



*The Confluence of Data Mining and Market
Research for Smarter CRM*

April 17, 2003

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In most companies, the realms of customer-behavior analysis and customer-attitudes analysis are worlds apart. They are like two swift flowing rivers that never meet. Behavioral analysis is typically the domain of business intelligence: tightly managed by IT and heavily focused on operational systems, data management, report servers, On-line Analytical Processing (OLAP) cube administration and Data Mining. While attitudinal analysis is the world of Market Research: owned by Marketing, often outsourced to a Market Research agency, resulting in tabular reports and executive briefing documents.



However, true holistic customer analysis demands that these worlds come together. Customers both think *and* act. An understanding of how customers think can help explain and predict customer behavior. Conversely, customer behaviors can help explain and predict customer attitudes. Ideally, behaviors and attitudes would be analyzed simultaneously for deeper customer understanding.

For companies with large numbers of customers, Data Mining and Market Research are often employed to gain intelligence into customer behavior and attitudes respectively. Therefore, truly holistic customer analysis requires that these two disciplines be integrated. The rivers must converge.

- Are Data Mining and Market Research integrated within your company?
- Are you optimizing your investment in behavioral and attitudinal data for a complete picture of your customers' intentions and actions?
- Are you aware of the potential costs associated with redundant use of two disciplines to examine the same research question?
- Can you create a more efficient and accurate research operation by coordinating these disciplines for deeper customer understanding?
- What potential barriers will you face by trying to create a coordinated research operation?

In this paper, we will examine the issues surrounding the convergence of Data Mining and Market Research for deeper customer understanding. Much of the insight shared within this paper comes from the qualitative research study on the topic by SPSS Inc. and The Kantar Group entitled "Two Rivers"¹.

We begin with a review of these two disciplines and a discussion of where they fit within an overall Customer Intelligence environment. From this foundation we will discuss where they are being applied today, how they can be converged into a collaborative research discipline and why they haven't been converged to date. Finally, we discuss some of the benefits of convergence and recommendations for creating a convergent research discipline within your organization.

WHAT IS DATA MINING AND MARKET RESEARCH?

Let's begin our examination of the convergence of Data Mining and Market Research by exploring the basic principles and common uses of each discipline for customer² understanding today.

Data Mining

There are several definitions of Data Mining in use today. Broad definitions suggest that Data Mining is the exploration and analysis of large data sets. Under such definitions reporting, graphing, traditional statistics and sophisticated machine learning are all considered Data Mining. In this document we use a more narrow definition of Data Mining that stresses the discovery aspect of the discipline. Specifically, we see Data Mining as

¹ For more information on the Two Rivers study contact ken@kenningresearch.com.

² We will use the term 'Customer' to represent the identifiable customers that are known to an organization as well as anonymous 'Consumers' of the organization's goods and services.

the iterative process of using pattern discovery algorithms to find useful and previously unknown trends and relationships in large volumes of data. These patterns help explain past events as well as predict future events.

Data Mining is used in many industries where there is a need to find patterns in vast amounts of data. For example, Data Mining is being used to find sequences in DNA; predict manufacturing defects; identify drivers of student performance; optimize transportation logistics; forecast energy consumption; and, most recently, to identify threats to national security.

Perhaps the most widely recognized use of Data Mining is in the commercial market. Today's businesses are using Data Mining to identify patterns in customers' buying behavior; identify profitable customer segments; increase marketing return rates; prevent loss of valuable customers; estimate credit risk; identify fraudulent activity and much more.

The strength of Data Mining is in its ability to quickly sift through vast amounts of data to find patterns that are hidden and would otherwise be impossible to find. Data Mining often uncovers unexpected patterns, which fosters new learning and insight.

According to a 2002 report from IDC, the Data Mining market is expected to grow at a CAGR of 13% to reach \$823 million in 2006. This growth can be attributed to at least four key factors.

1. There are more information sources available today than ever and the amount of information is growing exponentially.
2. The explosive growth in the capacity of databases along with the shrinking cost of data storage has made it possible to acquire, store and manage more data than ever.
3. Using Data Mining techniques used to require complex programming skills. Today, there are extremely powerful Data Mining tools on the market that are easy to use making Data Mining more accessible to a broader audience. Many operational suite vendors are beginning to embed data mining into their applications.
4. The highly competitive market environment and growing customer options makes customer intelligence more critical for business performance. This has created an increased appetite for rapidly finding knowledge from vast amounts of data.

Market Research

The American Marketing Association defines marketing research as the "systematic and objective approach to gathering marketing information which -- when processed, analyzed and interpreted -- will help identify problems and opportunities that allow for better-informed, lower-risk decisions."

In business, Market Research is typically focused on learning more about consumers, customers, competitors and market trends at large.

Depending on the source of information, Market Research is classified as either primary or secondary. Primary research uses information from original sources; that is, a Market Researcher collects data that have not been previously collected or published. Secondary research refers to collecting data from published sources such as information released by government agencies, and reports and publications available in a public library.

Primary research is classified as either qualitative or quantitative. Examples of qualitative research are focus groups and in-depth personal interviews. The most common form of quantitative research is a survey that uses a questionnaire to collect data.

The name qualitative research implies that its findings are not quantifiable. The research process is quite often a discussion in which the researcher poses open-ended questions to participants. Findings are participants' opinions, comments and impressions that cannot be tabulated to obtain averages or percentages.

Qualitative research defines issues, substantiates perception and identifies behavior. For instance, results of focus groups involving the users of a consumer product can clarify issues surrounding brand loyalty, and reveal users' likes and dislikes. Findings of personal interviews with corporate purchasing agents can aid the understanding of the criteria business firms use to select suppliers.

While qualitative research provides valuable information, it does not lend itself to rigorous data analysis that can reveal relationships among marketing variables. Quantitative research relies on survey questionnaires that are often responses to multiple-choice items or ratings on a scale. These surveys are typically conducted as either personal interviews, telephone interviews, mail surveys, or web-based surveys. Results from these surveys are then analyzed to generate averages, ranges and percentages.

When analyzing customer or consumer information, Market Research has many uses. Market segmentation studies provide information about the characteristics shared by customers. Purchasing power and buying habits studies uncover the financial strength and economic attributes shared by the target market. Psychological market studies reveal information regarding the perceived opinions and values held and shared by consumers in the market. Marketplace studies can provide insight into competitor strengths and directions. Environmental studies can provide insight into economical and political circumstances that can influence internal productivity and operations.

WHERE DO DATA MINING AND MARKET RESEARCH FIT IN CUSTOMER INTELLIGENCE?

A corporate Customer Intelligence environment includes a wide range of technology-enabled processes for data collection, data storage, analysis and deployment. Typically, the customer intelligence environment is enabled by a large number of technology vendors, services providers and internal efforts. All of these efforts are brought together for the singular purpose of gaining a deeper understanding of the customer. Figure 1 clearly illustrates this environment.



FIGURE 1. CUSTOMER INTELLIGENCE ENVIRONMENT

Customer Data

Starting at the top of Figure 1, Customers and Consumers alike provide information in the form of behaviors and attitudes. Consumer behaviors may be captured internally by sales patterns, channel usage, and campaign responses. Consumer behavior may also be collected externally through syndicated research, behavior assessment such as Nielsen, or attitudinal/lifestyle profiles such as Acxiom or Experian. In addition, consumer attitudes may be captured through either qualitative or quantitative Market Research. Our model for customer intelligence suggests that these sources of information are captured and either loaded into or made accessible by the Analytic Data Repository.

Data Collection

Customer behaviors are directly collected through the major touch-points of the organization. These touch-points include call centers, point-of-sale systems, Web sites and other operational systems managed by the organization. Customer attitudes are being collected through commissioned Market Research studies as well as corporate web surveys, customer panels and emerging technologies for text analysis and customer voice analysis.

Data Storage

Whether from customers, consumers or both, there are a growing number of data sources available that provide organizations with a myriad of behavioral and attitudinal information. In order to derive insights from the data, the data must be combined, managed and centrally accessible.

Monitor

Monitoring is the process of identifying key indicators of business performance at various levels across the organization. These key performance indicators (KPIs) are typically accessed through executive dashboards. Critical KPIs may also be monitored by alerting agents that can send emails or calls when a defined threshold is crossed. Whether by human or machine, KPIs often identify areas of threat or opportunity.

Report

Upon identifying a potential threat or opportunity, enterprise reports are typically available to quickly determine the impact of the trend on business performance. Reports are useful for rapidly accessing business information. However, they are not well suited for exploration due to their static nature.

Explore

Given that the threat or opportunity has been shown to be relevant and substantial, exploration can begin in order to identify possible drivers of the trend. On-line Analytical Processing (OLAP) technology is a valuable tool for examining issues from several dimensions. With OLAP one can narrow the problem or focus the opportunity down to a manageable space. For example, if treadmill sales are on the decline, OLAP can help identify which regions and customer segments are most accountable for the trend. This exploration of the data can be classified as 'data mining' using the broadest definition of the term. However, manually finding important patterns in OLAP 'universes' may be like finding a needle in a haystack as the number of business dimensions grows. In such situations, automated Data Mining techniques may be employed to find hidden patterns.

Exploration often leads to the formation of new hypotheses. For example, one might observe that when women buy treadmills they also buy "ab crunchers." Yet, when men buy treadmills they also buy heart monitors. These observations may lead one to conclude that women buy treadmills to "tone up" while men buy treadmills for better health.

Here is where customer intelligence typically breaks down. The observations in the previous example merely suggest a cause. Many CRM efforts fail because decisions are made based upon one discipline without consideration for the other as described below.

Research

The origin of customer intelligence is Consumer research. Many hypotheses are generated daily within an active customer intelligence environment. These must be properly tested, especially those with strategic implications or costly tactical programs.

Back to our treadmill example, while exploration may have suggested that women were focusing on body image and men were focusing on health, the reverse may actually be the case. Research might reveal that women are including this equipment as part of a low-impact program designed to fight osteoporosis and promote healthy aging. While the men intend to use the treadmill to their physical limit to burn off the excess carbohydrates they are consuming as part of their muscle building program.

Consumer research is commonly executed with either of two disciplines - Data Mining or Market Research. Both disciplines provide scientific rigor and allow one to draw conclusions within acceptable bands of confidence.

Deploy

These conclusions are the new findings that expand one's customer intelligence. They provide the confidence to plan and execute new programs to avoid the threats or capitalize on the opportunities at hand. Done properly, these programs are tested and evaluated prior to being deployed broadly into the operations of the organization.

WHAT CUSTOMER INTELLIGENCE QUESTIONS DO DATA MINING AND MARKET RESEARCH ADDRESS?

Within the context of Customer Intelligence, Data Mining and Market Research are often used to support decision making in the areas of Customer Acquisition, Customer Segmentation, Customer Retention, and Cross-Selling. These applications are part of the field called Analytical Customer Relationship Management (A-CRM). As described below, the insights gained from these initiatives help organizations better manage their customer interactions, improve the level of customer service, and create richer longer-lasting customer relationships.

Customer Segmentation

Understanding customer segments is critical to any customer-focused organization. Market Research derives customer segments through surveys and demographic research. Data Mining uses clustering techniques to find naturally occurring groups within the customer database. While each approach individually provides insight into basic customer groups, combining these approaches yields deeper insight still. A simple illustration of this can be seen in the table below. The table shows variances between purchased Demographic Segments and Clusters that are derived by behavioral, transactional, and individual characteristics. Segment 1 seems to include two distinct behavioral clusters. An understanding of Clusters 1 and 2 may suggest varied marketing strategies within Segment 1. Segment 2 and Cluster 2 seem to validate each other. Clusters 1 and 3 contain two different demographics. While these two groups seem to behave the same, demographics may provide insight into differing intentions. Combining Data Mining and Market Research techniques for customer segmentation can lead refinement of segmentation strategies and to more accurate customer understanding.

Derived Clusters	Demographic Segments			
	Segment 1	Segment 2	Segment 3	Segment 4
Cluster 1	564	31	19	645
Cluster 2	69	950	92	22
Cluster 3	602	91	887	76

Customer Acquisition

Data Mining is used to help improve customer-acquisition efforts by identifying the profile of potential buyers for a particular product or responders to a campaign. While these derived profiles can lead to improvements in marketing efforts, one can only infer the reasons these groups respond where others do not. With Market Research one can survey customers to understand why they buy a particular product or respond to a specific campaign. Used together, Data Mining and Market Research can provide more actionable results in a more efficient manner. Specifically, Data Mining can identify customer segments to survey and provide hypotheses as to purchase intent and Market Research can narrow field work to a tighter segment and more focused research objective.

Customer Retention

Market Research is well equipped to identify drivers of satisfaction and loyalty. By matching primary Market Research data to a customer data-warehouse, Data Mining can be used to identify behavioral links between reported satisfaction and loyalty. Additionally, Data Mining can be used to validate a relationship between

reported loyalty and actual churn behavior. Used together, Data Mining and Market Research can more accurately identify key drivers of customer loyalty and enable an active management of customer churn.

Cross Selling

Data Mining is often used to identify naturally occurring associations between products. Marketing managers use these associations to develop joint-marketing and cross-selling campaigns. However, many times product associations are not obvious or only occur within specific customer segments. Data Mining is often ill-equipped to provide further insight into these patterns. In such circumstances, Market Research can be utilized to focus on what factors lead to these associations. This research can result in more effective cross-selling campaigns and product promotions.

WHERE SHOULD DATA MINING AND MARKET RESEARCH CONVERGE?

The convergence of Data Mining and Market Research can best be illustrated by examining the underlying research stages common to both disciplines. To this end, we define the underlying research processes as consisting of six distinct stages. These stages include:

- *Define* where the customer is articulated
- *Capture* where information is collected
- *Store* where information is managed and maintained
- *Analyze* where information is examined
- *Understand* where insights and conclusions are drawn
- *Deploy* where insights are operationalized throughout the organization

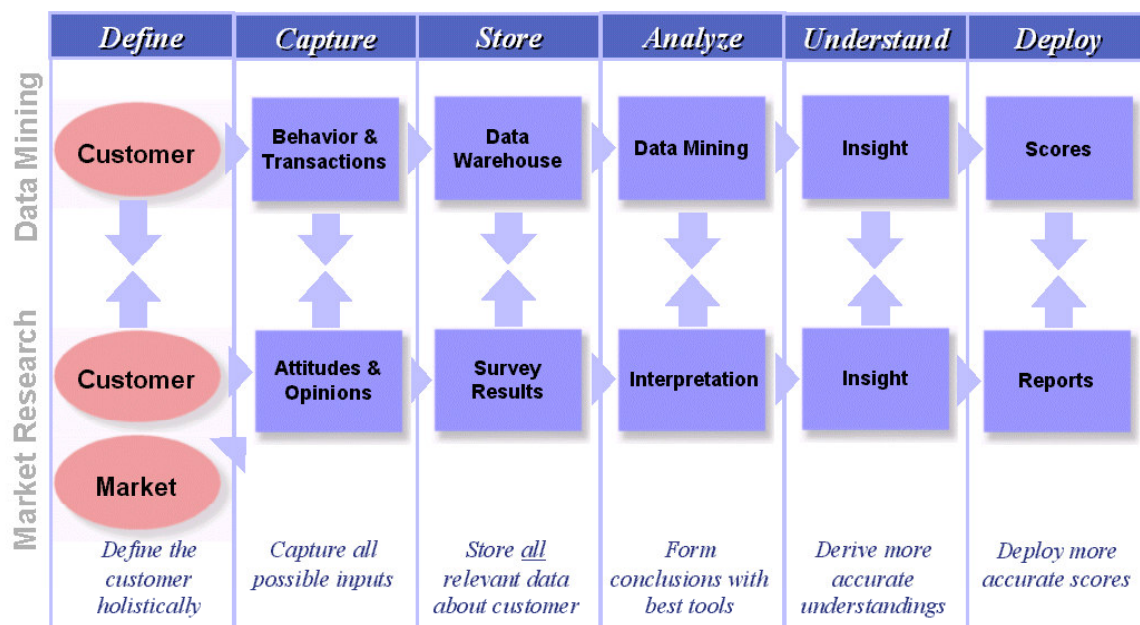


FIGURE 2. COMPARISON OF RESEARCH PROCESSES

Data Mining Process

Data Mining most commonly defines the customer as a set of trackable behaviors. This is due in large part to the fact that Data Mining requires large data sets. These are more often produced by operational systems than surveys. This means that the customer is defined as an acting entity with less input from intentions, attitudes or outside behaviors. Therefore, Data Mining focuses on capturing what is accessible via operational systems that interact with the customer.

These systems produce massive amounts of transactional data including purchases, customer service inquiries, web visits, phone logs and more. The data is stored in large data warehouses. The analysis of this data requires highly scalable algorithms that churn through the data looking for common aggregate patterns. Customer understanding is derived from interpreting behavioral patterns. Intentions are then inferred from actions. Finally, the insights gained through Data Mining are represented in the form of 'models' that can be used to score databases and real-time applications.

Market Research Process

Market Research defines the customer as a thinking affective entity where intentions and attitudes are more important than actions. Market Research often defines the 'customer' as a group within the general population. Being freed from the internal corporate database, Market Research is able to explore questions such as competitive-product assessments, intentions to defect and general satisfaction. The data outputs are subjective comments and ratings. The data is often captured in the form of spreadsheets or text files and delivered in the form of written reports. The analysis of this data is a subjective summary of the results and interpretation of meaning across the responses. Customer understanding is gained by linking the attitudes of general population segments to the assumed makeup of a client's existing customer base. Deployment of market research results occurs through presentations to decision makers.

Combining Processes

Combining Data Mining and Market Research will require synergy at each stage of the research process. While the customer deserves to be seen as a thinking and acting entity, combining these disciplines provides the unique ability to analyze the gaps that are known to exist between espoused plans and practice. Thus data capture must expand to include all information, subjective and objective, intentions and actions. The storage of data must come together so that the analysis stage can leverage both. In addition, the analysis stage must leverage new processes that take advantage of the best of both disciplines, including empirical behavioral modeling and qualitative research methods. Finally, the deployment of insight, whether to human or machine, should take advantage of the knowledge gained from both Data Mining and Market Research. Only when a full perspective of the customer is available can holistic conclusions be drawn and the most accurate insight be deployed.

For a more detailed examination of the convergence of Data Mining and Market Research practice, see [Convergent Research Patterns](#) (Kenning Research Inc., 2003).

WHY AREN'T DATA MINING AND MARKET RESEARCH CONVERGED TODAY?

Despite their shared fit within customer intelligence, their commonality of application, and their similarity of research stages, Data Mining and Market Research are still not converged into a unified research environment today. While there are examples of leading companies who have converged disciplines for ad hoc research, systematic convergence has been hindered by several factors. Among the most challenging barriers to convergence are separations between Data Mining and Market Research with respect to organizational structure, culture, and infrastructure.

Organizational Separation

In most organizations today, Data Mining and Market Research operations are housed within different parts of the business. This physical separation hinders interaction and cooperation. Organizational separation also implies that two decision-makers, both tasked with customer intelligence, are operating under different strategies and objectives.

Cultural Separation

The cultural separation between Data Mining and Market Research can be seen from the executive and field level. At the executive level, there tends to be a decision-making culture that is based more heavily on either internal analytics or Market Research. The comfort of decision-makers toward one approach over the other perpetuates the separation of disciplines.

At the field level, there may exist an adversarial relationship between Data Miners and Market Researchers. This atmosphere of non-cooperation hinders the advancement of research.

"Anything where a person's identity is used isn't Market Research, it's spying...We [Market Researchers] are always at risk of getting a bad name from people who mistake Market Research and Data Mining, which is about finding out enough about people to sell them something." President of a Market Research Society

"What we need is not market research, it's more transactional data. It is well known that past behavior is the best predictor of future behavior. Attitudinal research is weak at best." Data Mining Expert

Infrastructure

Today, Market Research and Data Mining rely on separate internal infrastructures. Bringing these two disciplines together will require the integration of technologies that are not widely integrated today. Such technologies include data collection, data management, data storage, data analysis/reporting, and deployment. As well as general applications such as project management and knowledge management.

WHAT ARE THE BENEFITS OF CONVERGING DATA MINING AND MARKET RESEARCH?

Maintaining two separate disciplines for consumer research, Data Mining and Market Research leads to:

- Non-optimized use of available data
- Non-optimized use of new learning
- Redundant treatment of similar research questions
- Sub optimal conclusions drawn when one discipline is used where the other would have been more effective
- Ultimately, the potential for non-optimized intelligence at a higher cost

Organizations that commission Data Mining and Market Research are often rich with data. In many cases, Data Mining and Market Research can be improved with the inclusion of data generated for use by the other discipline. Bringing these two research areas together can lead to the identification of available data, which can be leveraged to derive deeper, more accurate insight.

By not converging these disciplines there is the risk that knowledge gained from one research initiative isn't shared with the other. This can lead to the formation of conclusions that could have been improved by previous learning.

Certainly, an organization would want to avoid a situation where both disciplines are being used in an uncoordinated manner to address the same research question. For example, it is not uncommon for organizations to commission market research agencies to study the issue of customer loyalty, while in another initiative they have commissioned data analysts to develop models of customer retention. This is a good example of each discipline providing a unique and valuable contribution to the research question. Yet, the results will be sub-optimized and more expensive if they are not coordinated.

RECOMMENDATIONS

The convergence of Data Mining and Market Research may not be the best strategic initiative for your company at this time. Only those companies who today are making a significant investment in customer intelligence and market research can expect significant gains from convergent research. If your company collects behavioral and attitudinal data on your customers, has numerous customers with whom you engage frequently, and is under competitive pressure to grow and maintain your customer base, consider the following recommendations.

Determine the Need

The first step toward the development of a convergent research environment at your organization is an internal assessment. Review the following questions with relevant individuals within your organization. Do you commission Market Research and Data Mining today? Are they being conducted separately? Are they being conducted to address similar business questions? Is Customer Intelligence critical for business operations? Can incremental improvements in Customer Intelligence result in significant advancements in business performance?

Test the Readiness

Examine your internal Data Mining and Market Research operations. Distribute this paper and get their reaction. Assess the cultural readiness of your team to adopt a convergent research discipline. Examine the organization structure that houses Data Mining and Market Research. Develop a chart that documents the relationships among those who are pivotal to the research process for each discipline. Identify the cultural and organizational barriers that separate these disciplines. Be sure to document the strengths and supporting relationships as well. Review the technologies each group utilizes to perform its research. Identify the overlap and differences in the required infrastructure. Determine if these information environments be coordinated.

Then, identify all internal consumers of market research and data mining results. Interview these decision makers to understand how they use these streams of information. Ask them how they synthesize this information in their own minds, and what they desire from the research, and assess the potential business benefits from convergent knowledge. Also, identify all non-human deployment of research results, whether these are in the form of scores back into the database or recommendations to real-time operational systems. Assess the potential benefit of improving the accuracy of these scores, even by the smallest amount.

Start Small

While it is important to have a vision of what is possible and how to get there, take one successful step at a time. Pick a small pilot study to measure your internal readiness for the convergent research paradigm. This pilot should test the organizational, cultural, and technological environments. It should also be designed to demonstrate the "lift" generated as a result of convergent knowledge compared with traditional research approaches alone.

Start Strategic

Due to the initial investment in the pilot, choose an application that has high strategic value. Or pick a tactical application that has the promise of high financial returns. Chance are, a successful pilot project will lead to the identification of a larger implementation of the approach. Proving the concept on a highly visible and strategic application will insure greater excitement and buy-in for further progress towards convergent research.

Find Support

All change, no matter how beneficial, is difficult. It will be easy to slide back into the 'old ways' of doing things. Choose a consultant, under a limited and focused engagement, to help you through your internal assessment and to help design a pilot program. Make sure the consultant has experience in both Data Mining and Market Research toward improving customer intelligence.

Share your Success

Find a forum to share the results of your successful initiatives. Not only will this establish you and your organization as innovative and adaptive, it will foster the development of a supportive community of like-minded contemporaries who will challenge each other to grow and refine the discipline of convergent research. Start now and you can develop and maintain a convergent research practice as your competitive advantage.