not? At the highest level, this is often the kind of response that is talked about. Binary response behaviors do not convey any subtle distinctions between customer actions, and these distinctions are not always necessary for effective marketing campaigns.

Beyond binary response behaviors are categorical response behaviors. As one would expect, a categorical response behavior allows for multiple behaviors to be defined. The rules that define the behaviors are arbitrary and are based on the kind of business we are involved in. Going back to the example of sending out catalogs, one response behavior might be defined to match if the customer purchased women's clothing from the catalog, whereas a different behavior might match when the customer purchased men's clothing. These behaviors can be refined a far as deemed necessary (for example, "purchased men's red polo shirt.")

It should be noted that it is possible for different response behaviors to overlap. A behavior might be defined for customers that purchased over $100 from the catalog. This could overlap with the "purchased men's clothing" behavior if the clothing that was purchased cost more than $100. Overlap can also be triggered if the customer purchases more than one item (both men's and women's shirt's, for example) as a result of a single offer.

Although the use of overlapping behaviors can tend to complicate analysis and reporting, the use of overlapping categorical response behaviors tends to be richer and therefore will provide a better understanding of the customers in the future.

There are usually several different kinds of positive response behaviors that can be associated with an acquisition marketing campaign. (This assumes that the goal of the campaign is to increase customer purchases, as opposed to an informational marketing campaign in which customers are simply told of the company's existence.) Some of the general categories of response behaviors are the following:

- *Customer inquiry.* The customer asks for more information about the products or services. This is a good start. The customer is definitely interested in the products—it could signal the beginning of a long-term customer

relationship. We might also want to track conversions, which are follow-ups to inquiries that result in the purchase of a product.

- *Purchase of the offered product or products.* This is the usual definition of success. We offered the products to someone, and they decided to buy one or more of them. Within this category of response behaviors, there can be many different kinds of responses. As mentioned earlier, both "purchased men's clothing" and "purchased women's clothing" fit within this category.
- *Purchase of a product different that the ones offered.* Despite the fact that the customer purchased one of the products, it was not the one we offered. We might have offered the deluxe product and they chose to purchase the standard model (or vice versa). In some sense, this is a very valuable response because we now have data on a customer/product combination that we would not otherwise have collected.

There are also typically two kinds of negative responses. The first is a non-response. This is not to be confused with a definite refusal of the offer. For example, if we contacted the customer via direct mail, there may be any number of reasons why there was no response (wrong address, offer misplaced, etc.). Other customer contact channels (outbound telemarketing, e-mail, etc.) can also result in ambiguous nonresponses. The fact there was no response does not necessarily mean that the offer was rejected. As a result, the way we interpret a nonresponse as part of additional data analysis will need to be thought out.

A rejection (also known simply as a "no") by the prospective customer is the other kind of negative response. Depending on the offer and the contact channel, we can often determine exactly whether or not the customer is interested in the offer (for example, an offer made via outbound telemarketing might result in a definitive "no, I'm not interested" response). Although it probably does not seem useful, the definitive "no" response is often as valuable as they positive response when it comes to further analysis of customer interests.

16.2.3 It all Begins with the Data

One of the differences between customer acquisition and most other marketing applications of data mining revolves around the data that is used to build predictive models. The amount of information that we have about people is that we do not get relationship with his customer, with limited information. In some cases, the data might be limited to their address and/or phone number. The key to this process is to have a relationship between the information that we do have and the behaviors that we want to model.

Most acquisition marketing campaigns begin with the prospect list. A prospect list is simply a list of customers who have been selected because they are likely to be interested in the products or services. There are numerous

companies around the world that will sell lists of customers, often with a particular focus (for example, new parents, retired people, new car purchasers, etc.).

Some times it is necessary to add additional information to a prospect list by overlaying data from other sources. For example, consider a prospect list that containing only names and addresses. In terms of a potential data mining analysis, the information contained in the prospect list is very weak. There might be some patterns in the city, state, or zip code fields, but they would be limited in their predictive power. To augment the data, information about customers on the prospect list could be matched with external data. One simple overlay involves combining the customer's ZIP code with U.S. census data about average income, average age, and so on. This can be done manually or, as is often the case with overlays and the list provider can take care of this automatically.

More complicated overlays are also possible. Customers can be matched against purchase, response, and other detailed data that the data vendors collect and refine. This data comes from a variety of sources, including retailers, state and local governments, and the customers themselves. If we are mailing out a car accessories catalog, it might be useful to overlay information (make, model, year) about any known cars that people on the prospect list might have registered with their department of motor vehicles.

16.2.4 Test Campaigns

Once we have a list of prospect customers, there is still some work that needs to done before we can create predictive models for customer acquisition. Unless we have data available from previous acquisition campaigns, we will need to send out a test campaign in order to collect data for analysis. Besides the customers we have selected for the prospect list, it is important to include some other customers in the campaign, so that the data is as rich as possible for further analysis. For example, assume that the prospect list (that we purchased from a list broker) was composed of men over age 30 who recently purchased a new car. If we were to market to these prospective customers and then analyze the result, any patterns found by data mining would be limited to subsegments of the group of men over 30 who bought a new car. What about women or people age 30? By not including these people in our test campaign, it will be difficult to explain further campaign to include segments of the population that are not in our initial prospect list the solution is to include a random of selection of customers whose demographics differ from the initial prospect list. This random selection should constitute only a small percentage of overall marketing campaign, but it will provide valuable information for data mining. We will meet to work with our data vendor in order to add a random sample to the prospect list.

More sophisticated techniques than random selection, do exist such as those found in statistical experiment design and multivariable testing (MVT). Deciding when and how to implement these approaches is beyond the scope of this book, but there are numerous resources in the statistical literature that can provide more information.

Although this circular process (customer interaction? data collection? data mining? customer interaction) exists in almost in every application of data mining to marketing, there is more room for refinement in customer acquisition campaigns. Not only do the customers that are included in the campaigns change over time, but the data itself can also change. Additional overlay information can be included in the analysis when it becomes available. Also, the use random selection in the test campaigns allows for new segments of people to be added to our customer pool.

16.2.5 Evaluating Test Campaign Responses

Once we have started our test campaign, the job of collecting and categorizing the response behaviors begins. Immediately after the campaign offers go out, we need to track responses. The nature of the response process is such that responses tend to trickle in over time, which means that the campaign can go on forever. In most real-world situations, though, there is threshold after which we no longer look for responses. At that time, any customers on the prospect list that have not responded are deemed "nonresponses." Before the threshold, customers who have not responded are in state of limbo, somewhere between a response and a nonresponse.

16.2.6 Building Data Mining Models Using Response Behaviors

With the test campaign response data in hand the actual mining of customer response behaviors can begin. The first part of this process requires one to choose which behaviors one is interested in predicting, and at what level of granularity. The level at which the predictive models work should reflect the kinds of offers that one can make, not the kinds of responses that one can track. It might be useful (for reporting purposes) to track catalog clothing purchases down to the level of color and size. If all catalogs are the same, however, it really does not matter what the specifics of a customer purchase for the data mining analysis. In this case (all catalogs are the same), binary response prediction is the way to go. If separate men's and women's catalogs are available, analyzing response behaviors at the gender level would be appropriate. In either case, it is a straightforward process to turn the lower-level categorical behaviors into a set of responses at the desired level of granularity, If there are overlapping response behaviors, the duplicates should be removed prior to mining.

In some circumstances, predicting individual response behavior might be an appropriate course of action. With the movement toward one-to-one customer marketing, the idea of catalogs that are custom produced for each customer is moving closer to reality. Existing channels such as the Internet or outbound telemarketing also allow one to be more specific in the ways we target the exact wants and needs of their prospective customers. A significant drawback of the modeling of individual response behaviors is that the analytical processing power required can grow dramatically because the data mining process needs to be carried our multiple times, once for each response behavior that one is interested in. How one-handle negative responses also need to be thought out prior to the data analysis phase. As discussed previously, there are two kinds of negative responses: rejections and nonresponses. Rejections, by their nature, correspond to specific records in the database that indicate the negative customer response. On-responses, on the other hand, typically do not represent records in the database. Nonresponses usually correspond to the absence of a response behavior record in the database for customers who received the offer. There are two ways in which to handle non-responses. The most common way is to translate all nonresponses into rejection, either explicitly (by creating rejection records for the nonresponding customers) or implicitly (usually a function of the data mining software used). This approach will create a data set comprising all customers who have received offers, with each customer's response being positive (inquiry or purchase) or negative (rejections and nonresponses).

The second approach is to leave nonresponses put of the analysis data set. This approach is not typically used because it throws away so much data, but it might make sense if the number of actual rejections is large (relative to the number of nonresponses); experience has shown that nonresponses do not necessarily correspond to a rejection of one's product or services offering. Once the data has been prepared, the actual data mining can be performed. The target variable that the data mining software will predict is the response behavior type at the level we have chosen (binary or categorical). Because some data mining applications cannot predict nonbinary variables, some finessing of the data will be required if we are modeling categorical responses using noncategorical software. The inputs to the data mining system are the input variables and all of the demographic characteristics that we might have available, especially any overlay data that we combined with our prospect list. In the end, a model (or models, if we are predicting multiple categorical response behaviors) will be produced that will predict the response behavior that we are interested in. The models can then be used to score lists of prospect customers in order to select only those who are likely to response to our offer. Depending on how the data vendors we work with operate, we might be able to provide them with purchasing overlay data in order to aid in the selection of prospects, the output of the modeling process should be used to determine whether all of the overlay data is necessary. If a model does not

use some of the overlay variables, we might want to save some money and leave out these unused variables the next time we purchase a prospect list.

16.3 Customer Relationship Management (CRM)

Knowledge of CRM and Customers: Considering the key issues that relate to how business interpret and make use of data about customers

Definition of CRM
How CRM data is used
Strategic data analysis for CRM
Data warehousing and data mining, how they can be used in CRM
Sharing customer data within the value chain

Strategy and Technology:

(CVM) Customer Value Management
The re-emergence of smart cards as a technology for customer management

16.3.1 Defining CRM

Traditionally, companies have developed databases to capture customer information, including such details as customer profiles, demographics, products purchased, and other items of interest. This data is used by management salespeople, service personnel, and others to determine market trends, customer preferences, service, and maintenance required by customers. However, there was a question whether companies had managed to transform this data into value.

16.3.2 Integrating Customer Data into CRM Strategy

Today, technologies such as data warehousing and data mining allow companies to collect, store, analyze, and manipulate enormous volumes of data. This can be important for marketers trying to provide better service and more satisfaction to the customer than competitors.

16.3.3 Strategic Data Analysis for CRM

Many companies have not determined how to deal with the rapidly increasing volumes of data about customers now being recorded in and about their business, through research, operations, or external data suppliers. Examples here are firstly, consumer goods retailers. Retailers can now obtain reports about the purchasing of individual products by specific customers, usually

within a few hours of purchasing taking place and sometimes online. In its extreme form this can include the results of promotions mounted through mobile phone. Utilities, financial services, and B2B companies – managers in these industries now have comprehensive databases, which record not only purchase but also sales enquiries, responses to promotions, and a mass of detailed data about customers. All the examples illustrate two of the key dimensions that exist in marketing data analysis-product and customer.

Product Dimension

Companies such as retailers, which do not know the identity of their final customers, while applying customer management disciplines to their immediate direct customers, must use product management to get the best result. This is the so-called "product optimizers." Their own and market data on price, promotion, inventory levels and movements, and shipments is used to determine the optimum marketing and distribution policy. Their data is organized along the product dimension, and the key analysis task is to make sense of the possibly daily millions (e.g., P&G and Nestle) of transaction in which their products are involved. There are many companies that organize data by product and focus on marketing efforts that aim to increase demand for specific products – Gillette is one example, aiming to increase regular shaving, perhaps to twice a day.

Customer Dimension

Companies that can manage their customers as individual or small groups need to become expert in analyzing customer data, and be able to answer questions such as: Which customers do we want to market to market to, and we do not want to? How do we want to manage our customers? At what price would we like to sell, through which channels of distribution, and when? We will be very surprised that almost 90l of the companies in UK do not apply this basic principle to their companies.

The classification of management actions can be combined with a categorization of decision areas to produce a clear statement of requirement for the analyses to be undertaken. For example, for an FMCG supplier, the decision areas might be categorized to include: packaging, manufacturing and inventory volumes, distribution strategy and tactics, standard costing and pricing, promotional pricing, promotional offers, media advertising, individual brand/product definition and positioning.

Companies should normally need to consolidate and synthesize data from different sources (internal, market research, generally available market data, etc.) and functions (marketing, sales, finance, customer service, manufacturing, etc.). A successful approach to analyze the company is by defining the key analysis dimensions in some detail, and then to ensure focus on a few areas, which can be backed by management action.

The needs of different users vary, and different users will require different tools to support their different management actions, but this must not lead to data being dispersed to different users so that the capability for coordinated analysis is lost.

16.3.4 Data Warehousing and Data Mining

What is Data Mining?

A simple definition of data mining in marketing is: extraction of previously unknown, comprehensible and actionable information from large repositories of data, and using it to make crucial business decision and support their implementation, including formulating tactical and strategic marketing initiatives and measuring their success.

Why Using Data Mining in Marketing?

The aim of data mining is to obtain a sufficient understanding of a pattern of market behavior to allow quantifiable benefits to be derived from changes in behavior suggested by the analysis. This involves learning previously unknown facts about market behavior; answering specific questions, including forecasting questions.

In deciding whether to use data mining we must develop a clear view as to how we are going to use the output, in policy terms. Far too many data mining projects have been undertaken on the initiative of IT departments. These usually result in lots of interesting findings but number action. Companies with large customer bases, with a reasonable degree of stability in the marketing staff and in their marketing services suppliers, should have a wealth of knowledge about customers in the heads of their people and in reports on their past activities. Data mining will often confirm their beliefs, but add a more quantitative or practical edge – e.g., specifying the size of a long-suspected segment, identifying which customers belong to it. Some deductions are reasonable, such as buying behavior depending on socio-economic status, and these are the ones where one should collect data to investigate.

But data mining is more than simple data analysis. It is the understanding of a business environment, such that relevant questions can be answered by the use of the appropriate data analysis tool on the properly selected data. As such, data mining requires:

Understanding of the industry conditions
Appreciation of specific factors that apply to the company
Familiarity with a wide range of analytical tools
Ability to present extracted information in informative ways

16.3.5 Sharing Customer Data Within the Value Chain

How products and services (prices, availability, etc.) can more easily flow up and the supply chain using e-technology, helping customers toward the end of the chain better. However, it is clear that the more that suppliers further up the supply chain known about customers further down it, the better they can serve those customer needs. Put simply, customer data is valuable more than the supplier immediately facing the customer. An example of this is the willingness of suppliers in a market to share negative data about their customers, including those that do not pay in their activities. While there are many such examples of negative (or risk avoidance) data being shared, there are few occasions where positive data is shared within a market or value chain.

Data protection legislation

Data protection legislation has become a key management issue for all-new and existing processes and systems. A poor understanding of options can constrain a company's ability to use customer data competitively, while infringing legislation can have dramatic and expansive impact on company brand, create legal action. So the rules of importance for value chain management include such as: how the data was collected, for what purpose and with what expectation and approvals by the customer, data sharing within the company or group and with value chain partners.

Arguments for sharing customer knowledge

Improved targeting of marketing strategy.
Improved targeting of marketing communications.
Improved more relevant content of marketing communications.
Improved product planning.
Improved pricing.
Reduced costs of data acquisition.
Reduced costs of data processing.
Reduced media advertising.
Reduced direct mail expenditure.
Increased responsiveness to changing market conditions.
Gaining an advantage over competition at same level of the value chain.
Reducing market risk.
Learning/skills transfer.

Arguments against sharing customer knowledge

Increased complexity of the marketing process.
Increased problems with data management.

Conflict caused by mismatch in objectives/types/pace of marketing/sales process.
General conflict of interest.
Conflict of interest over customer ownership.
Conflict of interest over data ownership.
Systems incompatibilities.
Legal complexities (regulatory, data protection).
Data security.
Skills shortage-data analysis.

16.3.6 CVM – Customer Value Management

One of the biggest problems facing the company today is how to continue to attract customers in attaining growth, often in an environment where products and prices among competitors are moving closer and closer together. Traditional bases for differentiation, as product features or cost, are becoming less tangible and senior management are forced to look for new ways to be attractive to a target market. Many companies now should start thinking of the concept of customer value management (CVM) in order to identify the "value" that can be delivered, not only by products but also by processes and services, then engineering their business capabilities to deliver "ideal" customer-defined value at each customer interaction.

Due to the rapid introduction of new technologies and resultant rapid changes in customers' perceived "needs" and "values," in applying CVM companies can continuously monitor and maintain an alignment between the customer's vision of 'ideal value delivery' and the capabilities of the business to deliver that value.

The goal of CVM is to deliver optimal value to customers.

Measuring Up and Brands Have Relationships Too

The idea here is: lasting customer relationship. This results in long-term payback to a company. Customers want to be able to trust brands and rely upon them; they want a sense of commitment. In order to know how well they are doing in creating an emotional connection with their brands, managers must be able to measure such a concept by carrying out qualitative research, and one step further to benchmark data. They must know where these relationships are weak and where they are strong.

According to research by the Bristol Group, customers whose relationship with a company is 80 and higher on the 100-point scale will provide approximately 101 higher share of their business than those whose relationship is between 60 and 80. These customers are also 341 more likely to say that they are "very likely" to remain a customer and are more than twice as likely to recommend the company or firm to a friend. Such results point to the value

to a firm's relationships with their customers, rather than merely making it easy for customers to deal with them.

GCRM and Implementation

This part investigates some of the problems large companies have in transferring customer management knowledge, expertise, and process between countries. Customer management consists of a range of business practices, ranging from full-fledged customer relationship management to its contributing in disciplines such as direct mail, telemarketing, database management, campaign management, and e-business. Many global companies have initiated new activities in the last few years, often in individual countries. Some of these companies are now looking to consolidate their gains and ensure that good practice in one country or division is transferred across the business.

16.3.7 Issues in Global Customer Management

CRM – A Graveyard for Marketing?

We have already expressed a strong skepticism about the blind acceptance of some of the ideas promoted under the guise of CRM. We stress that there are many other models of customer management, many of them classic – some of them working much more profitable than CRM – and the newer e-business-based models actually help customers get excellent value by cherry-picking, spot-buying, and resisting relationships.

Nevertheless, CRM became a global fashion in 1999. However, as the more cynical among us suspected, the popularity of this fashion (which in its most naïve form translated CRM into "'CRM system") is already starting to evoke yawns among senior management as they see the problems caused.

A study in October 1999 by the Meta Group has confirmed this. The study confirms that many CRM initiatives in the world's largest companies are at "serious risk of failure." The Meta Group in conjunction with its research affiliate, IMT strategies, interviewed 50 end users, including Eastman Kodak/Nortel Networks and Sprint. Although 80% of companies polled said they have at least one CRM application up and running, they failed to benefit fully from them.

For example, they are not using data warehouses for in-depth analysis. Few of them are using application that allows proper collaboration with customers. While many companies are employing customer-facing applications such as call centers and Web sites integrated with front, back, and mobile officers, Meta estimates the world's largest companies will have to spend as much as US$ 250 million over the next two to three years to achieve tangible returns on CRM investments.

Any model of customer management requires a balanced approach, covering strategies, people, systems, processes, data, measurement, and the like.

Improving customer management globally is an even greater task – yet some companies are working on it, and some are succeeding. One of these reasons why global capacity is important is that e-business has given immense impetus to the global capacity of customer's management.

Global Commerce, Global CRM, and the Death of Distance

One of the current dominant influences on management thinking is the idea that "competition is only a click away." Although this simplifies the nature of the competition, there is no doubt that what Francis Cairns crosses calls "the death of distance" is a reality of many managers. The telecommunications and IT revolution that we are still experiencing means: distance is now only a minor factor in the cost communicating, and becoming less and less important as more communication moves off from conventional voice into data.

This makes location less relevant to business success. Businesses need less and less to be located near the market they serve provided that the logistics network is in place to deliver all the products/services and information required to ensure smooth transition through the value chain. Size is also less relevant. Once, only larger companies could afford the complex IT, telecommunications, and logistics infrastructure required to service global market. Now these are all available, cheaply, to almost any company. These accelerated infrastructure developments mean that any kind of "customer can be served anywhere in the world, customizing the offerings of the world to their needs."

Global Knowledge and Information Management

A critical part of improving customer management performance across the globe seems to be having some kind of approach to transferring knowledge and skills. However, it is clear that there are two very different approaches. One is to formalize and codify knowledge (in case about how to manage customers) and transfer it through global systems and processes. The other is to recruit very skilled people and assigned them to the creation of improved customer management in a particular country are region. There is no golden rule here and much depends upon the nature of the product and service.

There is evidence, for example, that where the relationship with customers is very ideas based (e.g., in management consultancy), the latter approach is likely to be more profitable, but where the relationship with customers is highly automated and functional, the more formal approach is likely to be more profitable.

16.3.8 Changing Systems

Just as we are beginning to settle down on the idea that the Web as we know it is revolutionizing customer management in ways that we are learning to

predict, along comes another revolution – the mobile phone as the location of customer management activity. The signs are already clear that it will have an effect that vary by country. However let us consider why it poses both a problem and an opportunity for global customer management programs.

Teenagers, among the most avid users of mobile phones, already ask why they need to be in a particular room to receive a pone call. However, many business customers already know that they do not need to be physically connected to anything in order to carry out any transaction, receive any information, or keep in touch with customers, suppliers, or colleagues. They share the vision of the mobile phone companies, in which each individual is in communication with whatever he or she wants to communicate with, with permanent or temporary connection according to that individual's wishes, but at relatively low cost. That means that the customer is often connected by a mobile phone to a computer, not a person (except in cases where the computer cannot do the job).

The mobile phone vision is supported by the widening gap between mobile access and Web access in most countries. This gap is widening very rapidly in those countries where the Web had the slowest uptake (e.g., in South East Asia). In the United States, on the other hand, the relatively poor development of mobile standards and networks has caused the country to fall behind Japan.

Of course it is the development of mobile phones as a means of sending and receiving information, rather than just mobile phones, which is bringing the reality of individual customer management to the fore. There will be even more of a need to ensure that the preferences and requirements of customers are managed and targeted in the right way as the more things become this is close to the individual, the more the potential for infringing on the customers privacy.

16.3.9 Changing Customer Management - A Strategic View

If this vision is to become a reality, what must change in customer management? We see the following as the key areas of change.

The Supply Chain

In many situations this is sticky. Transferring data along the supply chain and managing the eventual relationships with customers is difficult even using established technology. Companies will need to adopt a different vision of how they interact with customers; free up data within their supply chain to make it available to customers; and free up their supply chain to make it possible for customers to influence the chain itself.

The Customer Management Model

Companies will need to reconsider the nature of their customer management model. If it is based on privileged service to privileged customers, and if that

privilege is based on access to and influence of the supply chain the position is vulnerable, as the other companies will be able to make what was privileged access available to all validated customers.

It may be seen that companies that have very frequent transactions with their customers may be the first to benefit from this technology. However frequency of transaction may not be the issue, if value of transaction is high enough. A used-car buyer can request mobile notification of when an appropriate vehicle comes into stock, or can review the stock availability of a nearby dealer. A new-car buyer can request mobile notification of delivery status. A customer waiting for annual maintenance can receive notification of a problem and request for authorization of additional work, or that the car is ready for collection or delivery.

Content Management

As customers are able to access or receive the latest information from companies, they will need to combine information from company and other sources. For example knowing the latest share price of transaction balance is one thing, doing something about it is another.

The UPS sponsored a research analysis that was carried out by IBM recently, and the study was carried out using the following.

An e-mail questionnaire was sent to 50 members of the customer management group, an IBM-sponsored group of large companies that are interested in improving how they manage their customers.

Formal discussions during the period of the research with around 20 individual companies and 7- conference presentation around the world.

Discussions with both leading corporate and individual customers and suppliers.

The outcomes are:

Awareness of the customer management issue
Lack of local awareness of benefits
Global programmers
Recognition of requirement of explicit transfer
Effect of global systems
Preferences for own systems, processes
Awareness that particular marketing strategies are not the determining factor
Skills transfer strategy
Understanding importance of measure across countries and divisions
Use of internal benchmarks
Cultural issues
Senior management skills, motivation
Conflict with ideas of delegation of authority/devolution
Reliance of internal networking
Importance of IT support to the transfer process

Implementing Customer Management

One of the most difficult questions facing all companies interested in improving their customer management is "We have decided what customer management strategy to put in place. We have decided which models of customer management to use. We have bought our systems. We have decided on our implementation program. Now where on earth do we get the people to manage it all?"

This is the wrong question. Leaving the people until last is not a good idea. Indeed, companies that succeed in implementing new approaches to customer management tend to appoint much of the team first and leave the team to develop plans. This follows the excellent principles of not expecting people to implement plans that they had no hand in shaping.

Of course, it is not possible to appoint a complete team before deciding what to do, as the decisions about what to do, and where and when to do it, affect decisions about the nature and size of the customer management team.

Customer management research suggests a very high correlation between having the right people and people programmers in place, with achieving results for their customers and company. It is perhaps not surprising that some successful managers extol the mantra "the customer comes second," meaning that where there is internal focus on employees they in turn will be able to understand customer needs and manage relationships effectively.

Key Skill Requirements in CRM

Strategic skill requirements are many. Few companies would claim that they had all the skills they required in the quantities they require them. Developing and keeping the right mix and level of skills is a constant battle. The phrase "two steps forwards, one step back" rings very true here. As soon as a company recruits and or trains to the right levels, strategies needs may change or key staff may leave to join other companies. This section discusses the ideal mix of skills and what a company can do to move toward the ideal, while recognizing that the ideal will never be reached.

Core Competencies

Setting out and understanding the core competencies we need for customer management is critical. Some examples of new competencies that organizations have to develop are:

Understanding customers – customer analysis and research
Customer strategy design
Contact strategy design and management
Understanding business impact profitability

Key account management
Managing, developing, and coaching people
Managing customer information
Innovating for and with customers
Researching the market
Customer program design and management
Customer proposition
Customer product rating
Web site contact design
Web community design
Customer process and service level design

Management, Personal and Technical Skills

In training we usually distinguish three fundamentally different types of skill as follows:

Management skills
Personal skills
Technical skills

Fundamental Marketing Skills

We might be surprised by the number of people working in customer management whose level of knowledge of marketing and certain customer management discipline is weak. If they are specialists who have been drawn from an agency they would have had little chance of developing broader marketing skills.

What kind of general marketing skills would we like in our customer management staff?

Customer orientation
Understanding of different basic approaches to marketing
Understanding of the basic marketing approach

Personal Skills

Personal disciplines are usually at a premium in customer management, two skills in particular. The first is communication – the amount of teamwork required to develop and launch customer management campaigns means that those involved need to be good communicators. This is not just for formal presentations, but also in the sense of keeping the team informed. The second is team working.

Data and Database Skills

Customer management is probably the most-needed quantity for marketing. Direct marketers need to understand how customer databases are built and maintained. They must know what sort of data is required as the basis for successful customer management, how to analyze the data to find out which approaches work, and so forth. They do not necessarily need to be able to carry out the analyses themselves, as these are often contracted out to third parties. But they must understand the basis of data analysis in order to make sense of the results.

Different Strategies for Different Companies

Although the broad management skill requirements are common across most industries, different types and size of companies need different mixes of customer management skills. The major differences are likely to be as follows

Smaller Companies

These are unlikely to be able to afford many or any dedicated customer management staff. Staff responsible for customer management activity will have as their main task the orchestration of external suppliers to achieve effective campaign at low cost. The skills of supplier management are likely to be at a premium as are the efficient personal skills. At the same time, the staff concerned will need to be closely involved with the development of overall marketing policy and probably be expected to contribute to it, rather than taking it as given. In such situations, the marketing all rounder, who is personally an effective worker, is likely to be premium.

Larger Companies

These can afford and need specialists. Their tasks are likely to be more precisely allocated as part of an overall marketing plan. As specialists of various kinds, they will be "pitting their wits" against their opposite numbers in competitive companies, to gain an advantage over them. This degree of precision in job definition implies that these staff will be working as members of a large in-house team. The team needs to be communicated with, listened to, and influenced, rather than told what to do. Even the external suppliers may not be appointed directly, but as part of a wider corporate even international policy. So in this case the skills mix needs to be richer in the areas of team working, as well as there being depth in the particular specialism concerned.

Consumer Marketers

Companies marketing mainly to consumers need to have skills relating to the more "mass-market" media-mail, inbound telemarketing, published and broadcast media, Web marketing – as these are likely to be used more intensively. They also need to understand the kinds of consumer data available from third parties and the kinds of analysis that can be carried out on such data to segment the market.

B2B Companies

These will need mass market skills when they are marketing to small business. However if their market is mainly to larger organizations they will need specific strengths in the areas of telemarketing, Web management and using customer management in support of sales, staff, or large agents. In that case they will need to be very strong in the skill of "working with." These include communicating, influencing, negotiation, functioning as part of a team. Sales forces are rightfully suspicious of new approaches to marketing, which involve addressing people they see as their customers.

Long-Term Relationship Marketers

Companies marketing to customers who maintain a long-term relationship with the company, e.g., if the purchase is frequent or if there are additional products and services, which can be sold after the main sale, require the skills of database marketing. This is because they will probably find the development of an in-house database cost effective.

Top Ten Reasons for CRM and the Five Key Elements of Success

We have identified ten reasons for CRM and five key elements required for success in CRM as follows.

Ten Reasons

Information flow improves sales force productivity
Improved sales force productivity means more deals
Better customer knowledge results in better win rates
Improved communication between staff gives the company a united voice
Accurate communications between customers makes more marketing more effective
Enhanced market and competitor intelligence brings better business decisions
Customer care brings competitive advantage
Back office integration produces business efficiency
Integrated customer touch points present an integrated customer experience
Better sales forecasting means more accurate business decision.

Five Critical Factors for Success

Customer management strategy - which customers are to be managed, for what products or service through which channels
Customer management models- how these customers are to be managed
Infrastructure- systems, data, operational customer management
People- who is to develop the new capability, who is to manage it, and how
Programmers- how new customer management capabilities are to be installed

16.4 Data Mining and Customer Value and Relationships

The way in which companies interact with their customers has changed dramatically over the past few years. A customer's continuing business is no longer guaranteed. As a result, companies have found that they need to understand their customers better, and to quickly respond to their wants and needs. In addition, the time frame in which these responses need to be made has been shrinking. It is no longer possible to wait until the signs of customer dissatisfaction are obvious before action must be taken. To succeed, companies must be proactive and anticipate what a customer desires.

It is now a cliché that in the days of the corner market, shopkeepers had no trouble understanding their customers and responding quickly to their needs. The shopkeepers would simply keep track of all of their customers in their heads, and would know what to do when a customer walked into the store. But today's shopkeepers face a much more complex situation. More customers, more products, more competitors, and less time to react means that understanding one's customers is now much harder to do. A number of forces are working together to increase the complexity of customer relationships:

- *Compressed marketing cycle times.* The attention span of a customer has decreased dramatically and loyalty is a thing of the past. A successful company needs to reinforce the value it provides to its customers on a continuous basis. In addition, the time between a new desire and when we must meet that desire is also shrinking. If we do not react quickly enough, the customer will find someone who will.
- *Increased marketing costs.* Everything costs more. Printing, postage, special offers (and if we do not provide the special offer, our competitors will).
- *Streams of new product offerings.* Customers want things that meet their exact needs, not things that sort of fit. This means that the number of products and the number of ways they are offered have risen significantly.
- *Niche competitors.* Our best customers will also look good to our competitors. They will focus on small, profitable segments of our market and try to keep the best for themselves.

Successful companies need to react to each and every one of these demands in a timely fashion. The market will not wait for our response, and customers that we have today could vanish tomorrow. Interacting with our customers is also not as simple as it has been in the past. Customers and prospective customers want to interact on their terms, meaning that we need to look at multiple criteria when evaluating how to proceed. We will need to automate:

- The Right Offer
- To the Right Person
- At the Right Time
- Through the Right Channel

The right offer means managing multiple interactions with customers, prioritizing what the offers will be while making sure that irrelevant offers are minimized. The right person means that not all customers are cut from the same cloth. Our interactions with them need to move toward highly segmented marketing campaigns that target individual wants and needs. The right time is a result of the fact that interactions with customers now happen on a continuous basis. This is significantly different from the past, when quarterly mailings were cutting-edge marketing. Finally, the right channel means that we can interact with our customers in a variety of ways (direct mail, email, telemarketing, etc.). We need to make sure that we are choosing the most effective medium for a particular interaction.

The purpose of this section is to provide with a thorough understanding of how a technology like data mining can help solve vexing issues in our interaction with our customers. We describe situations in which a better understanding of our customers can provide tangible benefits and a measurable return on investment. It is important to realize, though, that data mining is just a part of the overall process. Data mining needs to work with other technologies (for example, data warehousing and marketing automation), as well as with established business practices.

16.4.1 What is Data Mining?

Data mining, by its simplest definition, automates the detection of relevant patterns in a database. For example, a pattern might indicate that married males with children are twice as likely to drive a particular sports car than married males with no children. If we are a marketing manager for an auto manufacturer, this somewhat surprising pattern might be quite valuable. However, data mining is not magic. For many years, statisticians have manually "mined" databases, looking for statistically significant patterns.

Data mining uses well-established statistical and machine learning techniques to build models that predict customer behavior. Today, technology automates the mining process, integrates it with commercial data warehouses, and presents it in a relevant way for business users. The leading data mining

products are now more than just modeling engines employing powerful algorithms. Instead, they address the broader business and technical issues, such as their integration into today's complex information technology environments.

In the past, the hyperbole surrounding data mining suggested that it would eliminate the need for statistical analysts to build predictive models. However, the value that an analyst provides cannot be automated out of existence. Analysts will still be needed to assess model results and validate the plausibility of the model predictions. Because data mining software lacks the human experience and intuition to recognize the difference between a relevant correlation and an irrelevant correlation, statistical analysts will remain in high demand.

An Example

Imagine that we are a marketing manager for a regional telephone company. We are responsible for managing the relationships with the company's cellular telephone customers. One of our current concerns is customer attention (sometimes known as "churn"), which has been eating severely into our margins. We understand that the cost of keeping customers around is significantly less than the cost of bringing them back after they leave, so we need to figure out a cost-effective way of doing this.

The traditional approach to solving this problem is to pick out our good customers (that is, the ones who spend a lot of money with our company) and try to persuade them to sign up for another year of service. This persuasion might involve some sort of gift (possibly a new phone) or maybe a discount calling plan. The value of the gift might be based on the amount that a customer spends, with big spenders receiving the best offers. This solution is probably very wasteful. There are undoubtedly many "good" customers who would be willing to stick around without receiving an expensive gift. The customers to concentrate on are the ones that will be leaving. Do not worry about the ones who will stay.

This solution to the churn problem has been turned around from the way in which it should be perceived. Instead of providing the customer with something that is proportional to their value to our company, we should instead be providing the customer with something proportional to one's value to them. Give our customers what they need. There are differences between the customers, and we need to understand those differences in order to optimize our relationships. One big-spending customer might value the relationship because of our high reliability, and thus would not need a gift in order to continue with it. On the other hand, a customer who takes advantage of all of the latest features and special services might require a new phone or other gift in order to stick around for another year. Or they might simply want a better rate for evening calls because their employer provides the phone and they have to pay for calls outside of business hours. The key is determining which type of customer we are dealing with.

It is also important to consider timing in this process. We cannot wait until a week before a customer's contract and then pitch them an offer in order to prevent them from churning. By then, they have likely decided what they are going to do and we are unlikely to affect their decision at such a late date. On the other hand, we do not start the process immediately upon signing a customer up. It might be months before they have an understanding of our company's value to them, so any efforts now would also be wasted. The key is finding the correct middle ground, which could very well come from one's understanding of their market and the customers in that market. Or, as we discuss later, we might be using data mining to automatically find the optimal point.

16.4.2 Relevance to a Business Process

For data mining to impact a business, it needs to have relevance to the underlying business process. Data mining is part of a much larger series of steps that takes place between a company and its customers. The way in which data mining impacts a business depends on the business process, not the data mining process. Take product marketing as an example. A marketing manager's job is to understand their market. With this understanding comes the ability to interact with customers in this market, using a number of channels. This involves a number of areas, including direct marketing, print advertising, telemarketing, and radio/television advertising, among others.

The issue that must be addressed is that the results of data mining are different from other data-driven business processes. In most standard interactions with customer data, nearly all of the results presented to the user are things that they knew existed in the database already. A report showing the breakdown of sales by product line and region is straightforward for the user to understand because they intuitively know that this kind of information already exists in the database. If the company sells different products in different regions of the country, there is no problem translating a display of this information into a relevant understanding of the business process.

Data mining, on the other hand, extracts information from a database that the user did not know existed. Relationships between variables and customer behaviors that are nonintuitive and are the jewels that data mining hopes to find. And because the user does not know beforehand what the data mining process has discovered, it is a much bigger leap to take the output of the system and translate it into a solution to a business problem.

This is where interaction and context comes in. Marketing users need to understand the results of data mining before they can put them into actions. Because data mining usually involves extracting "hidden" patterns of customer behavior, the understanding process can get a bit complicated. The key is to put the user in a context in which they feel comfortable, and then let them poke and prod until they understand what they did not see before.

How does someone actually use the output of data mining? The simplest way is to leave the output in the form of a black box. If they take the black box and score a database, they can get a list of customers to target (send them a catalog, increase their credit limit, etc.). There is not much for the user to do other than sit back and watch the envelopes go out. This can be a very effective approach. Mailing costs can often be reduced by an order of magnitude without significantly reducing the response rate.

Then there is the more difficult way of using the results of data mining: getting the user to actually understand what is going on so that they can take action directly. For example, if the user is responsible for ordering a print advertising campaign, understanding customer demographics is critical. A data mining analysis might determine that customers in New York City are now focused in the 30-to-35-year-old age range, whereas previous analyses showed that these customers were primarily aged 22 to 27. This change means that the print campaign might move from the *Village Voice* to the *New Yorker*; there is no automated way to do this. It is all in the marketing manager's head. Unless the output of the data mining system can be understood qualitatively, it will not be of any use.

Both of these cases are inextricably linked. The user needs to view the output of the data mining in a context they understand. If they can understand what has been discovered, they will trust it and put it into use. There are two parts to this problem: 1) presenting the output of the data mining process in a meaningful way, and 2) allowing the user to interact with the output so that simple questions can be answered. Creative solutions to the first part have recently been incorporated into a number of commercial data mining products. Response rates and (probably most importantly) financial indicators (for example, profit, cost, and return on investment) give the user a sense of context that can quickly ground the results in reality.

16.4.3 Data Mining and Customer Relationship Management

Customer relationship management (CRM) is a process that manages the interactions between a company and its customers. The primary users of CRM software applications are database marketers who are looking to automate the process of interacting with customers. To be successful, database marketers must first identify market segments containing customers or prospects with high-profit potential. They then build and execute campaigns that favorably impacts the behavior of these individuals.

The first task, identifying market segments, requires significant data about prospective customers and their buying behaviors. In theory, the more data the better. In practice, however, massive data stores often impede marketers, who struggle to sift through the minutiae to find the nuggets of valuable information. Recently, marketers have added a new class of software to their targeting arsenal. Data mining applications automate the process of searching

the mountains of data to find patterns that are good predictors of purchasing behaviors. After mining the data, marketers must feed the results into *campaign management software*, which, as the name implies, manages the campaign directed at the defined market segments.

In the past, the link between data mining and campaign management software was mostly manual. In the worst cases, it involved "sneaker net," creating a physical file on tape or disk, which someone then carried to another computer and loaded into the marketing database.

This separation of the data mining and campaign management software introduces considerable inefficiency and opens the door for human errors. Tightly integrating the two disciplines presents an opportunity for companies to gain competitive advantage.

16.4.4 How Data Mining Helps Database Marketing

Data mining helps marketing users to target marketing campaigns more accurately and also to align campaigns more closely with the needs, wants, and attitudes of customers and prospects.

If the necessary information exists in a database, the data mining process can model virtually any customer activity. The key is to find patterns relevant to current business problems.

Typical questions that data mining addresses include the following:

Which customers are most likely to drop their cell phone service? · What is the probability that a customer will purchase at least $100 worth of merchandise from a particular mail-order catalog? · Which prospects are most likely to respond to a particular offer? Answers to these questions can help retain customers and increase campaign response rates, which, in turn, increase buying, cross selling, and return on investment (ROI).

Scoring

Data mining builds models by using inputs from a database to predict customer behavior. This behavior might be attrition at the end of a magazine subscription, cross-product purchasing, willingness to use an ATM card in place of a more expensive teller transaction, and so on. The prediction provided by a model is usually called a *score*. A score (typically a numerical value) is assigned to each record in the database and indicates the likelihood that the customer whose record has been scored will exhibit a particular behavior. For example, if a model predicts customer attrition, a high score indicates that a customer is likely to leave, whereas a low score indicates the opposite. After scoring a set of customers, these numerical values are used to select the most appropriate prospects for a targeted marketing campaign.

The Role of Campaign Management Software

Database marketing software enables companies to deliver timely, pertinent, and coordinated messages and value propositions (offers or gifts perceived as valuable) to customers and prospects. Today's campaign management software goes considerably further. It manages and monitors customer communications across multiple touch points, such as direct mail, telemarketing, customer service, point of sale, interactive Web, branch office, and so on.

Campaign management automates and integrates the planning, execution, assessment, and refinement of possibly tens to hundreds of highly segmented campaigns that run monthly, weekly, daily, or intermittently. The software can also run campaigns with multiple "communication points," triggered by time or customer behavior such as the opening of a new account.

Increasing Customer Lifetime Value

Consider, for example, customers of a bank who use the institution only for a checking account. An analysis reveals that after depositing large annual income bonuses, some customers wait for their funds to clear before moving the money quickly into their stock brokerage or mutual fund accounts outside the bank. This represents a loss of business for the bank.

To persuade these customers to keep their money in the bank, marketing managers can use campaign management software to immediately identify large deposits and trigger a response. The system might automatically schedule a direct mail or telemarketing promotion as soon as a customer's balance exceeds a predetermined amount. Based on the size of the deposit, the triggered promotion can then provide an appropriate incentive that encourages customers to invest their money in the bank's other products. Finally, by tracking responses and following rules for attributing customer behavior, the campaign management software can help measure the profitability and ROI of all ongoing campaigns.

Combining Data Mining and Campaign Management

The closer data mining and campaign management work together, the better the business results. Today, campaign management software uses the scores generated by the data mining model to sharpen the focus of targeted customers or prospects, thereby increasing response rates and campaign effectiveness. Ideally, marketers who build campaigns should be able to apply any model logged in the campaign management system to a defined target segment.

Consideration of Customer Value in the Data Mining Process

One of the most important issues for business-oriented use of data mining is the incorporation of value considerations into the analysis process. *Value* is

a general term that may mean different things in different settings, such as: the average monthly revenue from the customer, number of lines the customer owns or other combination value we would like to consider certain point of time. In context of churn management, some of the tactics and ideas often employed are:

- Predata-mining segmentation of the customers by their "value" and separate analysis for the various segments.
- Postdata-mining analysis of the results by the value of the customers – e.g., considering the coverage of prediction rules only for the highest value customers.
- Customer lifetime value analysis that combine estimation of the customer "lifetime" with a revenue estimation during this period.

We propose an original approach in which value is integrated into the data mining algorithm, in a way that the process of data partitioning is considering the distribution of value at the same time as the size of populations.

Effective Incentive Allocation

In several applications data mining is used for analysis followed by countermeasure reaction. For example, in the churn management, the analysis of churning customers will normally result with incentive campaigns. This means that we will accord incentives to valuable customers who are predicted to churn. There are two main areas of interaction between the incentive component and the data mining component in such application: the attribution of incentives to population segments and the measurements of their effects in future analysis.

We propose to use the data mining results (in the implementation-induced rules) for incentive allocation. The generated data mining rules and their related customer segment can be useful symptom descriptors for matching effective incentives. For example, following a rule quoting that young customers in a certain area are massively disconnecting, the analyst may design a campaign that will propose an attractive price plan for customers with young customer usage profile through an aggressive targeting media in this area.

In the following, we address the question how to consider incentives' attribution in future data mining, on one hand, and how to a posteriori evaluate their effectiveness on the other.

Incorporation of External Events into the Data

A churn prediction model would usually be constructed from data extracted from the corporate data warehouse, such as: usage history and trends (number of calls, duration, services used, destinations, etc.) and social-demographic data (income, city, education, profession, etc.). At the same time, there are

some implicit punctual events in history or at the present, such as a competitor coming out with a promotion campaign, or a major financial crisis in a certain area – which may have a major effect on the behavior of the customers. This may have effect on different segments of the customer population, depending on: geographical area, usage patterns, etc. Ignoring these events may lead to wrong prediction models. Therefore, any successful analysis cannot ignore their existence and must incorporate them into the model. In general, we see distinguish three relevant approaches to this issue.

- The ideal situation, where an expert can quantify the impact of these singular events for the different segments of the customer population. This enables the inclusion of "external effects" as an additional input field.
- When such quantification is not available, some discrete input fields indicating "competitor promotion," "financial crisis," etc. may be added. This is much less desirable and can be counterproductive when for example different promotions have completely different effects.
- To some extent, the effects of singular events may be diminished by "time randomization." In such solution the model is built from samples at different points in time. In this manner, the effects of external events are averaged but the resulting models are inferior to those obtained with incorporation of those events.

16.5 CRM: Technologies and Applications

It is supposed to give an introduction to and overview of CRM (customer relationship management) and its connections with ERP. This section sheds some light on applications, enabling technologies, users, and providers of CRM.

We put the emphasis on CRM technologies – ones currently in use as well as upcoming technologies – and the connection between ERP and CRM. By doing so we wish to give a useful overview of what the (future) worker in the field of ERP can expect and has to have heard of when dealing with CRM. Section 3 shows some implications of implementing CRM. In this light it might be surprising that we paid little attention to CRM as ***the*** enabler of e-commerce. Everyone still calls any business on the Internet e-commerce. Paired with the fact that CRM is a hype word itself, this made finding useful information like looking for a needle in a haystack. E-commerce would be an interesting topic for further study, though.

This section is not meant to be a profound, let alone a complete view on CRM. We chose to omit a discussion of possible disadvantages of using CRM as well as the pitfalls of implementing CRM. We do however take a look at difficulties that can be encountered in the integration of ERP and CRM. Furthermore, we intend to show the possibilities of CRM, not necessarily the average implementation. For these reasons, the discussion can appear to be somewhat euphoric. Our decision of scope is a result of the scarcity of articles critical of CRM.

16.5.1 What is CRM ?

Introduction and brief history of CRM

CRM stands for customer relationship management and is the term used to describe any methodologies, strategies, software, and Web-based capabilities that help an enterprise organize and manage customer relationships.

The idea is to have the same information available to all people and departments in the company so that every product or service need of the customer is met. CRM makes it possible that everyone in the enterprise is focused on the customer.

CRM is one of many ICT developments in the past decade to come forth from the growing awareness of information as a key strategic business asset. Today this is a nearly universally accepted fact.

CRM came up in the early 1990s, when global competition was becoming an increasingly important issue for enterprises. It was this competition that made it necessary to find new ways of looking at business. An important development was the shift from a product-centric view to a customer-centric view.

Enterprises with a product-centric view have a splintered view of their customers, because they have several customer contact points and several separate systems and databases that could not interact at all or very little, whereas enterprises with a customer-centric view have a complete picture of their customers and can focus on them better.

In order to realize an enterprise with a customer-centric view, it was necessary to develop new strategies and technologies. These are explained in the rest of this section.

16.5.2 What is CRM Used for?

The basic idea behind CRM is to consolidate all contact points with the customer as well as all customer information into a single system. This enables an enterprise to do the following as illustrated in Table 16.1:

CRM can also help acquire new customers to a certain degree, by sharing customer information with business partners or by simply knowing what kind of customer you should be on the look out for. However, the emphasis in CRM is clearly on maintaining a good relationship with existing customers. Research has shown that it costs an enterprise ten times as much to obtain a new customer than to retain an existing one.

All of these applications of CRM can directly or indirectly lead to an increase of profitability. Without CRM, many of the benefits explained above would be impossible. For example, a customer could register a complaint about his treatment by one department and shortly after be treated the same way by another department, as a result of inconsistent or incomplete customer information.

Table 16.1. Functions of an Enterprise

Use	Goal
Gather and access information about customers:	
- Purchase history	Increase marketing and selling opportunities by offering similar or related products and services as well as updates of the purchased product itself
- Wishes and requirements	Develop new products and services
- Complaints	Improve products and services, prevent mistakes in the future and give (highly profitable) customers special treatment
- Preferences	
Customize Web pages and other information services based on previous visits, preferences, and other information on the customer	Finetune services and cater to customers' special requests
Enhance and optimize help-desk functions and performance	Increase customer satisfaction and reduce service-related complaints
Respond more quickly to customer inquiries	
Gain a better understanding of their customers' wants and needs	Create new products and services in the best interest of the customer
Increase customer loyalty by creating exit barriers (making the customer feel so much "at home" that he does not want to switch to another company)	Secure a market position in the long term
Better anticipate what customers will want	Be ahead of the competition and reduce time to market
Increase efficiency through automation	Reduce production and/or operation costs and reduce production times
Identify the most profitable customers	Concentrate marketing efforts on them and drop unprofitable customers
Obtain suitable information and share it with business partners via Electronic Data Interchange (EDI)	Acquire new customers
Leverage every role, device, channel, and customer contact points within an enterprise	Enhance profitability

Who uses CRM?

CRM is being employed in industries where a one-to-one relationship with customers offers competitive advantage. Companies in consumer service industries as financial services, banking, travel, and telecommunications rely heavily on CRM solutions to stay competitive. A special group of enterprises in which the one-to-one relationship with customers is important are those

doing e-business. The Internet being an IT itself can be connected directly to an enterprise's CRM applications, opening up even more possibilities.

CRM is used successfully by companies from extremely diverse branches of industry. SAP alone already implemented CRM functionality in enterprises from the automotive, metal, food, retail, process, ICT and media industries.

On the one hand, small- to medium-sized enterprises can use CRM to compete with or even gain an advantage above bigger enterprises. On the other hand, CRM yields great benefits to large enterprises as well, by solving the problems of customer data that is spread over several "island" systems and databases, or simply over large geographic distances. At the same time, with increasing size and complexity of an enterprise, the consequences of the implementation of CRM become more severe and difficult to handle.

16.5.3 Consequences of Implementation of CRM

CRM cannot be implemented without a customer strategy, because that is exactly what it is designed to support. That means that the first step in any CRM implementation effort is to develop such a strategy to optimally support the enterprise's mission. A customer strategy includes the choice of what kind of customer the enterprise wants, how to find them, and how to provide service to them, as well as the choice of a preferred communication medium (mail, phone, Internet, etc.), how often to contact the customer, about what to contact the customer, and so on.

Once a customer strategy has been established, the enterprise must ensure that it will be carried out, some might even say lived by. This is all but straightforward, because the whole view on doing business shifts from a product-centric view to a customer-centric view. Staff has to be trained and motivated to work within the chosen strategy. In practice, they have to be able to solve customers' problems and work with the new information technology. This training in itself (not including the CRM system) is already a major investment, which should not be underestimated.

Another important task is connecting existing systems to the new system or component. Depending on what type of system has to interact with the CRM package, this task can range from reconfiguration to full-blown development of a special interface.

On the one hand, if an enterprise system is already in place, the enterprise might only have to reconfigure it or add a CRM component from the same provider. Some enterprise systems do not offer CRM functionality, but do have an interface ready to use with a CRM package from a different provider.

On the other hand, existing systems that were not designed to do so, might have to interact with the new system. Then an interface must be tailor-made to fit the needs of the enterprise precisely. The complexity, costs, and risks of such a project might even give reason to consider doing away with the old system altogether and replacing it with a standard package.

16.5.4 Which Technologies are Used in CRM?

CRM Software

16.5.5 Business Rules

As stated in section 3, an enterprise needs to develop a strategy for handling its customers. The strategy can be formulated as business rules. Business rules define criteria for processing transactions with customers and are meant to enforce efficient, predefined business structures and to control and influence the type of transactions the enterprise makes. They align day-to-day operations with corporate goals. In an ideal situation, business rules are enforced in real time, i.e., the very moment an employee or the customer himself uses the system to do a transaction. Business rules are not technology in themselves. The implementation is realized with a wide variety of technologies, including for instance Corba, XML, Java, HTTP, etc.

16.5.6 Data Warehousing

The most important technology used in CRM is data warehousing. A very simple explanation of data warehousing would be that there is a single central database that contains all relevant customer information. The database model underlying a data warehouse system typically corresponds more with reality than the models underlying the systems it collects data from, such as order processing, product inventory, and marketing. That way, the data warehouse gives a total and more natural view of the customer. If the data warehouse also integrates all applications that deal with customer information, it is sometimes called an *integration framework*.

The fundamental concept of data warehousing is that data for business analysis is combined from more than one source application and is stored and analyzed independently from those applications and their operational data. The main advantage of this strategy is that data analysis and queries, which can be very computation intensive, run on the data warehousing system and not on other, possibly critical systems. Computational load can be further avoided by constantly keeping up standard reports of the customer data that is queried most often.

Another advantage is the possibility to cross-reference data from the different applications. This in turn makes it possible to do queries over a certain time, such as a query about a customer's purchases and the services provided to him in a certain month. Data warehousing is typically used in connection with a company's Intranet, which is often connected to the Internet. This combination enables worldwide access to consistent data and data analysis tools at a low cost, compared to the use of legacy systems.

16.5.7 Data Mining

Data mining is the discovery of new information in terms of patterns or rules from (very) large amounts of data that would not become evident in standard queries to a database or data warehouse.

There are different types of patterns to be found by data mining:

- Associations: e.g.: It seems that when men buy diapers, they often also buy beer. Or when someone buys a certain service, he also buys another, related service.
- Sequential patterns: e.g.: Someone buys a camera and every few months photo supplies and every once in a while photo accessories. Or when a customer buys a software package, he regularly buys updates and new plug-ins.
- Customer classification trees: e.g.: Customers can be classified by how often or what kind of products and services they buy, by how much they buy, or by their preferred method of paying, etc.

Data mining can be carried out in order to reach a number of goals:

- Prediction: To make prediction, data mining is combined with business knowledge to show how certain attributes of the data will behave in the future. For example, one can predict what a customer will buy when made a certain special offer, how much a certain store will sell in a given period of time, or whether discontinuing a product or service will increase profits.
- Identification: Data patterns can be used to identify the existence of an item or an entry in the database. An example application is authentication, which checks whether a user is really a specific user. This is important for privacy in applications, especially if the customer interacts directly with the CRM software.
- Classification: Customers can be partitioned into different classes or categories based on combinations of properties stored in a CRM system. An enterprise can then concentrate its (marketing) efforts on groups of customers that are especially profitable, loyal, or show an increasing consumption pattern.
- Optimization: The use of limited resources such as time, space, money, materials, and bandwidth can be optimized in order to maximize sales or profits.

Two of the most important applications of data mining within CRM are marketing and finance. Based on analysis of customer behavior, an enterprise can determine marketing strategies, including advertising, outlet location, design of catalogs, and campaigns. Financial applications include analysis of creditworthiness, segmentation of clients, and evaluation of financing options.

Data mining is a technology still in development. As a result, it not quite clear those techniques and technologies that are encompassed by the term *data mining* and which are not.

16.5.8 Real-Time Information Analysis

It is possible to reduce response time to customers' e-mails by having them automatically processed. They are parsed to discover important information such as customer number, order number, and key phrases. Based on the result of the analysis, the messages are scored with a priority level, from which the CRM software can either automatically generate a precomposed response to the inquiry where no customer review is necessary, as in the case of order status inquiries, or route the e-mail to the appropriate employee for response.

Another application is the real-time analysis of online customer behavior. Conclusions can be drawn as to what is of most interest to the customer and how products and services should be presented in order to satisfy him.

When a customer places an order, a CRM application can check whether the requested item is sufficiently on stock and estimate what the delivery time will be. If the item is out of stock or the delivery time exceeds the customer's order constraints, an alternative product or service can be offered.

Real-time information analysis can be combined with call centers (technology) by presenting call-center agents (near) real-time information on a customer's buying habits. The agent can then determine those products that the customer is likely to be interested in.

Call Center Technologies

A call center is a place where telephone calls are either placed or received in high volumes for the purpose of sales, marketing, customer service, telemarketing, technical support, or other specialized business activity. Customers' calls are most often on orders, questions, complaints, etc.

Call centers are almost always linked to the enterprise's network in a client-server architecture. The most important reason for linking a call center to the enterprise's network is to enable the agent to access, create, and change customer data.

CTI or Computer-Telephony Integration is an increasingly widespread technology that combines voice and data flows in the call center. When a call is received from a known customer, his data, including name, purchase history, etc., automatically appears on the screen of the call center agent. During the phone call, the agent can make notes and appointments and further process the customer's information. When an agent makes a call to a customer, he can do so by selecting a customer on screen instead of having to dial a number or a speed dial. In both cases, after the call is terminated, the CRM software automatically processes any changes in the customer's data and passes on orders, appointments, etc. to the responsible applications of the ERP system.

IVR or Interactive Voice Response is a term used for several different applications. IVR can take over the task of asking routine questions, so that qualified personnel can devote its time to real services. Some services can even

be realized (around the clock) completely without a human counterpart, so the customer more or less helps himself with the possibility of speaking to an employee if he feels the need to do so. The customer can not only access services, but also his data by phone. IVR does this by transforming data into speech. Data can be entered or change by means of voice recognition.

Another application of IVR is the replacement of waiting tunes with information relevant to the waiting customer, who before has been identified by his phone number.

Other call center technologies are Private Branch eXchange (PBX), Voice over Internet Protocol (VoIP), and Automatic Call Distribution (ACD).

16.5.9 Reporting

CRM produces two kinds of reporting: customer reporting and internal reporting:

Customer reporting can notify the user in the case of an order that cannot be fulfilled or beforehand that a regular item will be unavailable in a certain period. Furthermore, automatic order tracking or regular account information reports can be generated and sent to the customer.

Internal reporting can supply managers with real-time analyses of customer data and statistics to support identification of trends and customers' value, support strategic decision making, and monitor overall performance of the enterprise. Many reporting tools automatically make a graphical representation of the analysis, which further aids the manager.

16.5.10 Web Self-Service

CRM offers customers the opportunity for Web self-service. They can access their back-office information or account from anywhere at any time without the assistance of an employee. At the appropriate times it allows access to front-office contact channels as well. An upcoming Web self-service is Electronic Bill Presentment and Payment or EBPP. Customers are presented their bill online, where they can also pay the bill. An example could be that when a telephone customer's bill contains more international calls than domestic calls, within short notice he receives a special offer for an international calling plan.

Application Service Providers (ASP)

An application service provider, or ASP, hosts applications that are accessed through the Internet or private networks and sold as services, typically with a monthly subscription fee. ASPs allow an enterprise to outsource CRM activities in order to concentrate on its core activities.

It is currently possible to outsource all CRM functionality to an ASP, but it is still an upcoming technology and service. Some analysts even say that CRM hosting is already over its peak, because it makes little sense to outsource important functionality while the main advantage of CRM and ERP lies in integration (Lee). ASPs often do not have as much experience with CRM than providers of CRM software. Some enterprises therefore choose to outsource only some CRM components, especially operational components such as sales automation, marketing automation, and customer service support.

The appeal of ASPs for outsourcing of analytical or even all CRM applications is limited for many organizations by issues pertaining to CRM application customization, control, and security. The use of an ASP inherently offers less possibilities for customization and control than the installation of an own CRM system or CRM component of an ERP system. The security of customer information is a crucial issue in CRM and the fact that an ASP stores this information remotely can make an enterprise be reserved.

There is a trend, however, that (experienced) providers of CRM software offer ASP services themselves or closely work together with existing ASPs. Companies that have already chosen this direction are for example Peoplesoft together with Agilera and Corio amongst others, and Siebel together with ManagedOps and Corio as well.

16.5.11 Market Overview

The following section gives an overview of companies that sell CRM software. The overview also contains some ERP system retailers who offer CRM functionality as well.

According to an IDC study, the CRM market is quite fragmented, and beyond the top five suppliers in the market, no company holds more than 2l market share.

Major suppliers are Siebel and BOPS: Baan, Oracle, Peoplesoft (Vantive), and SAP. These vendors all offer complete CRM packages and an advanced integration possibilities with ERP systems. They all aim at the broad market and not at vertical industries, so the actual functionality of the packages is similar.

Other vendors of CRM software worth mentioning are: Pivotal, E.piphany, eGain, Ivensys, Nortel, Clarify, SalesLogix, Onyx Software, Kana, Silknet Software.

Some of these CRM vendors specialize in a certain discipline:

Pivotal specializes in midsize enterprises and demand chain management and cooperates with Microsoft's.NET initiative. E.piphany specializes in customizable extractors and integrating data from disparate source systems, while eGain's specializes in integration of unstructured data sources.

Important integration cooperations in the CRM (and ERP) market are Peoplesoft with Vantive, SAP and J.D. Edwards with Siebel, Baan with Ivensys and Oracle with CSC (Computer Sciences Corporation).

There is also a high degree of cooperation between CRM and ERP vendors with consulting firms like KPMG consulting, Deloitte & Touche, PriceWaterhouseCoopers, and Cap Gemini.

16.5.12 Connection between ERP and CRM

Brief History of ERP and CRM

ERP systems in the widest sense have been around since the 1960s. First, for inventory handling in the 1970s for MRP (Material Requirement Planning) and in the 1980s for MRP-II (Manufacturing Resource Planning). Since the 1990s and especially with the upcoming of the Internet as a mass media, ERP is continually being enhanced with capabilities in the fields of engineering, project management, HRM, finance, and CRM.

The trend of ERP vendors integrating best of breed functionalities into their products is not so advanced in the field of CRM as it is in other fields of business. Today, some ERP packages still do not contain CRM capabilities. That is why there are still several best of breed vendors of CRM applications as well.

Integration of ERP and CRM

While both ERP and CRM arose in order to solve integration problems, neither was created to integrate with the other. ERP concentrates on back-office functions and data sources, while CRM concentrates on the front-office with collection and management of customer and sales information. Their coexistence and the differences between the goals and the functionality are a challenge in creating a single integrated system.

The data that is necessary to feed a CRM system in order to make it effective, such as materials billing and order history, is often stored all over the enterprise and in the best case embedded in an ERP system. Even then, the collection of that information is far from straightforward. In practice, enterprises often choose the ERP and CRM systems that fit them best and hire yet another party to hook up everything.

There is however a growing consciousness of the need for close cooperation between ERP and CRM. The result is that ERP vendors cooperate with CRM vendors, or simply buy them, like Peoplesoft bought Vantive. CRM vendors for their part develop more integration tools and APIs (Application Programming Interface) to support integration.

Other important challenges in the integration process are data volume and speed. The amount of data an ERP system has to handle increases significantly when extended with CRM. The system has to be able to process it all in a short time; otherwise the aimed benefits cannot be obtained. If a customer calls a company and speaks to a representative, and then calls back several

minutes later and speaks to someone else, the customer expects that person to know about the previous call and its outcome.

To summarize the challenge of integration: ERP needs to acquire the immediacy of CRM, while CRM must get access to and use more of the back-office information stored in the ERP system. Even though sharing data is important, ERP and CRM systems should connect at several points, including the financial, order entry, purchasing, inventory, manufacturing management, human resources management, and logistics functions, as each of these components plays an integral role in the entire customer interaction and fulfillment process.

Ways of Integrating CRM into an ERP system

Depending on how CRM is integrated in the ERP package, the customer's data can be included in the ERP database or kept in a separate database. In the latter case, there should still be a close connection with the ERP database.

The following paragraphs explain different possibilities of integrating CRM functionality and data into an ERP system.

Full integration: Full integration is something like the holy grail of CRM. The ideal is that the ERP vendor delivers a product in which you configure specific CRM functionality just like current components. There is a single, central database, on which the system operates. The borders between ERP and CRM become more and more vague toward this ideal. Currently there is no vendor of a true front-to-back solution, according to Web/CRM analyst Dennis Pombriant, even though some vendors claim to have reached (near) full integration, such as Oracle and Peoplesoft.

Modules: Some ERP vendors offer a module for CRM next to their standard ERP packages. The module is developed to work solely with the corresponding ERP. As a result, the integration level is quite high. The CRM functionality operates on the database already in use. SAP for example offers mySAP CRM as an extension of its standard package.

Bolt-ons and interfaces for the 3rd party product: Best-of-breed CRM vendors are becoming more and more aware of the fact that their clients use ERP. For quite some time now, they design or tailor their products to connect with certain third-party ERP systems as bolt-ons. There are also co-operations between ERP and CRM vendors for developing an interface, which lead to a shorter implementation time and better integration. For example, Siebel's CRM integrates with Epicor ERP.

Existing ERP with CRM from ASP: There are some ASPs who can handle the integration of hosted CRM into an existing CRM system, but most are still oriented toward simply providing turnkey CRM applications. Analysts Caruso and Pombriant warn that trying to integrate CRM from an ASP adds challenges to connecting with the back-office and burdens end-user enterprise with the integration or costs for yet another firm to do the integration for them.

16.5.13 Benefits of CRM to the Enterprise

To avoid too much repetition, this paragraph only handles benefits that come forth from integration with an ERP system.

The central storage of CRM data within the ERP system enables every employee to access consistent and complete customer data at any time.

At the same time, it enables a client to access his data for a longer time as well. The customer order decoupling point (CODP) is brought closer to the point of delivery. The CODP is a virtual point in the supply chain where a client cannot control his order anymore. The closer the CODP is to delivery, the more customized a product or service can be delivered. When an enterprise can offer assembled-to-order or even engineered-to-order products and services, it gains an advantage against competitors who only offer off-the-shelf products and services.

The supply chain can also be supported by information exchange and cooperation between order management and resource scheduling. Information exchange and cooperation between customer service, bill payment, and financial management support administration and management.

16.5.14 Future of CRM

Trends

For a large part of this section, we leave forecasting of future trends to the experts.

Increasing integration: An important trend already taking place is the effort to increase integration of CRM in enterprises' businesses, so of course in their ERP systems as well. Another development that goes hand in hand with integration is "migration of functions that were previously performed in the back office out to the front office at a point closer to the customer – very often at the point of customer contact," according to Dick Lee, principal of High-Yield Marketing.

Denis Pombriant, Web/CRM analyst with Boston's Aberdeen Group, warns that, for the most part, no one has yet offered a full front-to-back CRM-ERP solution. "It's still very much a best-of-breed marketplace." This holds true at the moment, but vendors are working hard from several sides (ERP, CRM, consulting, etc.) to offer completely integrated packages that enterprises will gladly buy. ERP vendors cooperate with CRM vendors or simply buy them, CRM vendors develop more integration tools and APIs to support integration and (IT-) consulting firms' advice goes into the direction of more integration as well.

Vertical CRM: CRM software vendors will begin crafting packages targeted at distinct, vertical markets in order to fit different types of customers, business models, and sales strategies. The vendors will offer more and more special

solutions for certain industries, instead of forcing the industries to customize the software products to fit their needs. Lee believes that the number of CRM vendors will shrink significantly due to the disappearance of many companies that are looking for fast profit from the hype and offer the same type of products.

Less CRM via ASP: Erin Kinikin, vice president of the research firm Giga Information Group of Cambridge, states why CRM hosting came up in the first place: "We look at outsourcing as filling two key functions: as a way for a beginning company to meet a competitive need to get going quickly, and as a method of cost-reduction at companies that've decided that customers are not very important. But it's not a strategic move for most businesses."

Section 4.2 mentions the trend that CRM vendors will offer ASP services themselves or closely work together with existing ASPs, but CRM hosting will become less and less important. Enterprises are discovering that good relationships with their customers as a strategic asset. Outsourcing customer relationship management would mean separating the customer from one's business.

Common practice CRM: The lines between CRM and other information-based management disciplines, particularly ERP, are blurring. "There is definitely a broadening of the definition," concedes Jon Wurfl, CRM evangelist at SAP. Dick Lee's vision on the future of CRM seems to summarize the current upbeat attitude toward CRM: "I don't think the term 'CRM' is going to be as predominant several years from now. It's going to simply be what we need to do."

Market growth prognosis

Businesses and research institutes alike are enthusiastic about CRM. There are a large number of reports on the growth of both ERP and CRM markets. Quite often, forecasts vary between them, depending on which segments of the markets were included (software, services, consulting, etc.).

ERP Market

The top five ERP vendors, SAP, Oracle, Peoplesoft, Baan, and J.D. Edwards, account for 61l of total ERP market revenue. Their predominance in the ERP market is likely to persist in the coming years.

AMR Research predicts that the enterprise resource planning (ERP) market will grow at a compound annual growth rate of 32l over the next three years. Total company revenue will reach $66.6 billion by 2003.

Another AMR's research predicts that ERP market growth will slow to 5l a year, increasing from $16.9 billion in 1999 to $21.4 billion in 2004. The reasons for the decrease of the ERP market are the Y2K problems and the introduction of the Euro, which induced enterprises to invest heavily in ERP

systems, in order to tackle several issues at once. They are now refocusing strategic technology plans to extend ERP throughout global supply chains to gain competitive advantage.

CRM Market

The CRM market is booming as a whole, which is also a result of increased average budgets for single CRM initiatives. *Dataquest* says the average had reached $1 million by the end of 2000 and that it is expected to have doubled until the end of 2001.

A report from the Meta Group predicts a 50l annual growth rate for the global CRM market. Meta Group analysts expect demand for CRM software, consulting, and systems integration services to increase from $13 billion in 2000 to $67 billion in 2004.

IDC (International Data Corp) reports the CRM segment is expected to grow at a compound annual growth rate of 29l through 2004. In addition, the demand for CRM solutions among midmarket companies will result in a market uplift for implementation services in the second half of 2001, continuing through the year 2004.

IDC estimates that $40 billion was spent on CRM consulting, systems integration, and outsourcing in 1999, and predicted the market would grow to $90 billion by 2003.

AMR Research expects the CRM market to grow to more than $20 billion by 2004 making it as large as the ERP market.

North America is the largest CRM market and held more than 70l of the sector's revenues in 1999. Revenue growth in North America is expected to slow, however, and the region's market share will drop to 64l by 2004, the study found. Western Europe's CRM market will see the most rapid revenue growth, at about 36l, in the next five years, compared to 30l for the sector overall.

16.6 Data Management in Analytical Customer Relationship Management

Customer relationship management (CRM) is a strategy to acquire new customers, retain them, and recover them if they defected. The corresponding CRM goals can only be achieved if the right data sources are combined. This section discusses what external and internal data are available along the CRM process and how they support the achievement of the specific CRM goals. Starting with defining a CRM process model and the belonging goals within the CRM programs – acquisition, loyalty, and recovery – we explain the internal data situation. From here, we derive the need for external data and how one can merge and manage the information along the CRM process. The

aim is to provide a rough guideline for the selection and combination of data sources among the CRM programs and to give hints how to overcome possible problems.

Uniform products, along with individualization of customers, have brought pressure for change in marketing practices. In the automotive industry CRM generates additional product benefits by means of communication and services that are designed and delivered to match the individual needs of customers. This is one of the main goals of customer relationship management (CRM).

Although CRM is an advanced concept, its implementation still requires the development of feasible approaches. From a practical point of view, a crucial issue concerns the systematical collection, storage, usage, and continuous improvement of customer data. The only companies able to construct lasting relationships with their customers are those that properly process and maintain an adequate volume of customer information.

The overall aim of this section is to discuss the different data situations along the CRM process and to give hints on how to overcome data problems. We try to explain how one has to consider the whole process when handling data within a certain stage. These suggestions are valid for many CRM-oriented companies. But, for the ease of comprehension and to cover the specific issues of automotive companies, we restrict ourselves to this industry. In addition, we focus solely on private customers.

In this section we aim at generating a homogeneous and complete understanding of the CRM process, since there is no generally accepted approach concerning this topic. Afterward, we describe what data sources can be used in the car industry and how their importance varies along the CRM process. Also we discuss options for handling these sources in order to fulfill the activities of operational CRM (oCRM). Here we talk about both single activities and long-term strategy. We conclude by summarizing the main points and outlining open issues for further research.

16.6.1 The CRM Process Model

According to one of the earliest definitions **R**elationship **M**arketing (RM) is a "... strategy to attract, retain and enhance customer relationships." The term CRM is a later version of RM, having similar meaning, but used differently in literature. Within this section we use these terms synonymously. Operational CRM includes all activities concerning the *direct customer contact*, such as campaigns, hotlines, or customer clubs. Every oCRM activity is generally implemented in one of the three enterprise processes: sales, marketing, or service, since these are the processes concerned with direct customer contact.

Analytical CRM (aCRM) provides all components to *analyze customer characteristics* (behaviors) in order to accomplish oCRM activities, with respect to the customers' needs and expectations. There, the idealistic goal is to provide all information necessary to create a tailored cross-channel dialog with each single customer on the basis of his or her actual reactions. To reach

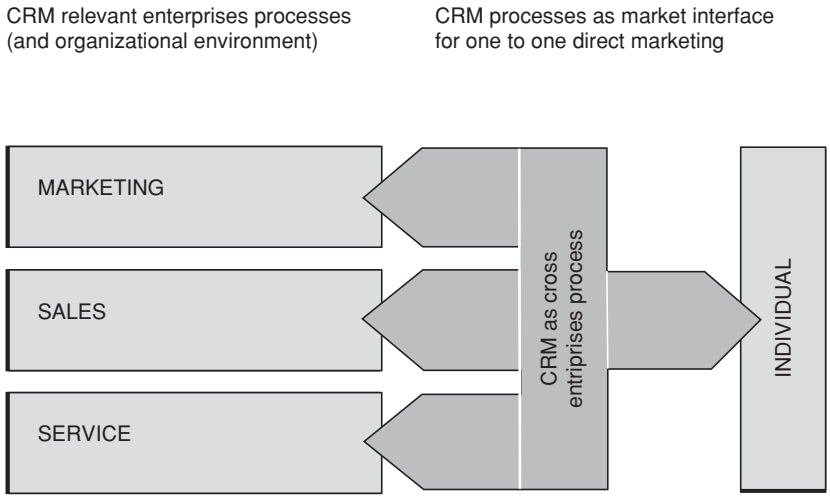

Fig. 16.1. CRM as cross-functional process

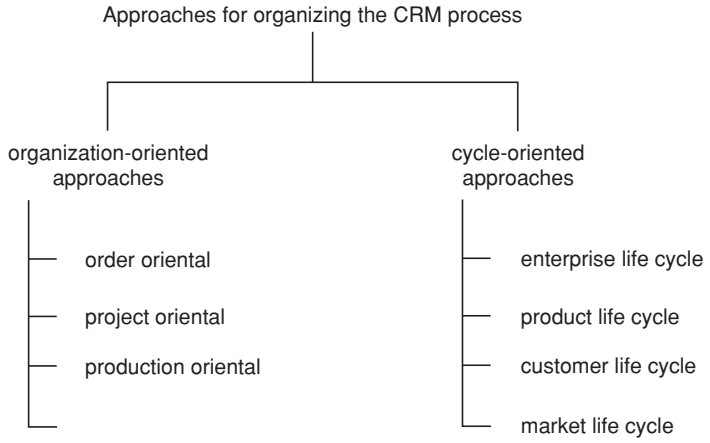

Fig. 16.2. General possibilities of the CRM process

this goal and aiming to show only one company image to the customer, it is necessary to look at CRM (oCRM and aCRM) as a cross-enterprise process. Marketing, sales, and service departments have to coordinate their responsibilities, activities, information systems, and data. Figure 16.1 illustrates this demand.

There are many theoretical ways to organize the cross-functional CRM process within an enterprise. Generally, we divide the approaches into two broad clusters: *organization-oriented* approaches and *cycle-oriented* approaches. Figure 16.2 gives an overview.

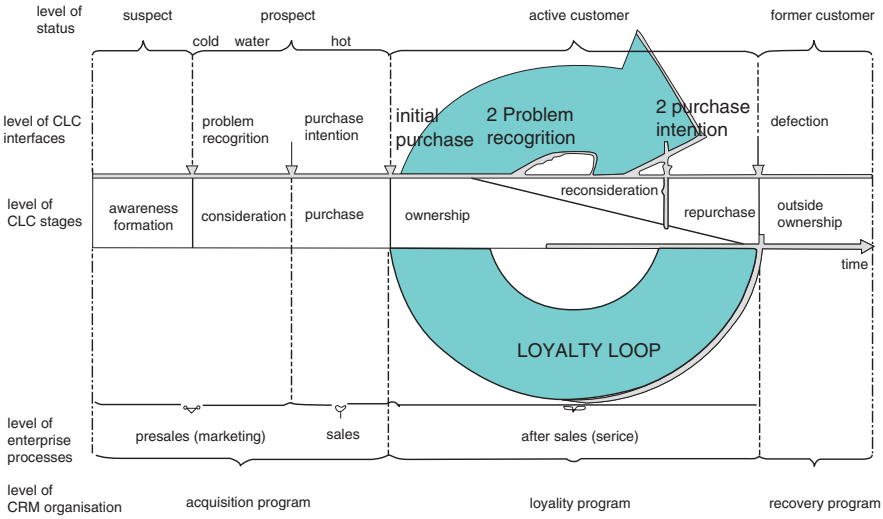

Fig. 16.3. CRM process based on customer life cycle

For our purpose, to discuss the issue in general, we base the CRM process on the customer life cycle (CLC). Since CRM centralizes the satisfaction of the individual customers and their needs, it seems logical to do so. Furthermore, CLC is the most time-stable approach and provides the ability to arrange oCRM activities according to each single life stage of the targeted subjects.

Nevertheless, in real life there may be good reasons to choose another approach, at least temporarily. If, for example, an enterprise enters a new market segment with a new product for the first time, it could be reasonable to organize the CRM process according to the product life cycle. Examples of such events in the automotive industry are the introduction of DaimlerChrysler's Smart in Europe and Volkswagen's New Beetle in North America.

Before enterprises can develop marketing or CRM strategies, they must understand how consumers make their purchase decisions. This decision process is called customer buying cycle (CBC). We assume that the chain of all CBCs a single customer runs through is his or her customer life cycle. The process ends with the final stop of consumption. Figure 16.3 illustrates the overall system and is described below.

We start with explaining the level of CLC stages. As mentioned before, the CLC refers to the various stages of the relationship between businesses and a (potential) customer. Now we take a closer look at these stages, assuming that the product in question is a car.

Each relationship starts theoretically long before the first "physical" contact. During the awareness formation stage a person is called *suspect* and gets in touch with lots of information on available brands in a determined market.

From there the suspect builds a set of product brands known to him and suitable to satisfy his needs in general. This set is called the *awareness set*.

The first stage ends when the suspect recognizes a problem, an unsatisfied need, or desire and starts to seriously consider several alternatives. Based on the individual criteria and their importance, he evaluates and ranks the brands. Therefore, he typically gets in touch with the respective companies and turns into a "prospect." The result of this stage is the prospects-evoked set.

By forming a concrete purchase intention, the person becomes a "hot prospect" (sometimes called hot lead) and enters the purchase phase. Here, he decides what kind of car or brand to buy, chooses where to buy the product, and negotiates the terms of sale (e.g., price, delivery, credit arrangement). This stage is closed by the initial purchase. Now the prospect has become an active customer and starts to use the car. He evaluates it in order to determine whether it is performing as expected. The outcome of this evaluation lies in a range between satisfaction and dissatisfaction, which influences subsequent CBCs.

After a certain time, the customer begins to consider replacement. If he is satisfied with his car experiences, he is most likely to remain an active customer. With the loss of the actual car (selling or stop of usage) the ownership stage of the first CBC ends and the person either stays with the company (loyalty loop) or ceases being a customer. For the latter, he might come back during any subsequent CBC.

As mentioned above, the CRM-relevant enterprise processes are cross-functional to the CLC-based CRM process. But they can be differentiated depending on their target groups and depending on the events "direct customer contact" and "purchase." This enables us to relate them to our process model, at least for one CBC. The first direct customer contact might be in the awareness, consideration, or purchase stages. To simplify the model, we assume that the first direct customer contact is identical to the purchase intention point. Therefore, we can construct the relationship shown on the level of enterprise processes of Fig. 16.3.

In order to organize the oCRM and aCRM activities along the CRM process, they are implemented as separate programs (as illustrated in Fig. 16.3 on the level of CRM organization) with clear interfaces, special goals, and corresponding direct marketing activities, like acquisition campaigns or road shows. Nevertheless, the programs have to be coordinated closely, as we discuss later. Figure 16.4 illustrates how the program-related CRM goals fit into the general goal pyramid of the enterprise.

Within the operational CRM goals we distinguish between goals related to single programs, e.g., increase of usage or cross selling for the loyalty program, and overlapping goals, such as efficient use of the budget or creating customer insights. Both require strong interactions among the CRM programs, since program-related goals partly need data gathered at some time in the process. For example, customers with a high probability to defect can be better

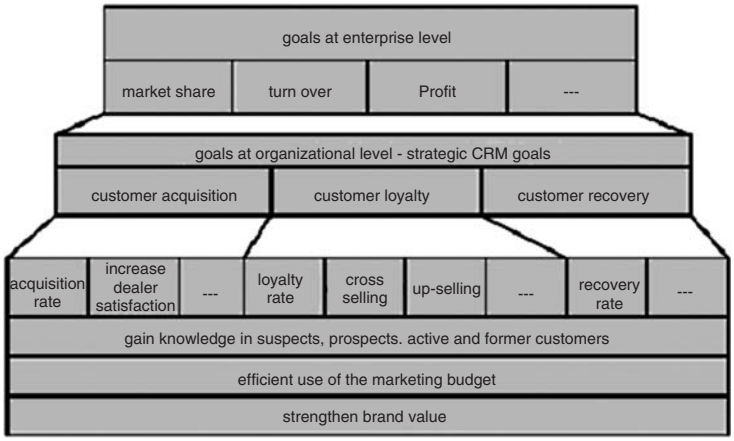

Fig. 16.4. Systematic CRM goals

detected in the loyalty program, if patterns of already defected customers and reasons for defection are known from the recovery program. Summing up, we may say that the synergetic effects of program interactions should not be ignored. We refer to this point in later part of this section again.

16.6.2 Data Sources for Analytical CRM

Analytical CRM supports the oCRM activities, as discussed before, through systematical collection, storage, and evaluation of data. Data management is, therefore, the starting point for effective CRM and will continue to grow in scale and importance. We have to consider three aspects: the quantity, the quality, and the actuality of data available. Based on the continuous cycle of data management, we learn about people's behavior and needs. We want to use this knowledge to optimize our oCRM activities through targeting the right people with the right information and offers at the right time.

In order to provide high-quality information for the CRM programs, we must discover first-rate customer-related data and evaluate them with suitable data mining techniques. Even if it seems that there is a wide variety of data, it is hard to find and merge the "right" data, even within the own company. Generally, we can find data sources within and outside the enterprise. Typically, internal data is considered more valuable data, because it reveals true insights belonging to our company and products. Additionally, we aim to generate a competitive internal data situation in the long run. Since competitors have the same access to external databases as we do, it seems to be the only way to generate real advantages.

In the first column of Fig. 16.5 we list the main information categories concerning customer characteristics. The most important examples for external sources, as used in automotive industry, are shown on the right-hand side of

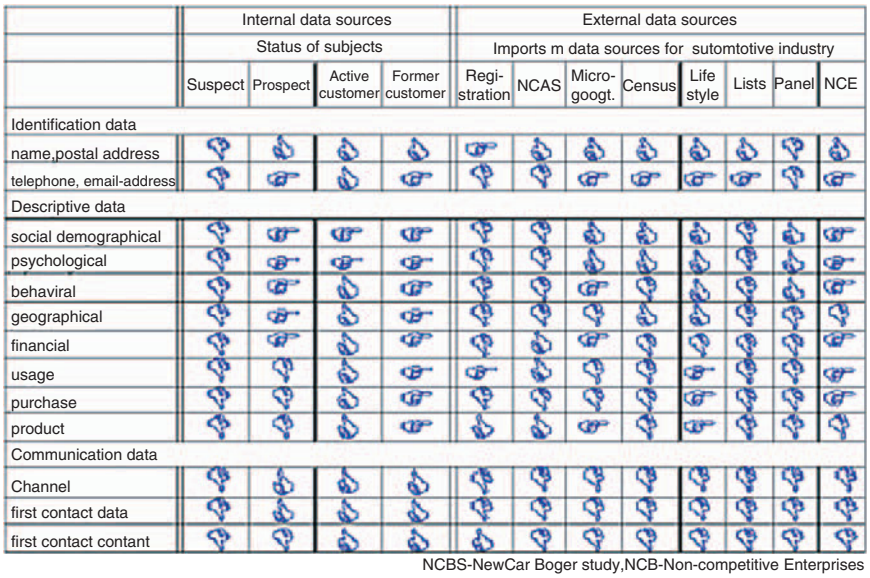

Fig. 16.5. Overview of general data sources

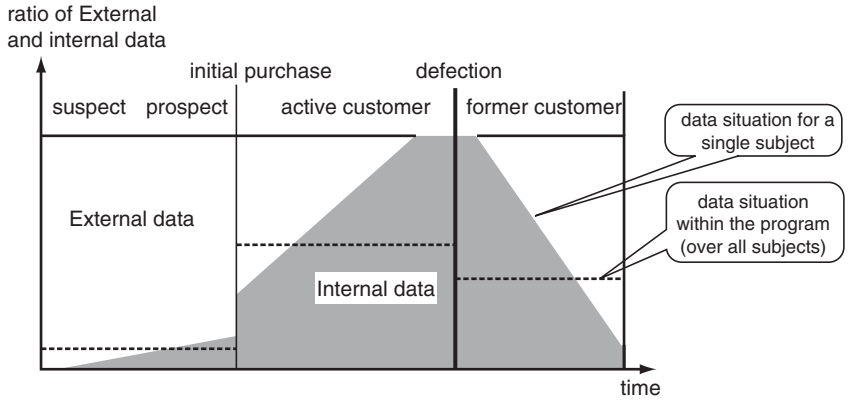

Fig. 16.6. The general data situation along the CRM process

the figure. For internal data we show only the availability during the CLC, as they can be stored at different databases in any company. The hands indicate the internal data, when the data categories are most likely to be available. For external data they give evidence as to which data sources these categories can be found in. Because it is very difficult to measure information quality, they do not indicate the excellence of information.

After the short overview, we now want to relate the potential information sources to the CRM process. In order to do so, we start by describing the data situation for the CLC of a *single person* (illustrated by the gray area in Fig. 16.6). After that, we change the perspective to the *enterprise*'s point of

view. This is necessary because we want to look at the data situation of each CRM program. Consequently, the CRM programs must be discussed independent of the fact of whether or not an individual passes through the whole process. The relationship between these two perspectives is that programs are static in their nature, but are passed through by a large number of evolving subjects.

Examining the data situation from a single customer's perspective, we lack internal information at the beginning of the CLC (see internal data in Fig. 16.5). There are two general ways to overcome this gap: we either buy data from external providers or collect it by means of surveys, lotteries, etc. With the evolvement from a suspect to a hot prospect, the person releases more and more information. This improves the data situation within our company and the proportion of internal and external data changes slightly. At the point of the initial purchase there is a sudden jump. Buying the product, the person becomes an active customer and we receive personal information, e.g., about his favorite car (including equipment) and his financial situation. Over time, the proportion of internal and external data of an active customer changes more rapidly than before. Now we constantly gather information like usage behavior or service interest. If the customer stays active for several buying cycles we are theoretically able to develop the internal data up to a point where no additional external data is needed. If the customer defects to another enterprise, the situation changes again.

Shortly after the defection, we still have lots of internal data. If we cannot win back the subject, these data age or get lost. Additionally, the subject creates new data without revealing them to us. Note that the absolute amount of data is not considered. We also have to keep in mind that this is only a rough guideline for the automotive industry, and generally depend on industry, previous internal knowledge, CRM goals, and CRM programs.

If we now want to connect the data situation of a subject with that of CRM programs, we just have to understand that each program focuses generally on another status level of the CLC (see Fig. 16.3). This means that we always have a certain number of subjects with an identical status level and with a similar data situation within a specific CRM program. Consequently, the data situation of each program is almost static over time. If we take all subjects belonging to a certain CRM program for a certain spot in time and calculate the data average (in terms of quality, quantity, and actuality), the results are the dotted lines in Fig. 16.6. As it becomes clear, we have different information levels of internal data amongst the programs. Therefore, we need more or less external data and for that reason the ration of external and internal data varies also.

16.6.3 Data Integration in Analytical CRM

In this subsection, we explain how the data described before can properly support the CRM process. To do so, we discuss the single programs as well as

overlapping issues. Section 4.1 clarifies basic requirements and assumptions. From Sections 4.2 to 4.4 we look at each CRM program. Before we outline special questions related to the corresponding program, we first restate the specific goals and then point out the internal and external data situation. Section **??** deals with the program overlapping goals and the resulting interactions between CRM programs.

Basic Remarks

The most likely situation is that the CRM programs have to be developed for companies that already exist. In this case, the company must first capture the status quo of the internal data. Depending on their quality in terms of accuracy, actuality, completeness, etc. external data have to be purchased. Two or even all three CRM programs could be started simultaneously. Then, benefits of interactions between the programs are possible from the very beginning. But in companies that already exist, we face difficulties with existing (nonoptimal) conditions, e.g., in terms of internal data quality or given information systems.

If a company starts with CRM for the first time, in theory it could start from scratch. This would mean that there are no existing customers and, therefore, no customer data. Naturally, the company in question would first develop an acquisition program, immediately buy external data, and form the relationship with the new customers along their CLC. Although this situation is possible (e.g., when smart AG entered the car market for the first time in the 1990s), it is rare, especially in established industries. For the purpose of this section we discuss both situations if there are any significant differences.

Acquisition

Acquisition mainly aims at establishing a dialog with the suspects belonging to predefined target groups and at gradually converting them from suspects into customers. When a suspect goes through the acquisition program, the major challenge is to become our brand part of the awareness and later the evoked set of the subject. If the subject does not leave the acquisition program unplanned (e.g., because of no interest or unrecognized change of address), the program ends with the initial purchase (see Fig. 16.3).

As shown in Fig. 16.6, external data sources play an important role, especially in the acquisition program. Therefore, we would want to take a closer look at their suitability. In order to rank data sources in terms of their usefulness we have to find ranking criteria. The researchers explained that the measurement of information quality is a complex task with various facets. Aiming to make a first rating of the general suitability of an external data source for acquisition, we try to restrict ourselves to four main aspects here. These are the number and the quality of descriptive variables, the market coverage, the costs per contact, and the expected response rate for suspects.

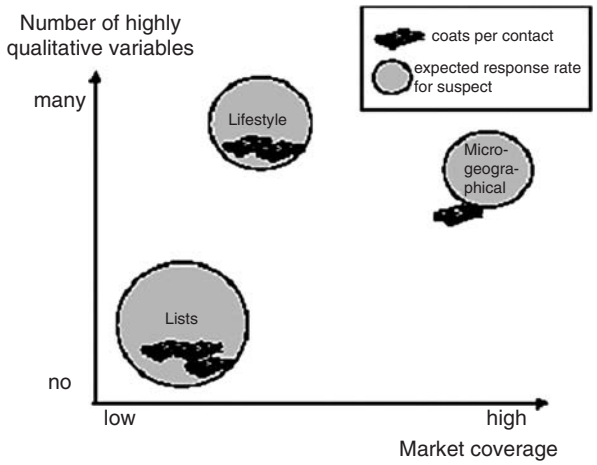

Fig. 16.7. Ranking portfolio for most important external data sources

In order to run *continuous acquisition programs*, we need many new addresses every time and hence, the *market coverage* is a fact to take into account. Because we *lack internal data* about suspects as well as prospects we have to buy this information. For that, the *number and quality of descriptive variables* is important in acquisition. Especially at the beginning of a CRM project we are often obliged to proof its *usefulness and efficiency* within the company. Thus, we must consider the *expected response rate* and of course the overall *costs per contact*.

Considering the market coverage for passenger cars, registration data (for legal aspects), NCBS data (New Car Buyer Survey), panel data, and data from noncompetitive enterprises (NCE) can only be used as supplements here. Census data is not only highly aggregated, but also mostly available within microgeographical data sources. If we focus on the remaining data sources (cf. Fig. 16.5), we receive the portfolio illustrated in Fig. 16.7.

Now we want to see how these data sources fall in place during acquisition. An ongoing aim of acquisition programs is the generation of new suspects. As we have learned in section 3 (Fig. 16.6), usually we have only internal information about them. As a result, in acquisition one aims to buy external data continuously.

If a company starts acquisition with direct marketing for the first time or is new in business, normally it lacks data about responders or customers, and thus it misses a proper target variable for the use of data mining techniques like classification or predictive modeling. Consequently, the company does not need any descriptive variables for prediction. Furthermore, because it is just starting acquisition campaigns and therefore did not use lots of publicly available addresses in the past, market coverage is not very relevant. Considering these two aspects as well as the highly expected response rates for

properly selected lists, we recommend using them. This will help to achieve quick results in terms of generated prospects (responders) and to strengthen the position of CRM within the enterprise.

Nevertheless, there are two aspects to bear in mind about lists. First, addresses generated from lists are contacted frequently by many enterprises and therefore show a certain saturation. And second, suitable lists are limited and certain social classes are neglected. In the case of running acquisition programs the potential value of lists is less. Because of their small market coverage, appropriate lists will at times be nearly exhausted. We can still use lists as frequent sources for the acquisition program, because there will appear new needs for the subjects already on the lists, new subjects in existing lists or completely new lists, but we also have to look for alternatives.

After running the first campaigns, the internal data situation is improved. The reactions to our mailings and the identification data (name, address, etc.) of the contacted suspects from the lists are the core of our internal database. Additional data can be added, if we send questionnaires with the mailings. They inquire, e.g., about the next replacement need, the product, and the communication preferences of the prospect and give hints how to correspond with him properly. Since during acquisition we aim mainly at distinguishing between potential customers and noncustomers, we focus on data mining techniques like classification and prediction.

Because of the now-improved data situation we have positive responders and therefore a valid target variable. This can be used to predict the response behavior of subjects from other data sources. In order to do so, we have to find data that refer to both our responders and the targeted subjects. For this reason, it is advisable to refer to external data sources again. If we look at the dimensions of our portfolio from Fig. 16.7, we now face new requirements. For generating predictive models we clearly need descriptive variables, although the specific requirements vary for different data mining approaches and techniques.

Additionally, we call for high market coverage. This is essential for maintaining ongoing acquisition campaigns. Microgeographical and lifestyle data mostly fulfill the two requests. Because of the higher expected response rates, it makes sense to start using lifestyle data. If the data is exhausted, microgeographical data can take their place. The more knowledge we possess about the responders (and responders that become customers), the finer we can select new subjects to contact. Therefore, the usually lower response rates of microgeographical data compared to lists and lifestyle data can be partly compensated by better targeting (and lower address costs).

Loyalty

Loyalty clearly focuses on establishing a permanent dialog with active customers. The aim is to build a mutually profitable long-term relationship. Therefore, we pursue operational goals like increasing usage, upselling, and

repurchase rates. A person becomes a customer and therefore a potential target for the loyalty program, if he signs a contract (initial purchase). He stays within the program as long as he remains an active customer. With defection to another company (voluntary or forced) he will be handed over to the recovery program (Fig. 16.3).

From a data point of view, loyalty is the key program of CRM. Neither during acquisition nor recovery are there so many and such close contacts to customers. As a result we can gather lots of internal data with supposedly high quality. Therefore, the ratio between internal and external data will change over time, in favor of the internal data (cf. section 3). If many customers stay with our company and pass through several CBCs, theoretically there is a point where no additional external data is needed.

Taking a closer look at the quantitative and qualitative growth of internal data, we discover three general ways for improvement. First, we can collect information (like sociological or financial data) freely given by the customer. This data has very high reliability, if the customer has to prove the accurateness (e.g., for leasing or credit purposes). The data is less reliable if it is based on volunteer statements (e.g., from questionnaires). The second way for obtaining data is observing customer behavior. Here we get hard facts like mileage, product characteristics, or use of services. As the third category there is data derived from the internal database. For deriving the data, we use basic statistical or data mining techniques like regression or neural networks (e.g., for building averages, or estimating and prediction of variables).

Because of the growing internal data, the need for external data decreases the longer the loyalty program runs and it is clearly lower than in the acquisition program. Nevertheless, there may always be a good reason to buy external data. As we explain here, there are two basic applications for external data in the loyalty program.

First, we can buy external data on a regular basis and thus extend the customer database with valuable information, *permanently*. For example, we could add socio-demographical data from microgeographical sources in order to generate selection criteria for direct marketing activities. For applications like these, we still need data that refers to most of the customers, and consequently, we need high market coverage as found by microgeographical or lifestyle data sources. Lists do not represent an additional value here, because they lack the descriptive variables and market coverage.

Second, we can use external data on a *nonpermanent* base, e.g., for special tasks in market research. For these tasks we work mostly with samples. Consequently, we do not need high market coverage. Data sources with special topic-related information (e.g., NCBS or panel data) have higher priority.

After talking about the general data situation in loyalty, we now want to look at the main tasks to fulfill. During his ownership, the customer is exposed to a variety of influences that can have an impact on his attitudes concerning our company, brands, or products. Such influences are called *triggering events*. There are two groups of triggering events we would like to point out, because

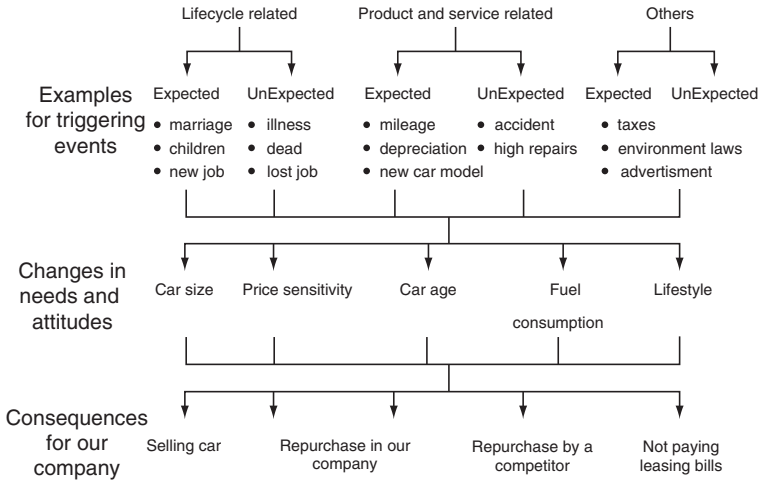

Fig. 16.8. Examples of triggering events and their consequences

of their high impact on the customer-to-business relationship. The first group contains events related to the *lifecycle* of the customer himself, such as marriage, death, or unemployment. The second group encloses *product (car)- or service*-related events (e.g., accidents, car maintenance, or mileage).

Product- and service-related events can sometimes be caused by lifecycle events. As shown in Fig. 16.8, all triggering events can be distinguished by expected and unexpected events as well. A single triggering event or a combination of events can result in fundamental changes in the customer's needs and attitudes and therefore, his expectations and actions regarding the relationship to us may change, with serious consequences (see Fig. 16.8).

One of the main tasks of aCRM for loyalty programs is the prediction (e.g., use of decision trees for predictive modeling) and recognition of triggering events (e.g., use of residual analysis for derivation recognition). Not only do we have to *prevent undesired consequences*, but additionally, triggering events often provide opportunities for *enhancing customer relationships*. The goal of prediction is hard to accomplish for expected events and barely possible for unexpected events (How to predict an accident?). For the latter we are mostly restricted to event recognition. Another approach could be the evaluation of likelihood classes as used, e.g., for car insurance policies. For the detection of triggering events we refer mostly to the use of internal data. This should be more detailed and have higher actuality than most external sources (Fig. 16.5). Examples for such triggering events are a sudden change of annual mileage that indicates different usage habits or a modified email address that refers to a new company. External data might be used additionally for explaining such indicators (e.g., microgeographical data can show new housing conditions).

Another important task for aCRM in loyalty is to provide customer insights for the tailored customer dialog. For that, we primarily use data mining

applications from the fields of clustering (e.g., k-means) and description (e.g., association rules). In order to find customer segments we can use the external sources with topic-related information, as described above. But to apply all customers to the appropriate segments we need to find corresponding selection criteria, which is available within our internal customer database.

Recovery

The customer becomes a target for the recovery program when he changes to another car company. Recovery pursues two goals. The main goal is to *win defected customers back*. But in order to do so and to avoid future defection, the second goal is to *learn the reasons for defection.* The problem with recovering former customers is that when defection become known to us, the person has often already purchased a new car from a competitor. Considering the amount of time and emotions spent for choosing, as well as the money spent for acquiring the car, the customer will not sell the actual car in the near future. The average length of car ownership, e.g. in Germany, is approximately 3.5 years. That is why the goal of the dialog cannot consist in winning back the customer immediately, but in establishing and keeping contact with him until his next repurchase.

The final goal of the dialog is to gain the top position in his evoked set again. The reasons for defection must be questioned as one of the first steps of the recovery program. We need this information for planning the content and timelines of the recovering program and it is also helpful to prevent churn of actual customers in the loyalty program. Because the recovery program deals with former customers, we generally have detailed internal information about the targeted subjects, at least more information than in acquisition. But this is true only for subjects who defected recently. The more time that has elapsed since people defected from our company, the less valuable their data becomes (see Fig. 16.5). More concretely, new information about car characteristics, as well as car usage and financial data emerge, but not in our enterprise.

Unfortunately, such information is rarely available in public data sources. This implies that the lack of actual internal data cannot be compensated by external data. Additionally, the identification data becomes more and more obsolete and one day it is impossible to purchase external data because the customer's identification data is no longer valid. Regarding this debasing data situation, a recovery dialog must be established as soon as the defection becomes clear. Only when the customer has defected for a short time do we possess a lot of actual data about his contact address and his communication preferences. This is the precondition for a successful dialog. At this point we now know what do to when the defection is known already. In practice the customer rarely informs us of his defection.

For that, it is necessary to find proper identification variables. There are two fundamentally different types of churn. People can churn *voluntarily* if they do not want to be customers anymore (e.g., because they are unsatisfied

with the product or got a good offer from a competitor) or *involuntarily* if they are forced to stop consumption (e.g., because of unemployment or illness). Both types of churn can occur for many different reasons and can be recognized by different outcomes.

Involuntary churn is recognized more easily (e.g., people stop to pay their bills or the car is wrecked in an accident). For the recovery program we want to recognize mainly voluntary defection, because voluntary churners are more likely to return and stay good customers. For that we mostly have to use indirect indicators. Examples of such indicators are the abrupt stop of service bills or if loyalty measures get unanswered suddenly. In order to find these hints within our internal data we use the techniques of deviation recognition or basic statistics. Before ending this section we want to point out that recognizing the reasons for defection is mainly part of the recovery program, but it is important for the loyalty program as well. The behavior patterns and indicators discovered in recovery are the basis for churn prevention in loyalty.

Interactions Between the CRM Programs

As mentioned already within the preceding subsections, there can be several interactions between the different programs. In this section, we want to examine them from different perspectives. Looking at the interactions of the CRM programs we have to consider the *objects* of interaction. Naturally, subjects evolve from suspects to customers and therefore pass through the different program levels. These subjects are represented through their data and consequently the objects of the exchange are data. The exchanged data can differ concerning its *reference level*. First, data can be exchanged on an *individual level*. This means that data about a specific customer gained in the acquisition program is used in loyalty as well. Second, the data exchange can take place on an *aggregated level*. This implies that insights gained about a certain group of people, for instance in loyalty, are used for marketing activities in the acquisition program.

Because external data is available for each program and can be bought any time, normally, we do not include it in the program interchange. But we must keep in mind that, when purchasing external data for one program, the external data needs in other programs can be taken into account. More concretely, it makes sense to consider data needs in loyalty and recovery programs when buying external data for the acquisition program and the other way around.

Individual internal data is exchanged mostly *forward oriented*, meaning that data gained in acquisition is used in loyalty and recovery. In fact the individual data is not transferred, but the customer file is enriched with all information gained about the subject during his CLC. Prospect data acquired during the acquisition program is retained and enriched with new customer data. If the customer churns, the inquired reasons for defection are stored in the same customer file as well. This type of data exchange is already assumed in the explanations within the programs and is not examined in detail here.

Aggregated data can also be exchanged forward oriented. But the insights gained through the evaluation of aggregated data are especially advantageous in *backward direction* as we explain.

For that, we want to consider the *reasons* for the data exchange. Of course, data is exchanged to gain further knowledge, but there can also be interaction to compare and adjust data. This means that individual data with similar content may be gathered in different programs. For example, we may inquire as to the preferred car characteristics of a prospect via a questionnaire in acquisition phase. When the prospect becomes a customer, we gain reliable knowledge about his chosen car characteristics. As discussed before, the latter are better than the volunteer nonproofed statements.

We can update information about preferred car characteristics with data about chosen car characteristics. This update, again, is forward oriented on an individual level. Backward oriented we can analyze the differences between announced and true product preferences in order to make these insights available in precedent programs. This point refers to aggregated data. Another example of backward-oriented exchange of aggregated and individual data is the use of defection data to identify customers likely to churn. Therefore, we need information about the typical profile of churners. The corresponding data emerges within the recovery program and is transferred to the loyalty program. There, the descriptive variables about customers are used as input variables in order to generate a predictive model. The output variable is the information regarding whether a customer has defected or not. The generated predictive model assigns a score to new customers that indicate their fit with the churner's profile.

It becomes clear that backward-oriented exchange of aggregated data often goes along with the use of data mining methods like classification, prediction, and clustering. Similar to the prediction methods just described, clustering permits distinguishing between different groups of responders, active customers, or churners. Deviation analysis must also be established on an aggregated level in order to incorporate a certain standard deviation in the model.

16.6.4 Further Research

This section has not focused on the question of how to distinguish between different data providers that offer the same or similar kind of external data. This problem arises after the needed data within the programs is determined. The selection of a wrong provider often can destroy the benefits of the precedent steps.

The thoughts were oriented on CRM programs in automotive industry. But the CRM process model and the data suggestions are applicable for other industries as well. Nevertheless, there are differences in goals and data between industries depending on their product (industrial, consumer, or utility goods) and their customers (businesses or end users). These differences will

have an impact on the concrete design of the CRM process model, the CRM goals, the internal data situation, and the resulting need for external data. Further research should examine the differences and discuss the resulting consequences.

16.7 Summary

So far, the selection and integration of data within the CRM programs was rarely mentioned and hardly ever treated in marketing or data mining research. But for both domains, combining the right internal and external data is a guarantee for marketing success and for the use of data mining techniques within analytical CRM.

Most research has been restricted either to CRM strategy without discussing the practical issues of deploying the strategy or to characterize data independent on the business problem. Despite being really important in evaluating data sources, criteria like actuality, accuracy, and completeness resulted, and they do not give evidence as to which categories of data should be used depending on the marketing goal and on the internal data situation. In this chapter, we connected the CRM goals within acquisition, loyalty, and recovery to the internal data situation. Based on that, we derived the need for external data and the need for data exchange between the CRM programs.

We showed several levels at which the CRM process can be described. First, we pointed out the CLC level showing the possible evolvement from a suspect over a prospect to a (former) customer. The amount and quality of internally available data grows when the subject becomes an active customer. Second, we illustrated the organizational level with its programs. We showed the modest internal data situation in acquisition, which make additional external data a must. Loyalty and recovery also require external data – but to a lower extent and with different focal points.

Depending on the CRM goals we stated different requirements on the external data. While in acquisition market coverage is an important criterion, specific data about purchase history and behavior are much more important in loyalty and recovery. Furthermore, in order to reach the corresponding CRM goals the programs have to be coordinated closely especially for exchanging data and knowledge derived.

16.8 Review Questions

1. Define customer relationship management (CRM) and state its uses.
2. What are the key rules used in implementing CRM?
3. What are the general categories of separate behavior in CRM?
4. How are data mining models built using response behaviors?
5. Explain the application of data mining in marketing.

6. What are arguments for and against the sharing of customer knowledge?
7. Define customer value management (CVM).
8. Define global customer relationship management (GCRM). What are its issues?
9. Write a short note on content management and the core competencies in CRM.
10. Explain in detail on the fundamental skills in CRM.
11. State the reasons for CRM and the key elements required for success in CRM.
12. How does data mining help in database marketing?
13. What are the consequences of implementation of CRM?
14. State some of the technologies used in CRM.
15. Explain the connection between enterprise resource planning (ERP) and CRM.
16. What are the benefits of CRM to the enterprise?
17. Differentiate the market strategy of CRM and ERP.
18. Explain CRM as cross-functional process.
19. Explain CRM process based on customer life cycle.
20. How is data integrated in analytical CRM?