Rethinking Marketing Research for the Digital Environment

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Abstract

Rethinking Marketing Research for the Digital Environment

Marketing research, as we know it, is on the verge of a major transformation brought about by rapidly evolving digital technologies, such as online survey methods, data mining tools, web server log files, and 3-D graphics software. In this paper, we use examples from leading-edge practice to summarize how various digital technologies are enhancing marketing research. We also articulate how current developments will alter the nature and scope of the marketing research function.
1.0 Introduction

Marketing research is a function that provides management of organizations with information used to identify and define marketing opportunities and problems; generate, refine, and evaluate marketing actions; monitor marketing performance; and improve understanding of marketing as a process. (Adapted from the definition provided by American Marketing Association, Marketing News, January 2, 1987). Increasingly, many new digital technologies are being integrated into the marketing research process, including point-of-sale UPC scanners, frequent shopper programs, credit/debit cards, in-store tracking, caller-id systems, electronic shopping interfaces, and most importantly, the Internet. The theory and practice of marketing research are on the verge of a major transformation brought about by the acceptance and use of these technologies, particularly the rapid growth of the digital medium (Kannan, Chang and Whinston 1998). While much of this transformation is yet to take place, experiences of some lead users of marketing research in this medium is pointing to concepts and methods that we will see in common use within the next few years. In fact, we believe that few aspects of marketing research will be left untouched by the digital medium. Our objective for this paper is to provide a framework for understanding current developments, and to articulate some long-term consequences of these developments. We believe that managers must understand the assumptions and the tools of the digital medium and develop the skills to generate and apply research insights to resolve business problems in this environment.

Collectively, digital technologies have resulted in an explosion of data on customers and their purchase behavior. In particular, online data collection and retrieval systems have opened the door to volumes of secondary research on market trends and the competitive environment. Syndicated databases now provide detailed information on the buying habits of individual
households. Online surveys have simplified, and in many cases, improved primary data collection. Virtual reality simulations now allow marketers to test new marketing ideas quickly and inexpensively. The task of analyzing marketing data is no longer relegated to research specialists. We have seen major enhancements in software for data management, visualization, simulation, and communication. Increasingly, managers are using networked desktop computers, and data analysis and data mining software to process information.

We have also seen the Internet grow from a sparse network used by academics and the defense establishment into a major commercial network that connects millions of customers and firms. A primary reason for its impressive growth is that the Internet generates a number of benefits for its users by facilitating the convergence of computer and communication technologies through the use of common standards for connectivity and information transfer between digital appliances, such as computers. This “democratized digital connection” has the potential to transform marketing research by enabling higher bandwidth information transfer than is available through a telephone connection, faster access than is available by traditional mail, higher interactivity than TV or cable, and longer shelf life than print. It also facilitates unlimited reproducibility, greater perceived anonymity, higher degree of customization, cheaper means of reaching dispersed target segments, and the archiving, searching, and retrieval of vast amounts of information.

In the next Section, we summarize current developments. In Section 3, we highlight what we believe will be the far reaching implications of these developments on the field of marketing research. Section 4 concludes the paper.
2. Online marketing research: A view from the leading edge

Traditional marketing research consists of several stages: (1) Identifying and clearly specifying the decision problem(s) that will be impacted by research data, (2) Developing an overall research strategy, (3) Designing data collection methods, (4) Understanding and interpreting research data, 5) Recommending courses of action to resolve the decision problems, and 6) Participating in the implementation and evaluation of selected actions.

Digital technologies impact all stages of marketing research. However, we will primarily explore the third and fourth stages, which have been affected the most so far by the digital medium. In traditional marketing research, it is common to categorize research data into two types: Primary data and Secondary data. Primary data is collected for the purpose of a specific research project, and involves obtaining data from respondents. Secondary data are data that already exist, collected for reasons other than the specific project of interest. Digital technologies, particularly the Internet, has completely altered the potential value of secondary data, and significantly enhanced the relative merits of traditional primary data collection methods. We explore these two developments in greater detail below.

Online secondary data: An impressive aspect of the Internet is that most of the information on the Net is searchable! There are several free “search engines” on the net, such as Excite, Alta Vista, Hotbot, and Yahoo!, that catalog the information contained at the majority of web sites. These catalogs (actually, databases) can then be searched using flexible search techniques. It is important to note that one does not search the Internet per se when using a search engine. Rather, one searches the customized database of the Internet catalog developed by that search engine. While most readers are likely to be familiar with the general search engines like Yahoo, AltaVista, and Excite, there are also several other search engines with
unique features. These include MetaCrawler (www.metacrawler.com) which can simultaneously search using multiple search engines, Google (www.google.com), which is designed to retrieve the most relevant Web information, and Northern Light (northernlight.com), which searches over 120 Million Web pages and a special collection of more than 5,400 full-text sources.

The cost of search technology has dropped rapidly in recent years. It is now feasible for a web site to provide its own search engine to help users find information available only at that site (e.g., New York Times - nytimes.com). There are also search engines (“agents”) that can collect information from a specified set of participating sites and dynamically create “virtual databases.” Price search agents (e.g., Junglee) represent one such category of search engines.

HTML and related standards provide uniformity to Internet documents, making it possible to display information through a familiar interface, namely, the browser. As a result, even such traditional purveyors of information as Lexis-Nexis and the US Census Bureau have adapted to the Internet. Lexis-Nexis contains the full text of 22,000 major publications dating several years – magazines, Newswire reports, and even TV program transcripts. In addition to standard search techniques (e.g., use of “And” “Or” and “Not” prefixes in search strings), with full text, one can do positional searches (e.g., online “within 10 words” of marketing research). Even the order of words in a search string can be specified (e.g., “Venetian “before” blind, rather than blind “before” Venetian). While Lexis-Nexis charges its clients for access, Government agencies such as the Census Bureau provide free data and reports that can now be accessed via a browser. Soon, most syndicated data sources (e.g., those provided by firms such as IRI, Nielsen, etc.) will all be available online, accessible with nothing more than a browser software. Here are some examples of secondary data sources useful for marketing managers:

♦ **Company information:** Detailed company information is available from several Internet web sites. A good source of information about public companies is the U.S. Securities and
Exchange Commission (www.sec.gov). The SEC has set up the EDGAR database (the Electronic Data Gathering, Analysis, and Retrieval system), which archives most forms filed by public companies. Its primary purpose is to increase the efficiency and fairness of the securities market, but it is also a valuable source of marketing data. For example, by searching the database for a company's most recent form 10-K, you can often find more detailed information than what is reported in the company's annual report. Another government source is the U.S. Patent and Trademark Office (www.uspto.com). The USPTO database allows you to search for patents and copyrights held by a company, which can suggest a firm's future business directions.

There are also several private sources of company information, including NewsEdge (www.companylink.com), the Wall Street Research Net (www.wsrn.com), and Hoovers Online (www.hoovers.com). In most cases, these services provide free access to recent news stories and other public information about companies, but charge for more detailed reports based on proprietary research studies. Another helpful site is CEO Express, which offers convenient access to most business magazines and news sources (www.ceoexpress.com).

♦ Consumer information: There are also a growing number of sites which provide detailed consumer information. The mother lode of consumer data is the U.S. Census. Through the U.S. Census Office's web site (www.census.gov), you can access information on over 60 individual and household characteristics, including age, education, income, occupation, education, age and value of home, telephone availability, etc. The data are available for the entire U.S. population, aggregated from the individual block group, up the census tract, zipcode, county and state levels. The U.S. Bureau of Labor and Statistics (stats.bls.gov) provides up-to-date information on employment.

Many of the traditional syndicated services, such as Mediamark (www.mediamark.com) Arbitron (www.arbitron.com), and USA Data (www.arbitron.com) allow you to download consumer data directly from their web sites. Other sources of customer data include Demographics Magazine's searchable archive of articles (www.demographics.com).

♦ Information about the Internet: As an important medium, the Internet is also subject to a lot of information gathering, which are available from several source. Web sites such as www.cyberatlas.com, www.pandesic.com and www.iconocast.com provide links to a substantial amount of information about all aspects of the Internet and its various uses. Information on Internet users, their demographic and psychographic profiles, their use of online purchasing, the amount of money spent on web advertising, and information on a host of other aspects are available for free online. Likewise, Internet companies such as Netscape and Amazon.com, provide a substantial amount of information about their operations at their sites, which are updated frequently.

Another source of online secondary data is the archives of news groups. The Internet is home to numerous interest groups in a wide range of areas, such as new product development, gardening, movies, and amateur astronomy. Discussions between members of these groups are
typically archived and available for later access to members. Some groups have restrictions on who can become members. For example, Interval Research’s Purple Moon site (www.purple-moon.com) is a highly successful private community for preteen girls. To become a member, parental consent is required – parents must provide e-mail address or call the company on the telephone. In other cases, companies that run their own forums do not typically make available to members all the information that they gather at their sites. For example, Adobe (www.adobe.com) is able to capture detailed user information from its support site: How many people visited the Photoshop forum last month? Who were the most frequent visitors? What did they say about Photoshop and competing products? This data is theirs to analyze and put to work toward their business, and not all data are made available to members. However, most groups have few restrictions on who can become a member (they do have restrictions on what types of behavior are acceptable). Marketing researchers who become members of these groups can often get valuable information, such as getting a pulse on important trends and identifying emerging product problems. In addition to sometimes getting actionable information, participation at these sites allows researchers to anticipate research studies that would be useful to their firms.

As secondary data become easier to access, search, display, use, and share, there will be greater use of these data. The common misconception that secondary data are second hand and dated is even less true in the digital world. In fact, on the Internet, considerable amounts of useful secondary data are readily available, much of it for free. One can find something about everything. The fact that the Internet is a global phenomenon adds further value as a source of secondary data. In many cases, data about distant markets are easier to get online than by any other means.
A major cost associated with online secondary data is the user’s time, which can, in many cases, be very expensive. Therefore, the value of online data depends on the search strategies used by the user. Poor search techniques will generate much useless information, and become a time drain. A further danger is that ease of information retrieval distracts the user from focusing on the quality of the information. Because of these limitations of online secondary data, many search engines now attach an “index” value (e.g., on a scale of 0 to 100) to each site that matches the search string, to indicate how well information at a site matches the information requested by the user. Some search engines (e.g., Yahoo!) do an extensive analysis of every web site before including a site in their databases. This assures that only the best sites covering a topic are included in search results (this can be detrimental when one is doing an “exploratory” study). Other search engines (e.g., Hotbot.com) list search results in the order of frequency of visits to those sites by their users. This is an interesting new application of marketing research – the firm uses information on search effectiveness, generated at its own site, to improve the product it offers. This strategy is akin to Amazon.com’s use of “collaborative filtering” technology to recommend books to a customer, based on what other books were purchased by other customers, who also purchased the same book.

**Online primary data:** An important reason for the growing interest in online primary data collection is that it is cheaper and faster (but, not necessarily better). For example, Greenfield Online can conduct an online focus group study and deliver a report in five days or less. Likewise, web surveys can be conducted in 20 days or less at a cost of between $10,000 and $20,000 (the actual price depends on the complexities of skip patterns and question rotations).
The primary data collection methods typically used in traditional marketing research are: (1) in-person interviews, (2) focus groups, (3) telephone surveys, (4) mail surveys, (5) observation methods, and (6) lab and field experiments. The advantages and limitations of these methods are well documented (see, for example, Malhotra 1993). The Internet is beginning to influence all these methods, some in significant ways, with the possible exception of online personal interviews, which had low usage. Online surveys (e-mail and web surveys), focus groups, experiments, and observation methods have now been in use for several years. Observation methods, in particular, have had a big boost because web sites keep track of many of the activities that customers do at a site. In the rest of this section, we will summarize the early experiences in the use of online primary data collection methods.

Online surveys: Many firms have begun to experiment with online surveys. Current experience suggests that online surveys represent a compelling alternative to traditional methods. We summarize vignettes of a few experiments that have compared online and traditional survey methods.

♦ Socratic Technologies did a side-by-side comparison of telephone and Web-based research for a software company. Overall, the findings from the two surveys were very similar. Almost identical results were obtained for awareness, use of features and functions, importance of features and functions, interest in new features, and general demographics. However, there were differences in repurchase intent and satisfaction. First, Web based respondents tended to have more extreme opinions regarding satisfaction (Socratic reports this as a general tendency among online respondents). Second, for purchase intent, Web-based respondents are less likely to give yea-saying answers. Socratic reports that Web-based purchase intention results were more closely related to actual behavior. Another major difference is in the amount of data collected with the same budget. The marginal cost of data collection online is almost zero!

♦ Quaker Oats conducted a study with M/A/R/C Online for rice snack. The company had been doing traditional awareness, attitude and usage study for past 9 years, but was evaluating whether to move these studies online. Along with an online survey, they did a mall intercept study, to maintain comparability with earlier results. Online data was collected using AOL’s Opinion Place. An elaborate screening system was designed to qualify respondents, who were awarded 250 points (monetary value about $2.50) for their participation. In regard to the findings, the demographics of the mall sample mirrored that of the online sample. The
results were essentially the same in the two samples (there were some minor differences due of the particular choices made for collecting the online data). There were, however, more “Don’t Know” responses online (greater frankness is how many seem to explain this recurring result). The company got three times as many online respondents as in mall sample, for equal budget. The additional sample size online allowed the firm to examine sub-segment level behavior in greater depth.

A high-tech toy firm conducted a web-based concept testing and conjoint study. They also compared their web survey results with the more conventional disk-by-mail (DBM) method. The response rate was higher for DBM. There were nearly identical results in the two samples regarding the skills that result from the toy, and with regard to feature assessments. The purchase intent scores were less online (less yea saying?). But, across concepts, the rank orders had very high correlation between the two methods. The conjoint part-worths were also highly similar, as were simulated market shares for the concepts. One difference was a slightly higher price sensitivity for the Web-based sample. The web surveys were faster, afforded greater flexibility, and were much cheaper.

Based on the above examples, and others that we are familiar with, we have developed Exhibit 1 to summarize the relative positions of various online research techniques along several dimensions. In Exhibit 2, we summarize how the costs and benefits of online versus offline marketing research stack up for conducting concept tests. Consider the case of a print magazine for teenagers that wanted to test alternative cover concepts quickly. They used a panel from an online research company who found them 300 respondents that matched the readership criteria. Respondents were sent an e-mail, invited to a Web site, where they saw the alternate concepts and reacted to those concepts. Responses started arriving within 15 minutes of mailing the participation request (several other researchers have reported such rapid response rates). Most of the responses were received within 24 hours. The client then made changes to the cover, re-invited the respondents, and got new responses. This sequence of feedback was repeated 3 times in 5 days, with a total research cost of under $6,000.

Compared to traditional research methods, online research methods typically allow much greater physical separation between respondents and the researcher. Also, the cost per respondent is typically lower online than offline, especially for reaching professionals such as
MIS executives and physicians. Finally, the online medium is particularly suited for certain types of survey research that can take advantage of the interactivity and tracking ability of the medium. For example, bizrate.com has developed technology for conducting a point-of-sale customer satisfaction survey immediately after a customer makes a purchase at an affiliated site.

A major cost of all online surveys is that the sampling frame is limited. Further, there is no master list of all those with Internet access, as there is with telephone numbers (note also that there is no online equivalent to Random Digit Dialing). Most people still do not have Internet access (current estimates are around 25% of the population). Thus, a major concern with online research is that Internet users may not be representative of the general population. The Internet has traditionally had a disproportionate number of male users with higher than average levels of income and education. While this group may be appropriate for research on some topics, such as web site content, communication technologies and computer products, it does not match the target demographic of most consumer products and services.

Fortunately, the characteristics of Internet users are changing quickly. Low priced PCs are being purchased by a growing percentage of lower- and middle-class households (Briones 1998). IntelliQuest reported that the percentage of online users without a college education jumped from 54 percent in the second quarter of 1996 to 64 percent in the first quarter of 1999. Online households with average incomes below $50,000 increased from 40 percent to 45 percent during the same period. The Pew Research Center reported that 23 percent of those who have gone online in the previous year make less than $30,000 per year. According to a March 23, 1999, report by the Yankee Group, the household Internet penetration rate in the U.S. is now at 25 percent, and should be close to 67 percent by the end of 2003. Overall, it appears that differences between the online and offline populations are narrowing (see, for example, the
sequence of GVU survey results at www.cc.gatech.edu/gvu/user_surveys). Because the chances of getting non-representative samples are high online, researchers have developed several ways to address this problem. This includes the following tactics:

♦ **Select samples from a panel**: Many online research firms, such as Greenfield Online and Cyber Dialogue, have established large panels that have been pre-selected to be representative of the online population. These research companies can select samples from these panels to meet the needs of specific studies. Another advantage of panels is that the typical problem of online surveys, namely, “respondent authenticity,” is no longer an issue. However, panels cost money to maintain, and this reduces some of the cost advantages of online research.

♦ **Adjust online research results**: Some research firms are developing proprietary weighting schemes to adjust online research results to account for known demographic differences between the online sample and the composition of the desired target population. This might, for example, involve over-weighting the responses of females and under-weighting the responses from males. The appropriateness of these weighting schemes has not yet been evaluated carefully.

♦ **Pre-qualify respondents through e-mail solicitation**: This reduces self-selection bias, which occurs when web surfers happen to come across a web survey and choose to fill it out. Further, e-mail solicitation costs only a fraction of mail solicitation. However, unsolicited e-mail is not viewed favorably by the online community. As a result, this may not be a viable long-term option to improve representativeness of samples.

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1 A web survey is designed using HTML and is posted at a web site. For examples of such surveys, visit: www.gvu.gatech.edu/user_surveys.
♦ *Put links to the web surveys at popular Internet portals (e.g., Yahoo!, America Online, etc.):* While this is likely to ensure a good sampling frame, there is still the problem of response bias. The people who choose to click on these links are likely to be systematically different from those who do not. Clickthrough rate for banners and other links is less than 1% even at major portal sites.

♦ *Offer incentives for participation:* In the online medium, it is particularly easy to administer incentive programs, such as frequent flier miles. For example, respondents can be offered points or free gifts for participating in the study. However, without proper safeguards, it is also easier for respondents online to misuse an incentive program by repeatedly filling out the surveys.

In spite of these tactics, there will always be questions about the representativeness of online samples until most people have online access. It is wise to remember that it took more than 30 years after the first telephone interviews were conducted for it to become a common research method.

**Online Focus Groups:** A focus group, or group interview, is an exploratory research method used to help companies gain a deeper understanding of customers' needs and wants, shopping habits, decision criteria, and reactions to new marketing ideas. Focus groups bring together six to twelve participants in an informal setting to discuss their attitudes, perceptions, motivations and desires. An interviewer moderates the discussion based on an outline provided by the client. The group discussions usually last from one to two hours. The discussion is audio- or videotaped, and then transcribed, coded and analyzed at a later time.

Focus groups have several benefits. They can collect in-depth, qualitative research in a short period of time and at a relatively low cost. It's possible to use physical props and audio-
visual materials when testing consumer reactions to new products, packaging, promotions and advertisements. Focus groups allow clients to interact with current and prospective customers, tailoring the line of questioning based on the flow of the discussion. The videotaped interaction provides information on both the verbal and non-verbal reactions of participants. Of course, focus groups also have limitations. They are based on a convenience sample of respondents, so the results cannot be generalized to the population. Another concern is that the dynamics of the group discussion can bias the responses of individual participants.

Two technologies are having a significant impact on focus group research. The first is videoconferencing. Rather than having the client travel to a focus group facility and observe the discussion firsthand, the session is broadcast to a remote facility (often the client's office) where people can observe the live proceedings over a television. This saves clients the time and cost of traveling to distant locations, and allows them to participate in a greater number and more geographically diverse set of focus groups. Unfortunately, the picture quality of videoconferencing is inferior to face-to-face interaction because of limited resolution and time delays in signal transmission. The hardware and software costs for group videoconferencing can run into the tens of thousands of dollars. Long-distance telephone charges for ISDN connections are several times more expensive than audio connections. Finally, videoconferencing limits the degree of interaction between the client and the focus group moderator.

The second technology transforming focus group research is Internet "chat" software. Instead of coming to a physical focus group facility, participants join an online group by visiting a secure web site using their home or office computer and a web browser. The chat software allows the focus group moderator and each participant to type messages into a scrolling window and see the responses of the other participants. People are typically recruited from selected
Internet locations, such as newsgroups and forums, but can also be enlisted through online banner ads or telephone solicitation.

Online focus groups have several benefits. They are convenient for both clients and respondents, saving travel time and cost. The chat software automatically logs the interaction, permitting immediate distribution and analysis of the data. Online focus groups are very effective in bringing together people from different parts of the country, especially those in higher income brackets, and work particularly well when the subject is personal or sensitive (Weissman 1998). However, these groups also have limitations. The technology limits the interaction between respondents. The chat software typically provides a text-only interface, so it is not possible to show props, listen to voice inflection, or observe the facial expressions and body language of respondents. Typing skills are necessary (although respondents are asked to ignore typographical, grammatical and spelling errors).

In the future, as video cameras, full-duplex (simultaneous two-way) audio, and high-bandwidth Internet connections become common in home computers, we are likely to see more sophisticated versions of online focus groups, providing the rich interaction of videoconferencing with the convenience and low cost of chat software. It is also likely that this technology will incorporate multimedia and 3-D capabilities, so we can measure respondents reactions to new advertising, promotion, product and packaging concepts, as in conventional focus groups.

Experimentation and simulation: It is important to recognize that that Internet is not the only aspect of the digital environment that is changing marketing research. Other innovations, such as 3D graphics, kiosks, and infrared tracking systems are also increasingly being deployed in improving marketing research methods. In this section, we highlight the use of these technologies to facilitate marketing experimentation.
Computer-Simulated Test Marketing: One of the areas where technology has improved both the efficiency and effectiveness of marketing research is in test marketing. Test markets are often used at the final stages of product development to provide accurate estimates of consumer demand. They can also be used to evaluate new package designs, pricing strategies, advertisements, promotions and merchandising. While conventional test markets are slow and expensive to conduct, innovations in 3-D computer graphics and virtual reality have made computer-simulated test markets practical for a wide range of applications.

We use a new product test as an example. In a conventional test market, a company would produce a sample run of the new product, introduce it into a typical midsize market, and track sales using point-of-sale scanner data, warehouse withdrawals, and/or product shipments. This methodology has several benefits. It tests the new product in a realistic competitive context with a representative group of consumers and provides objective measures of marketing performance (e.g., sales and market share). Unfortunately, such research often takes six months to a year or more to complete and can cost millions of dollars. Test markets can evaluate only a limited number of options and can be monitored and disrupted by competitors.

This has led many firms to search for an alternative approach that provides the realism and accuracy of a test market with the speed, flexibility and low cost of laboratory research. A variety of Simulated Test market (STM) services have been developed, including Assessor, BASES, Discovery and ESP. While these services differ in terms of sampling, questionnaires and modeling, most share a common test procedure of exposing consumers to a new product or marketing program in a simulated shopping environment. In some methods, the manufacturer's product and competitive offerings are shown in a
photograph or slide presentation. In others, consumers shop from an actual shelf fixture
stocked with products. In either case, the creation of the simulated store is cumbersome, time
consuming and costly, especially when the simulation involves a large number of products,
categories, manipulations and/or data-collection sites. When the stimulus presentation does
not match the physical store, category-specific calibrations must be applied to the forecasting
models to achieve acceptable levels of prediction.

In the virtual shopping simulation, 3-D computer graphics are used to recreate the
appearance of a grocery shelf on touch-screen monitors or head-mounted displays (Burke
1996; Burke, Harlam, Kahn and Lodish 1992). Shoppers can pan down the aisles of the store
using a 3D trackball, “pick up” products by touching their images on the screen, and rotate
packages and magnify labels for closer inspection. To purchase a product, the consumer
touches an image of a shopping cart and the package would fly into the basket.

The simulation offers several advantages over existing methodologies. It provides the
realism and visual clutter of an in-store experiment while delivering the control and process
tracing measures of laboratory research. The computer unobtrusively records the amount of
time consumers spend shopping in each category, the items they pick up, the amount of time
taken to examine individual packages and labels, as well as the quantity of items purchased.
Consumer behavior in the virtual shopping simulation has been found to closely mirror
behavior in the physical store (see Burke 1996; Burke et al. 1992). Since the new products
are being simulated by the computer, testing can occur at an early stage of the new product
development process, before manufacturing costs have been incurred.

Unlike most other laboratory research techniques, including focus groups and concept
tests, the virtual shopping simulation does not force customers to examine the new product,
package, promotion or merchandising being tested. Instead, shoppers can selectively attend to the products and promotions they are most interested in, just like in the conventional store.

The importance of selective attention becomes apparent when you compare data from the virtual shopping simulation with data from a traditional concept test (where respondents rate their intent to purchase on a 5-point "not at all likely to purchase" to "definitely would purchase" scale). Using data from 22 new product tests, the first author found that the concept test scores (top two box) had a significant, positive correlation with the consumer's likelihood of buying a product once he or she had picked it up from the simulated store shelf ($r = 0.58$, $p < 0.005$). However, the concept test scores had no significant relationship with the consumer's likelihood of picking up the product in the first place ($p > 0.10$). It appears that while concept test scores can give a good indication of the appeal of a concept once consumers have noticed the product, they do not predict the product's ability to stand out from the visual clutter and attract the consumer's attention.

Virtual shopping simulations have been used in over 130 commercial studies. One of the first applications of the shopping simulation was conducted by the Goodyear Tire and Rubber Company (Rickard 1993). Goodyear was planning to extend its tire distribution beyond the traditional Goodyear stores to include general merchandise and mass merchandise stores. The company wanted to evaluate the equity of the Goodyear name in these new channels and identify the most profitable pricing and warranty options. The research asked over 1,000 respondents to shop in a series of simulated tire stores where the prices and warranty levels of the various brands were systematically manipulated. Separate simulations were conducted for conventional, performance and light-truck tires. Although the virtual shopping study took somewhat longer than a conventional in-mall consumer
survey, it was much faster than conducting a field experiment and achieved very high levels of consumer participation. Goodyear was able to measure the price and warranty self- and cross-elasticities for all major brands of tires. Ron Conlin, Goodyear's manager of marketing planning and research, noted that, "[the virtual shopping system] established realism in the retail environment and gives the marketer total control" [Rickard 1993].

Many applications of the virtual shopping simulation have been in the consumer packaged goods area. For example, Frito-Lay, a unit of Pepsico, has used the virtual shopping simulation to examine the impact of end-of-aisle displays and on-shelf advertising on the sales of snack foods. It has also simulated a vending machine to measure consumers' likelihood of switching between salty snacks and candy bars, cookies, crackers and fruit under reduced assortment conditions. Keith Carter, director of international market research for Frito-Lay noted, "It's as close to a real shopping experience as you can get—short of doing something in the store" [Feder 1997]. Johnson & Johnson's advanced care products division has used the shopping simulation to help price Uristat, a pain killer used for urinary diseases.

♦ **Kiosks and Electronic Shelf Labels:** While advanced 3-D graphics allow us to conduct computer-simulated test markets in the laboratory, innovations in retail technology are making it easier to conduct experiments in the physical store. For example, the Swedish firm Pricer has developed wireless, electronic shelf labeling which uses liquid-crystal displays (LCDs) to show the names and prices of merchandise. The information displayed on the signs is electronically transmitted from the store's central computer, which also feeds prices to the checkout registers. Therefore, the prices shown on the shelf tags are always consistent...
with the prices scanned at the register. Since the prices are controlled electronically, they can be changed quickly, allowing retailers to conduct pricing experiments.

Kiosk technology is also being used to test the performance of marketing programs. For example, Interact Systems has installed touch-screen kiosks in several major retail chains. When a shopper inserts a "frequent shopper" card into the kiosk, it displays a customized set of products and store specials based on the customer's past purchases. Different offers can be targeted at matched groups of customers. When the shopper presents his or her frequent shopper card at the checkout counter, the system automatically deducts the promotional discount from the order. The kiosk and checkout registers are linked, so we know what percentage of the shoppers who were exposed to an offer went on to redeem it.

**Online observation methods: Web site measurements:** A web presence allows marketers to track what visitors do at a site. At the minimum, all web servers allow measurements that conform to the “common log format.” Every activity of the visitor to a site generates one or more “requests” for information from one or more servers (some of these servers may belong to other firms). Each page viewed by a visitor to a site may generate multiple requests for files—sometimes a separate request is generated for each icon on the page. The common logs contain the following information, and are useful for generating aggregate site statistics:

- Host name or IP address of the computer making the request to the server
- User name registered on the computer making the request (seldom used)
- User name on the local web site making the request (if the reader logs into a secure area of the web site)
- Time stamp - the date and time of the request
- Request - the actual HTTP request, including the names of the files requested
- Status code - the code for the resulting success or failure of the request
- Transfer volume - the number of bytes sent to the reader's browser as a result of the request.
A major problem in using the common log data for marketing purposes is that there is no continuity to the data recorded by the server. Because the Internet is stateless, each request is transacted between the client and server separately and recorded as separate entries in the log file. Note also that each request may take a different network route from the client to the server. In general, it is difficult to determine from the common logs the identity of the user, and even whether the requests are associated with the same user session. To overcome this problem, some servers incorporate more sophisticated approaches:

- The server generates and appends a time-stamped “cookie” (a unique identifier) to the client. The client browser sends the cookie along with each request it sends to the server – this exchange of cookie information between the client and the server helps maintain continuity during a session. The server also appends the cookie ID to its logs, thereby enabling the web site to track the sequence of activities undertaken by a user during a session. Cookies do not typically permit data from different sessions to be linked together in a coherent manner. Cookies are also specific to a server, which means that it is difficult to use them to track users as they move from one server (e.g., web site) to another. However, some companies, such as doubleclick.com, have developed technologies so that they receive information from affiliated sites each time any of these sites receives a cookie from a user. This allows these companies to track the cumulative number of (banner) ads that a user is exposed to across visits to different sites over many sessions. Note that the user name or registration is not required for the cookie-based approaches to work. All that the server needs is a unique cookie ID.

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2 These methods have generated considerable interest among both marketers and privacy advocates. The privacy issues will be hotly debated in the coming months, especially with regard to the types of information that are collected unobtrusively at a site, and how such information is used.
The server appends an ID to the URL that it sends back to client, creating a “virtual page” just for that user. Using this ID, the server then keeps track of requests made by the user during a session, in a manner similar to that of cookies.

The site requires users to register before they get access (e.g., travelocity.com). This is the most reliable method for tracking customers across visits to a site.

Log files can be summarized to facilitate decision making, particularly to improve site design. Exhibit 3 summarizes the various measures and data that online marketers can use to enhance their understanding of how their online marketing tactics influence customer decision making. From Exhibit 3, it is clear that log files (suitably decoded and combined with other data sources) could be a rich source of information to drive marketing decisions.

In spite of a number of the rapid developments in tracking web site traffic, we are now only at the early stages of understanding how best to use these types of data for driving marketing decisions. We need more research to find improved methods to link web site data to marketing decisions and outcomes, and to identify other types of data that would also be useful to online marketers. For example, it would be useful for marketers to have data on online g across competitive sites, much like traditional scanner panel data. Doubleclick.com is attempting to generate data of this type. It is also becoming increasingly important to segment customers based on the “patterns of search” they undertake at web sites -- for example, the sequence in which they view various pages at the site and the specific items they search. From a practical perspective, such segmentation can be very useful to marketers, because it enables them to recognize a potentially adverse search sequence early in the process and “intervene” to offer helpful tips, thereby increasing the odds that a sale will result from that customer. For example, if the beginning elements of a search sequence indicate that the customer is likely to be confused
by the product options, automated agents can selectively provide information only for products likely to be of interest to that customer. In the digital environment, it will become increasingly important to do this type of “just-in-time” marketing research.

3. Online marketing research: A view of the future

In the short term, the new technologies discussed in the previous Section will make it faster, easier, and cheaper to conduct marketing research studies. This will enable small firms to begin using research to augment managerial judgment, and larger firms to extend their marketing research budgets to test more ideas in less time. These developments point to the beginning of a long-term transformation of marketing research. Just as survey research methods developed in the thirties revolutionized the theory and practice of marketing research (see, for example, Converse, 1987) the digital medium will have comparable impact in yet again transforming marketing research. We see the following major trends:

♦ Customers will become an integral part of the marketing planning process. As an example, consider how the educational division of Texas Instruments (TI) has used its web site (www.ti.com/calc) to establish links with potential customers in schools across the country. The company developed the highly successful TI-92 calculator by getting customers closely involved in the product’s development. TI posted the proposed specifications of the product at its web site, and offered an online demo simulating its functionality. It then invited feedback from members of various discussion groups devoted to education. Based on the feedback, major changes were made to the product, which led to further dialog with its online community of “marketing research respondents.” The continuing dialog with these participants was instrumental in making many enhancements to the product. When the calculator was introduced, the final specs were also put on the web site. This offered a simple
way for teachers to download documents to develop proposals to their school boards for purchase of these calculators. Other companies such as Netscape and Microsoft have also mastered the use of the digital medium to continuously engage their customers in generating new product ideas, and in designing and evaluating product features.

In some cases, the link between research and product development is especially strong. Consider, for example, companies such as Dell and Paris Miki’s (one of the world’s largest eyewear retailer). Dell allows customers to design “their own computer” by selecting product options listed at their web site. It then custom-produces a computer with precisely those options. In this process, the company collects considerable useful information about customers’ preferences for various product options. Likewise, Paris Miki’s uses multimedia technology to more closely link customer preferences to its production capabilities. In its retail outlets, a customer can make a digitized image of her face, and try on various virtual frames with different lens shapes, etc. to custom-design a pair of eyeglasses. The selected design is then produced on site using sophisticated production technologies. The approach used by Dell and Paris Miki’s overcomes one of the common problems for which traditional marketing research was developed, namely, not knowing what exactly each customer (or customer segments) will value before the company produces the product.

◆ Marketing research will become responsible for on-going data collection and its use. While there is always a need for one-shot studies, marketing research in the future will be more closely integrated with on-going decision making. Organizations are investing heavily in information technology infrastructure and communication networks to improve their performance and future prospects. Technologies such as UPC scanners and online transactions, and marketing tools such as customer loyalty programs help firms collect data
on a continuous basis at the level of the individual customer. In such environments, marketing research can take on an increasingly important role for facilitating organization-wide decision making (see, for example, Curry 1993; Hughes 1994). Marketing research will become a vehicle for tracking customer loyalty, estimating the lifetime value of customers, building customer relationships, developing cross-selling programs, customizing marketing programs, and enhancing customer retention (Berry and Linoff 1997).

Many organizations now have a new function called Marketing Information Systems (MkIS), which is charged with harnessing marketing-related information and distributing and facilitating its use within firms. As research becomes an integral part of running a business, data and insights will be needed on a just-in-time basis for large and diverse sets of people working on different projects. If marketing research can be deployed in this way, it may even display the “increasing returns to scale” that seems to characterize digital assets -- the more the research is used, the more value it generates, and the more secure its role will be within the firm.

Consider, for example, how Wal-Mart uses sophisticated database and decision support tools to help its store managers improve store performance. Its core software contains over 30 million lines of proprietary code, which allow the company to determine the profit (or loss) on each one of 65 million shopping baskets purchased every week at its 3,000 stores in seven countries (Information Week, December 9, 1996). By enabling continuous tracking of the sales of each item at each store, the system allows managers to manage the product mix, expedite price changes, plan promotions, etc. This type of “continuous data-based research” will become more prevalent in more firms in the near future. Even one-shot studies can take advantage of this continuous data collection. For example, MCI developed
its popular “Friends and Family” program by analyzing the calling patterns of its customers and finding that most households call at most 12 different telephone numbers on a regular basis.

As we look further ahead, technology supporting individual-level data will allow us to do research in fundamentally different ways. To highlight the evolution in marketing research, consider a typical marketing research project being conducted today. A company commissions a study to help identify opportunities in a new market, profile the most attractive customer segment, and design a new product and marketing program to appeal to this group. The steps might include (1) taking a representative sample from the total population, (2) conducting focus groups and survey research to identify consumers’ needs and wants, (3) identifying the largest and most profitable segment, (4) designing and testing alternative marketing programs with the target segment using concept tests, in-home use tests, field experiments and test markets, (5) selecting the program that scores best, and (6) mass-marketing this program to the target segment. Throughout this process, statistics are used to estimate the likelihood that the consumer attitudes and behaviors observed in the sample will generalize to the population.

Using digital technologies, firms may take a very different approach. They can: (1) gather information from a variety of sources on the entire population of customers, (2) use geographic, demographic, life stage and purchase information to infer customers' needs and wants, (3) measure the value and responsiveness of each individual, (4) tailor marketing programs to unique customer requirements, and (5) continue to track customers' characteristics and behavior over time, making appropriate changes to the marketing mix where necessary.
The newer approaches provide several benefits over traditional project-based marketing research. They treat customers as individuals rather than averages, so their unique needs and wants can be better satisfied. Marketing research becomes an integral part of managing customer relationships. Manufacturers, retailers and service companies are directly involved in analyzing and interpreting customer information, rather than delegating the task to outside consultants. The data are dynamic and timely, providing continuous feedback on the performance of marketing decisions. The focus is on optimizing the entire set of marketing mix variables, rather than addressing one element at a time. Because the data are collected on the entire population, issues of sampling and statistical estimation become less important. Finally, using individual-level analysis, companies are increasingly able to customize their marketing activities through catalogs, direct advertising and promotions, on-line systems, customer service, store- and customer-specific products and planograms, information kiosks and electronic shopping assistants.

To realize this vision, we will need powerful information systems to collect and analyze individual-level data, and the ability to customize marketing programs. Database marketing companies have already made significant progress integrating public sources of customer data (including census data, birth records, bankruptcy and divorce proceedings, real-estate transactions, motor vehicle registrations, and driver's license information) with private data sources (such as point-of-sale data, credit/debit card and ATM transactions, telephone billing information, membership lists, home shopping activities, electronic ticketing, etc.; see David Shepard Associates 1995).

- There will be increased use of controlled experiments: The digital medium facilitates, and often demands, continuous experimentation. In the digital medium, the real world serves as
the laboratory, and offers much higher levels of control at lower costs than is the case with the physical medium. For example, it is a simple matter for online stores to change prices (if required, only for selected consumers) and determine the impact of this change on sales. The digital medium also offers the potential for constructing much richer and more interactive stimuli for experimentation. This is particularly useful for new product testing using such techniques as information acceleration (Urban, Hauser, and Roberts 1990), where future scenarios depicting contexts for product use could be presented more effectively.

♦ **New methods and models will be developed for deriving insights from large data sets.**

Companies are now building data warehouses which bring together information from multiple sources, organized in a common format with consistent definitions for keys and fields, and providing input/output facilities for decision support. Data mining, a field of study at the intersection of statistics and computer science, offers a set of tools for extracting “hidden predictive insights” from large data sets, especially when the structure of the data is unchanging but the data elements themselves are continuously changing – as in scanner data. Data mining tools are now being developed to sift through the marketing data to identify patterns and relationships using traditional analytic tools like regression, cluster analysis, and decision trees, and newer technologies like Artificial Neural Networks, Genetic Algorithms, and Bayesian Networks. For more details about some of the newer techniques, see Fayyad and Piatesky-Shapiro (1996).

The ability to manipulate large amounts of customer data and automate parts of the analysis, will be an increasingly important skill required for conducting marketing research in the digital environment. Inaccessible or unusable data serve no purpose. Without the deployment of “intelligent data interpretation agents,” much useful information would be lost.
in cyberspace. There is today an urgent need for developing data mining techniques that
serve the marketing community, and for evaluating the relative merits of alternative
approaches in various marketing research applications.

♦ Marketing research agents will be deployed for automatic data collection: The Internet has
spawned a large number of “intelligent agents” to make it easier for people to use the Internet
for getting information or for completing transactions. An agent is an autonomous software
entity that carries out specific operations on behalf of an Internet user or another software
program, based on specified goals and preferences. There are agents that help search for
specific information (e.g., hotbot.com); agents that compile information according to user
preferences (e.g., pointcast.com); agents that facilitate evaluation of product options (e.g.,
Bargain Finder); agents that recommend products and services (e.g., firefly.com). It is just a
matter of time before we have “marketing research agents” that scour the Internet to do such
activities as gather data from specified sites at specified times, administer questionnaires, and
generate top line reports.

4. Conclusions

Marketing research deals with information, a digital asset. The deployment of all digital
assets will undergo fundamental transformations in the new digital medium. This offers
significant new research opportunities for marketing academics. Specifically, we need to initiate
academic research immediately in several areas: (1) Understanding the changing role and impact
of marketing research; (2) Developing research techniques (or modify existing techniques) for
measuring and explaining how online consumers process information and make product choices;
(4) Developing research techniques for generating data and facilitating managerial decision
making for the digital economy; (4) Developing methods to improve the quality of marketing
research currently being conducted online; (5) Developing improved methods for interpreting
large amounts of transactions data that are generated by online markets.

In recent years, there has been growing skepticism about the role and value of marketing
research in improving decision making. Many managers believe that marketing research often
does not deliver the information that they really need, that it costs too much for what it actually
delivers, and even when it does deliver useful information, it comes in late. The digital medium
offers an opportunity to address these limitations of existing research approaches.
Exhibit 1 shows how various online research methods stack up relative to each other on various dimensions. Simultaneity of contact refers to whether the respondents and interviewer/moderator talk to each other contemporaneously. Representativeness of sample refers to whether the online sample is representative of the online population, not of the total population. Web surveys can be conducted in two stages – solicitation by e-mail followed by a web survey.

<table>
<thead>
<tr>
<th>Method</th>
<th>Simultaneity of contact</th>
<th>Richness of stimuli presented</th>
<th>Depth of Information collected</th>
<th>Degree of interactivity</th>
<th>Customiz-Ability</th>
<th>No. of Respondents</th>
<th>Representativeness of sample</th>
<th>Benefit/cost ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online personal interviews</td>
<td>Hi</td>
<td>Med</td>
<td>Med</td>
<td>Hi</td>
<td>Hi</td>
<td>Lo</td>
<td>Med</td>
<td>Lo</td>
</tr>
<tr>
<td>E-focus groups</td>
<td>Hi</td>
<td>Lo</td>
<td>Med</td>
<td>Hi</td>
<td>Med</td>
<td>Lo</td>
<td>Lo</td>
<td>Med</td>
</tr>
<tr>
<td>E-mail surveys</td>
<td>Lo</td>
<td>Lo</td>
<td>Lo</td>
<td>Lo</td>
<td>Hi</td>
<td>Hi</td>
<td>Lo</td>
<td>Lo</td>
</tr>
<tr>
<td>Web surveys</td>
<td>Lo</td>
<td>Med</td>
<td>Med</td>
<td>Lo</td>
<td>Hi</td>
<td>Med</td>
<td>Lo/Med</td>
<td>Hi</td>
</tr>
<tr>
<td>Observation methods</td>
<td>Lo/Med</td>
<td>Hi</td>
<td>High</td>
<td>Lo</td>
<td>Lo</td>
<td>Hi</td>
<td>Hi</td>
<td>Hi</td>
</tr>
</tbody>
</table>
### Concept Test (20 minute)

<table>
<thead>
<tr>
<th>Concept Test</th>
<th>Production/ mailing cost</th>
<th>Recruiting cost</th>
<th>Respondent incentive</th>
<th>Interviewing cost</th>
<th>Stimulus complexity</th>
<th>Sample representativeness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mail concept with printed survey</td>
<td>High</td>
<td>&gt;$0 (list)</td>
<td>$1 + $10</td>
<td>$0</td>
<td>Low</td>
<td>Low (due to low response rate)</td>
</tr>
<tr>
<td>Mail concept with telephone interview</td>
<td>Moderate</td>
<td>$10</td>
<td>$10</td>
<td>$25</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Pre-recruit personal interview</td>
<td>Moderate</td>
<td>$10</td>
<td>$20</td>
<td>$40</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Pre-recruit computerized study</td>
<td>Moderate</td>
<td>$10</td>
<td>$20</td>
<td>$10</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Mall intercept Computerized study</td>
<td>Moderate</td>
<td>$5</td>
<td>$10</td>
<td>$10</td>
<td>High</td>
<td>Unknown (probably moderate)</td>
</tr>
<tr>
<td>Web intercept</td>
<td>Low</td>
<td>&gt;$0 (web ads)</td>
<td>$10</td>
<td>$0</td>
<td>Moderate</td>
<td>Unknown (probably low)</td>
</tr>
<tr>
<td>Pre-recruit web interview (ID #)</td>
<td>Low</td>
<td>$15 (low incidence)</td>
<td>$10</td>
<td>$0</td>
<td>Moderate</td>
<td>Moderate (computer users)</td>
</tr>
</tbody>
</table>

Exhibit 2: The above table summarizes the costs and benefits of various research methods for conducting concept tests. Some online methods (e.g., Pre-recruit web interviews) cost less than offline methods, but still deliver acceptable levels of stimulus complexity and sample representativeness.
<table>
<thead>
<tr>
<th>Customer Decision Stages</th>
<th>Measures</th>
<th>Data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness and Search</td>
<td>Total pages delivered</td>
<td>Enhanced log file</td>
</tr>
<tr>
<td></td>
<td>Cumulative number of visits</td>
<td>Enhanced log file</td>
</tr>
<tr>
<td></td>
<td>Unique visitors</td>
<td>Enhanced log file (e.g., cookies)</td>
</tr>
<tr>
<td></td>
<td>Visitor profiles</td>
<td>Registration</td>
</tr>
<tr>
<td></td>
<td>Aided/Unaided recall</td>
<td>Online intercepts/panel surveys</td>
</tr>
<tr>
<td></td>
<td>Clickthroughs (referrals from other sites)</td>
<td>Log files/data from affiliates</td>
</tr>
<tr>
<td>Interest and Evaluation</td>
<td>Incoming links, user sites/groups</td>
<td>Enhanced log file</td>
</tr>
<tr>
<td></td>
<td>Visit duration and depth</td>
<td>Enhanced log file</td>
</tr>
<tr>
<td></td>
<td>Inter-visit duration</td>
<td>Enhanced log file + registration</td>
</tr>
<tr>
<td></td>
<td>Requests for more information</td>
<td>Customer database</td>
</tr>
<tr>
<td></td>
<td>Leads generated</td>
<td>Customer database</td>
</tr>
<tr>
<td></td>
<td>Site search usage</td>
<td>Enhanced log file</td>
</tr>
<tr>
<td></td>
<td>Brand attitude and knowledge</td>
<td>Online intercept surveys, panels</td>
</tr>
<tr>
<td></td>
<td>E-mail activity</td>
<td>Database/e-mail server</td>
</tr>
<tr>
<td>Desire and Trial</td>
<td>Requests for information</td>
<td>Log file/Customer database</td>
</tr>
<tr>
<td></td>
<td>Downloads</td>
<td>Log files+registration</td>
</tr>
<tr>
<td></td>
<td>Simulator usage</td>
<td>Log files/Activity monitoring</td>
</tr>
<tr>
<td></td>
<td>Preferences</td>
<td>Activity monitoring/registration</td>
</tr>
<tr>
<td></td>
<td>Consideration set formation</td>
<td>Monitoring, Online survey, panels</td>
</tr>
<tr>
<td></td>
<td>Qualified leads</td>
<td>Customer Database</td>
</tr>
<tr>
<td></td>
<td>Participation in promotions</td>
<td>Registration/Database, surveys</td>
</tr>
<tr>
<td>Action</td>
<td>Online ordering</td>
<td>Log file/Database</td>
</tr>
<tr>
<td></td>
<td>Coupon redemption</td>
<td>Log file/Database</td>
</tr>
<tr>
<td></td>
<td>Cross selling</td>
<td>Enhanced log file/registration</td>
</tr>
<tr>
<td></td>
<td>Store visits (e.g., competing stores)</td>
<td>Surveys/Channel partner database</td>
</tr>
<tr>
<td></td>
<td>Automated replenishment</td>
<td>Transactions database</td>
</tr>
<tr>
<td>Post-purchase relationship</td>
<td>Customer satisfaction</td>
<td>Surveys/Resource usage at site</td>
</tr>
<tr>
<td></td>
<td>Repeat purchase intent</td>
<td>Surveys</td>
</tr>
<tr>
<td></td>
<td>Repeat purchase rate and amount</td>
<td>Enhanced log file+ registration</td>
</tr>
<tr>
<td></td>
<td>FAQ usage</td>
<td>Enhanced log file/Database</td>
</tr>
<tr>
<td></td>
<td>Incoming calls</td>
<td>Customer database+unique ID</td>
</tr>
<tr>
<td></td>
<td>Share of customer requirements</td>
<td>Surveys/offline database</td>
</tr>
</tbody>
</table>

Exhibit 3 summarizes the various stages in an online customer’s decision process and the corresponding measures and data that could facilitate our understanding of the decision process. In this Exhibit, we have focused on the decision process at the individual level. The common log formats are best suited for generating aggregate information across customers.
References


