EFFECTIVE MARKETING SCIENCE APPLICATIONS: INSIGHTS FROM THE ISMS PRACTICE PRIZE FINALIST PAPERS AND PROJECTS

Gary L. Lilien

Smeal College of Business, Pennsylvania State University, Pennsylvania 16802, GLilien@psu.edu

John H. Roberts

College of Business and Economics, Australian National University, Canberra, Australian Capital Territory 0200, Australia; and London Business School, London NW1 4SA, United Kingdom, john.roberts@anu.edu.au

Venkatesh Shankar

Mays Business School, Texas A&M University, College Station, Texas 77843, vshankar@mays.tamu.edu

Web Appendix 1
Interview Cover Letter and Questionnaire

Cover Letter

Dear [Name]

First, we would like to congratulate you on having conducted marketing science research and analysis, INSERT NAME, that was judged by your peers through the ISMS-MSI Practice Prize Competition to have substantially influenced marketing practice. We are engaged in research to understand how such work comes about and what the barriers and incentives for such work are. We have constructed a questionnaire/interview guide to help us codify the collective learnings from the Practice Prize finalists and hope that you will participate. We have attached a copy of that questionnaire and we plan to use it as a guide during a phone interview with you in the near future. While you may wish to make some rough notes on this questionnaire for your own reference, there is no need to complete it at this stage. To save you time, we will talk you through it.

The goal of the interview/questionnaire is to better understand the origin of the project, some of the details of the application not included in the paper that you published in *Marketing Science*, and to trace what has happened to the application within the organization (and, if relevant, in other organizations). With your help we may also connect with other members of your team and/or others in the organization (or elsewhere) who might complement or supplement the information we get from you.

The report that will emerge from this work has been commissioned by the *Marketing Science Institute* as a part of its 50th anniversary retrospective; we also hope a version will appear in *Marketing Science* to highlight the work of the entries in the Practice Prize Competition and the role marketing science can play in influencing management decision making.

Your answers will remain confidential to the three researchers in the project and a research assistant. We will not use any information that could be attributable to you personally, or to the application in which you were involved, without your express written permission.

Could you please give us some time windows over the next 3-4 weeks when you would be available for a phone discussion? The call should take no more than 30-45 minutes. We will provide a dial in number for that call and will be recording your comments.

Thank you for your help.

Gary Lilien	John Roberts	Venky Shankar
+1 814 863 2782	+61 2 6125 8112	+1 979-845-3246
Glilien@psu.edu	john.roberts@anu.edu.au	VShankar@mays.tamu.edu

Questionnaire

Genesis of the project: [INSERT PROJECT NAME]

We are first interested in how the project in your Finalist entry came about.

1. How did you become acquainted with the managerial problem? (For example, did you have a pre-existing relationship, did a manager read your work or hear you present it, or was it a consulting assignment, etc.?)

[If marketing intermediaries were involved as co-authors]

2. What was the role of the marketing consulting firm in the project? That is, what were your inputs, relative to those of the consulting firm?

Project drivers

3. Why do you think that this application was an interesting problem to academia? What benefit do you feel academia gains from it?

4. What would the management of the organization have done had it not undertaken this piece of research (e.g., undertaken other research [if so, what?], continued past practice, learned from another company or market, etc.)?

5. Why do you think that this was an important problem to management and, in particular, why was the approach that you took to address it valuable?

Project barriers

Next, we would like to understand better some of the barriers that got in the way of either the execution of the study or in implementation of its findings and gaining impact from it, once it had been undertaken.

6. *Time*: To what extent did time constraints affect the study, if at all it did?
7. *Communications*: To what extent did a lack of understanding of the management environment on your part affect the study?
8. *Implementation*: What difficulties, if any, arose due to a lack of insight to action plan gaps by either you or the management?
9. *Intra-organizational issues*: What difficulties arose, if any, due to different parts of the organization having different objectives, priorities, or agendas and how did you address/overcome them?

Changes in actions taken

10. Based on the results of the application you described, what actions did the firm take that it would not have taken without your work?

Nature of the project and the context-Survey questions

11. We would like to understand your beliefs about the nature of your study and the context in which it took place on a range of different criteria. Could you please indicate the degree to which the following statements are true by checking the appropriate box? (Below, "firm" means "client firm.")

	Degree to which you agree with the statement				
	1 Strongly disagree	**2** Disagree	**3** Neither Agree/ Disagree	**4** Agree	**5** Strongly Agree
1. This project would never have gotten off the ground without a strong advocate within the firm **(Company advocate)**					
2. While the project was impactful, I feel that there was a lot of value in the study left unexploited **(Unexploited value)**					
3. Top management support (at the CEO level) was essential to the success of this project **(CEO essential)**					
4. The key to the realization of the benefits was having a series of communications tools with which to diffuse the insights throughout the organization **(Communication tools)**					
5. The firm has a recognized reward structure for those who contribute to its analytical capabilities **(Analytic rewards)**					
6. The firm's annual reports and other publications highlight the use of analytics as a core competitive advantage **(Analytic highlight)**					
7. The firm's senior management expects quantitative analysis to support important marketing decisions **(Quantitative support expected)**					
8. The firm adopts new modeling and data analysis approaches soon after they become available **(Adopt early)**					
9. The firm has mastery of many different quantitative marketing analysis tools and techniques **(Analytic skills)**					
10 The firm has market response models in place for most of its major products **(Market-response models)**					
11. The firm has marketing mix optimization models in place for most of its major products **(Mix optimization)**					
12. The firm has found that the insights it obtains from marketing analytics are almost always very useful **(Useful insights)**					
13. The firm generally feels confident that the use of marketing analytics improves its ability to satisfy its customers **(Satisfy customers)**					

14. The firm feels that if it reduces its marketing analytics activities, its profits will suffer **(Improve profits)**					
15 The firm has a state-of-art IT infrastructure **(State-of-art IT)**					
16. The firm uses IT to gain a competitive advantage **(IT advantage)**					

Current status and realization of benefits

12. What is the current status of the project in the organization? Can you update us with the follow-up activities in the organization and tell us about any related events?

13. Having gained the insights from the study you undertook, can you tell us the range of techniques you used to help management share those insights across the organization, and turn those insights into management actions.

Postscript

14. Have you taken this solution to other organizations and, if so, where?

15. Do you know of other work, innovations or replications that flowed from this study within the organization for which you undertook it?

Contacts

We are keen to get the perspective of as many players involved in this project as possible.

[If marketing intermediary co-authors were involved]

16. We note that [Names] were involved as co-authors. Are there any other consultants who were involved? If so, whom you think would be valuable for us to contact? Could you please give us their names and email addresses? We will only be asking them questions similar to the ones included in this survey, but if you have any reservations, please tell us.

[If management co-authors were involved]

17. We note that [Names] were involved as co-authors. Are there any other executives within the firm who were involved, whom you think would be valuable for us to contact? If so, could you please give us their names and email addresses? We will only be asking them questions similar to the ones included in this survey, but if you have any reservations, please tell us.

[If management co-authors were not involved]

18. Are there any executives within the firm who were involved, whom you think would be valuable for us to contact? If so, could you please give us their names and email addresses? We will only be asking them questions similar to the ones included in this survey, but if you have any reservations, please tell us.

19. Finally, are there any other comments that you can give us that throw light on the genesis, development, implementation, and post implementation phases of this project?

20. In retrospect, if you had to do this project again, what are some of the things you would do differently?

Thank you for your assistance. We are very grateful to you for your help.

We believe that work such as what you have submitted to the Prize increases the visibility of marketing science practice, and as such, helps lead to the diffusion of new ideas and increase the penetration of established ideas.

Web Appendix 2
Interesting Quotes

The following comments are excerpts from the interviews, organized by relevant topics.

Project Barriers

"Lots of data and lots of action, but no link between the two."

—Thorsten Wiesel, Coauthor, Inofec project

"There is a tension between disenfranchising managers and using a tool for decision making."

—Martin Natter, Coauthor, bauMax project

"I would have bought a lot of beer for my web developers and try to build better bridges. That is what I would have done differently, absolutely, because like I said earlier that was a key reason why the project did not have longer legs. If we could have, you know, organizational dynamics are a very intriguing thing. Most of us going to college as students learn about it and we think that it does not matter, but I have come around."

—Marty Vriez, Coauthor, Clickthrough project

Project Enablers

"You have to start with a metric that the finance folks are comfortable with. Unless there is something new and challenging for me, I am not interested in doing another project of the same nature."

—Venky Shankar, Coauthor, Allstate project

"The switch from a legacy system to .Net and Excel was a huge milestone because everyone on the client side knows how to use Excel."

—Jorge Silva-Risso, Coauthor, JD Power DSSIP project

"The executive who championed the effort mentioned that with just this one test they [Chrysler] made more than they paid for the project."

"In the first test at GM, I asked for a simple but effective program that could give a 30% lift….and GM increased volume 35%."

"From a standing start in 1996, the modeling and analytics group now has 25-30 people and is the most profitable unit at J.D Power."

—Jorge Silva-Risso, Coauthor, JD Power DSSIP project

Organizational Learning from the Project

"Academia is often busy solving problems that don't exist."

—Ashish Sinha, Coauthor, Campbell's project

"Management needed to optimize long term profitability, not customer sat."

—Manfred Krafft, Coauthor, Rhenania project

"For applications to be successful the links from analysis to strategy and from strategy to execution have to be present."

—Martin Natter, Coauthor, tele.ring project

"When you go through this and follow the rules of the company and follow the rules of the competition it is always like, in Gary [Lilien]'s words, going through a pregnancy. Right at the end of the pregnancy, you will say I don't want another baby, but after a year again, you deliver."

—V. Kumar, Coauthor, IBM-CLV, P&G, and Prudential projects

"Very often we as academics do very complicated models, even when the simpler models are fairly robust…. I think it is very difficult for an academic going in to change a company unless the company really is already along the road of seeing a problem and wanting to fix it."

—Kusum Ailawadi, Coauthor, CVS project

"There were some real issues amongst managers as to whether in some sense if all these numbers was the way to drive an industry rather than just rolling up your sleeves and getting on with the service delivery."

—John Roberts, Coauthor, Jetstar project

"I think it is kind of interesting to think of that second order affecting our marketing models, which is not just the ones that get into *Marketing Science* because they beautifully, rigorously, sort of, design and calibrate it, but also the ones where it just helps managers formulate a problem and think about it and systematize their own judgment."

—John Roberts, Coauthor, Telstra project

"The practitioner community never came to know about this because it was published in *JMR* and *Marketing Science*. I should have published it also in *Direct Marketing* and *Journal of Advertising Research*."

—Gerard Tellis, Coauthor, Futuredontics project

"If one firm was doing both, the correct solution would be to give away the machine for free or very low and make the profits on the detergents. But that was not easy because different firms produced the machine and the solution, and a profit sharing solution may not have been easy and risk free."

—Gerard Tellis, Coauthor, Whirlpool project

"It is always good to keep contact with the people that you work with which I did with this company but ….People move on and I think it is always good to keep track of what is going on because I think new things start coming up. If you keep contact with them and they are already sold and you did some good stuff with them, you can always leverage that."

—P.K. Kannan, Coauthor, National Academies Press project

"If I had to do it over again, I would make the model simpler ... the genetic algorithm is very flexible but very complex and difficult to explain to a client. I would do a rule-based system. Obviously there is no academic interest in that."

"In the real world, optimization is always under business constraints. On the one hand, the system needs be flexible enough to balance the requirements of all stakeholders by adding in various constraints. On the other, our clients needed to change their traditional thinking from considering only their own organization to the whole enterprise to fully appreciate the benefit of the system"

"It is not only hard, but hard to sell."

"We were academics; when we first demonstrated our system to clients, we were not talking their talk. I remember one client who told me, 'I hear all that music but I don't hear the song'. Learning the industry jargon and tailoring our presentation for the audience was almost as important as the model development at the beginning of the project."

—Jie Du, Coauthor, JD Power-PIN project

"We needed to find out 'do these guys believe in the effects we estimated?'"

"The process resulted not only in strategic discussions but in a reorganization, a new department."

"…some products they thought did not need any more resources turned out actually to need more resources … the process shed light on differences in goals and beliefs internally."

"If I had it to do over again, I would have a partner on site 100% of the time helping implement at the organization."

"With this project we came close to the Holy Grail of academic research, marrying rigor and relevance."

—Marc Fischer, Coauthor, Bayer project.

"You have to have a couple of home runs, then high continuity to get model implementation."

"After you do all that [good technical] stuff, people could hate your solution and you have to have man/machine interaction where you allow change."

"Most academic work is not valuable to companies. If I were a company and you came to me with some of the models I have seen in academia I would laugh."

"It is not all that astounding to me that I do not have anybody who competes with ZS who is an academic."

"You have to have the 10,000 hours that Malcolm Gladwell talked about. The question is where do you put the 10,000 hours? If you are going to put the 10,000 hours on becoming an agency guru, then that is where you have to be. If you put the 10,000 hours hanging out with companies trying to figure out if you can build models for them, that is where you have to be."

"I would like to write a couple of papers on all the wisdom we [ZS] have built up over time…. The reaction I get from [academic journal editors] is 'well, send me a copy and we will figure out if it fits our mandate'."

"The people who are doing both academically rigorous and impactful projects must have a personality that somehow enables them to get access to companies or else they bring some kind of a value that companies just totally appreciate."

Zoltners' Listening Story

“One of the guys who was in my PhD class at Carnegie was working at a pharmaceutical firm and he called me in and said, ‘we have this alignment problem and why don’t you come and maybe look at it.’ I had ways to solve alignment problems and, this is Eli Lilly, and the guy who we were talking to, who ultimately became CEO at Bristol, Myers, Squibb said, ‘well I have two sales forces and I was wondering if we should have two, maybe we should only have one, consolidate them,’ and I said, ‘that is a great problem, but once you solve it you have to do territory alignment.’ Then he said ‘I don’t really know how to size the sales forces. Right now one is 600 and the other is 300, is that a good thing?’ I said, ‘well, good problem, once you solve it you are going to have do alignment.’ Then he said ‘well I got some products, I don’t know which products to put on each sales force.’ Then, I said, ‘good problem, once you solve it you have to do alignment.’ Then he said ‘I don’t know which products I should spend the most time on.’ I said ‘good problem, once you solve it you have to do alignment.’ That is an early academic lesson that we are in our own space and if the world conforms to our space then we will be able to deal with it. Otherwise, it is going to become somebody else’s problem.”

“You can't overlook the wisdom. I remember Bluefield Kentucky. We suggested that a client put a sales person in Bluefield Kentucky and I remember some guy just yelling at me, saying ‘Do you have any idea what it would be like to live in Bluefield?’"

“Suppose you have a model for compensation: you are going to have the finance people involved, you are going to have the HR people involved and you are going to have the sales force involved, so you are going to have all these conflicting objectives—finance wants you to pay as little as possible, HR wants to make sure you are fair, sales wants as much money as possible. Successful implementation quite often requires that all these agendas somehow get merged. In some cases you optimize, most often you satisfice. We found that *if you come out of a computer with an alignment for a sales force of 100 people, 85 of them are going to want to kill you*.”

—Andy Zoltners, Coauthor, ZS project

“The tenure process should give some weight to research-based consulting. We need to change the academic measurement and reward system.”

—Suresh Divakar, Coauthor, PepsiCo project

“We lack any upfront thinking as to how the project is going to be managed all the way from design to running the analysis, coming up with the strategy, and the implementation of that strategy. I think all these things are linked, it is just that most managers do not think about it that way in advance.”

—Ashish Sinha, Coauthor, AMSI project

“Essentially it always a conversation, they talk about their problems, we ask a couple of stupid questions and make some maybe meaningful comments and then from there on we move forward. It is not that we have particular rules how we do this.”

— Bernd Skiera, Coauthor, Soquero project

"Implementation has a lot of challenge. We had to train the ice cream parlor boys who are not that educated, so educating them about this competition and the kind of hash tags and get them to give their ID code and do that was a process. We had to go through not only in person training, we showed them a video demonstration, we showed them an actual physical demonstration, so that was challenging, and then we had to replicate that across parlors in three states."

— V. Kumar, Coauthor, Hokey Pokey project

Web Appendix 3
Abstracts of Practice Prize Articles/Presentations

Kumar, V., Vikram Bhaskaran, Rohan Mirchandani, and Milap Shah (2012), "Creating a Measurable Social Media Strategy for Hokey Pokey: Increasing the Value and ROI of Tangibles and Intangibles," *Marketing Science,* forthcoming.

HokeyPokey, a popular 'super premium' ice-cream retailer with over a dozen outlets based in the western part of India, is aspiring to become a national chain with a limited marketing budget. HokeyPokey offers "customized mix-in" flavors, which are more popular among youngsters and the college going crowd. The concept of customized food services is fairly new in the region, and the retailer feels the need to create a strong brand identity through its passionate customers. The main business question that the retailer asked is 'How do we measure the value of social media marketing spend?' With a bit of art and creativity and sophisticated marketing science, we have been able to illustrate the success of using the social media by HokeyPokey to create its identity and reach potential customers through existing ones. We relate abstract social media measures such as "comments" and "conversations" to financial metrics and demonstrate the increase in buzz and monetary gains. A cultural revolution in the ice cream market has been created whereby customers are allowed to create their own customized ice cream and market their creations through social media to the target audience.

Skiera, Bernd and Nadia Abou Nabout (2012), "A Bidding Decision Support System for Profitable Search Engine Marketing," *Marketing Science,* forthcoming.

In this article, we report on a large-scale implementation of marketing science models to solve the problem of optimal bidding in search engine marketing. In cooperation with the performance marketing agency, SoQuero, we developed a fully automated bidding decision support system, which is implemented in the agency's bid management software. Specifically, the decision support system determines the optimal bids for maximizing the advertiser's profit per keyword and also allows for, but does not require any human intervention. We present a closed-form solution for the optimal bid as well as the newly developed "costs per profit" heuristic that enables advertisers to submit good bids in case of too much noise in the data. In contrast to common belief, we also show that the popular "costs per revenue" metric has an optimal value and outline the drivers of this value. An experiment demonstrates that the decision support system increases the profit per keyword and year by 33.12€, which leads to an increase in the profit per campaign and year between 10,135€ and 139,236€.

Sinha, Ashish and Anna Saghal (2012), "Category Optimizer: A Dynamic Assortment, New Product Introduction, Price-Optimization, and Demand-Planning System," *Marketing Science,* forthcoming.

Category Optimizer™ is an advanced analytics tool that is used by retailers and manufacturers alike to make assortment, price-optimization and demand-planning decisions. Not only has this tool been successfully applied by Synovate-Aztec in the Australian-NZ context, and by Analytics Consulting Group and MMA in the North America market, it is also currently being trialed by other companies in both Europe and Asia. It uses readily available scanner store data to estimate a market share model, and subsequently, uses these results to inform strategic and tactical decision making. While this tool borrows its methodology from aggregate level market share models, much of the academic work has been applied to extremely small data sets that have a few SKUs, rendering these academic models highly inapplicable to most practical settings. Therefore, an important contribution of this work is to develop a system that is applicable to large scale problems commonly found in applied settings. There have been attempts in both academia and industry (Sinha, Inman, Wang and Park 2005 (*Marketing Science*); Inman, Park and Sinha 2008 (*JMR*); Fader and Hardie 1996 (*JMR*)) to use panel data to solve this problem; however, the non-representativeness of the panel sample, the non-availability of reliable panels in several international markets and the lack of information at account level makes the use of these models impossible for informing micro-marketing strategies, particularly at lower levels of geography, such as markets and accounts. In addition, practitioners tend to prefer scanner store data over panel data.

Danaher, Peter, John Roberts, Alan Simpson, and Ken Roberts (2011), "Jetstar: A Dynamic Model of Consumer Choice to Guide Brand Development." ***Marketing Science*** **(Published online in Articles in Advance on February 9, 2011), 1-9.**

The paper describes a marketing science model used by Jetstar to compete in the low cost carrier marketplace. We trace the evolution of the Jetstar strategy, from its initial position, through to its efforts to grow price competitiveness and service parity, followed by a highly focused, cost-effective service delivery strategy. From a methodological perspective, in addition to developing a model that incorporates dynamics, we also allow for unobserved heterogeneity of both perceptions and importance weights of process attributes. This allows us to study not only how service design and pricing initiatives shift the perceived performance of Jetstar relative to its competitors, but also how the airline is able to shift market preferences in a way that emphasizes the areas in which it has competitive advantage. During the study Jetstar market share went from 14.0% to 18.1%. Significant price perception and service level disadvantages were ameliorated. Profit for Jetstar went from $A 87mm in 2006/07, before the study was commissioned, to $A 115mm in 2007/08 and $A 137mm in 2008/09 during a period of major industry losses. We describe some of the operational challenges Jetstar overcame to realize these results and the non-quantitative benefits. Finally, we briefly outline applications of the approach in other situations.

Kumar, V. and Denish Shah (2010), "Uncovering Implicit Consumer Needs for Determining Explicit Product Positioning: Growing Prudential Annuities' Variable Annuity Sales." ***Marketing Science*** **(Published online in Articles in Advance on December 10, 2010), 1-9.**

A variable annuity is a popular product for investing retirement income. However, thousands of similar-looking variable annuity products are being offered by hundreds of financial service companies. In such a scenario, how can Prudential achieve meaningful product differentiation to increase the sales of its variable annuities? The solution led to the development and implementation of the "Emotion Quotient" (EQ) Tool. The EQ Tool enabled Prudential to redefine its marketing and sales approach along a proactive (as opposed to responsive) market orientation paradigm. This was accomplished by first using the EQ Tool to uncover and quantify the prevalence of certain emotions (such as fear and regret) in the prospective consumer and then pitching relevant variable annuity product(s) that could mitigate the specific behavioral risk corresponding to the prevalent emotion(s). This approach, which was backed by extensive research (as described in this study), enabled Prudential to gain over $450 million lift in variable annuity sales and contributed to consumer welfare by promoting awareness of behavioral risk to investors who are within five years of their retirement. This research study illustrates how industry can collaborate with academia to successfully apply marketing science to solve real-world business problems.

Fischer, Marc, Sönke Albers, Nils Wagner, and Monica Frie (2011), "Dynamic Marketing Budget Allocation Across Countries, Products, and Marketing Activities at Bayer." ***Marketing Science*** **30 (4), 568–585.**

Presentation Summary from http://techtv.mit.edu/collections/isms:1132/videos.rss:

The authors report on the development of an innovative solution to the dynamic marketing allocation budget problem for multi-product, multi-country firms. Their decision support model determines near-optimal marketing budgets at the country-product-marketing-activity level in an Excel-supported environment each year. The model accounts for marketing dynamics and a product's growth potential as well as for trade-offs with respect to marketing effectiveness and profit contribution. The model has been successfully implemented at Bayer, one the world's largest firms in the pharmaceutical and chemical business, leading to an organizational transformation and a dramatic reallocation of resources, leading to a profit improvement of $685million in a $4billion unit at Bayer.

Wiesel, Thorsten, Koen Pauwels, and Joep Arts (2010), "Marketing's Profit Impact: Quantifying Online and Off-line Funnel Progression." ***Marketing Science*** **(Published online in Articles in Advance on December 30, 2010), 1-8.**

Inofec, a small- to medium-sized enterprise in the business-to-business sector, desired a more analytic approach to allocate marketing resources across communication activities and channels. We developed a conceptual framework and econometric model to empirically investigate (1) the marketing communication effects on off-line and online purchase funnel metrics and (2) the magnitude and timing of the profit impact of firm-initiated and customer-initiated contacts. We find evidence of many cross-channel effects, in particular, off-line marketing effects on online funnel metrics and online funnel metrics on off-line purchases. Moreover, marketing communication activities directly affect both early and later purchase funnel stages (website visits, online and off-line information, and quote requests). Finally, we find that online customer-initiated contacts have substantially higher profit impact than off-line firm-initiated contacts. Shifting marketing budgets toward these activities in a field experiment yielded net profit increases 14 times larger than those for the status quo allocation.

Du, Jie, Lili Xie, and Stephan Schroeder (2009), "PIN Optimal Auction Vehicle Distribution (ODAV) System: Applying Price Forecasting, Elasticity Estimation, and Genetic Algorithm to Used Vehicle Distribution." ***Marketing Science*** **28 (4), 637-644.**

In addition to retailing new vehicles, automotive manufacturers in the United States sell millions of vehicles through leasing and to fleet customers every year. The majority of these vehicles are returned to the automotive manufacturers at the end of the contracted term and must be "remarketed." In 2007, about 10 million used vehicles were sold at more than 400 auctions in the United States. Large consigners face decisions every day about when, where, and at what price to offer these vehicles, which has significant financial implications for their profitability.

To address the challenges of the distribution process, Power Information Network (PIN), a division of J.D. Power and Associates, developed the PIN Optimal Distribution of Auction Vehicles System (ODAV), an automated decision optimization system that helps remarketers maximize profits through the most advantageous distribution of their auction vehicles. At the core of the system is a combination of three models that determine the distribution of the vehicles on a daily basis: a nearest neighbor linear regression model for short-term auction price forecasting; an autoregressive integrated moving average time-series analysis model for volume-price elasticity; and a genetic algorithm optimizer for vehicle distribution.

Since its launch in 2003, PIN has been providing ODAV services on a daily basis, and to date, more than two million vehicles have been distributed through this system. In this paper, we will describe the PIN ODAV System, its implementation, and the business impact by using as an example the experience with our largest client, Chrysler Group LLC.

Kannan, P.K., Barbara Kline Pope, and Sanjay Jain (2009), "Pricing Digital Content Product Lines: A Model and Application for the National Academies Press." ***Marketing Science*** **28 (4), 620-636.**

We examine the problem of how a content provider, specifically the National Academies Press (NAP), can optimally price the different forms of its product---print and PDF---that it sells online. Whereas products in the traditional product line generally tend to be substitutes, the different content product forms could range from being substitutes to being complements across customers. Thus the content provider can possibly sell bundles of the product forms, leading to additional revenue. We first discuss NAP's decision context and describe the model we proposed for developing NAP's optimal pricing policies for its different forms. We describe the choice experiment we conducted on the publisher's website that maximally uses the online interface to collect relevant data needed to estimate our model. We show how NAP embraced the results from the model for developing a new business model and how it used the insights derived from the study to set pricing policies and monitor sales performance as a function of pricing. Finally, we perform validation of the model and the implemented policies using dynamic modeling of sales data from NAP's website. The paper illustrates how e-commerce technologies can lead to the development of optimal policies using marketing models.

Kumar, V., Jia Fan, Rohit Gulati, and P. Venkat (2009), "Marketing-Mix Recommendations to Manage Value Growth at P&G Asia-Pacific." ***Marketing Science*** **28 (4), 645-655.**

Procter & Gamble (P&G) Asia-Pacific is interested in managing value growth. Only after fully understanding the true effects of the marketing-mix variables can P&G managers make strategic decisions answering questions such as the following: (1) Are the P&G brands in the detergent market inelastic or elastic with respect to price? How has the price elasticity changed over time? Can P&G increase the price of its brands to gain value growth? (2) What are the price, distribution, and sizing combinations needed to achieve the desirable value growth? (3) How can P&G gain market share from its competitors without cannibalizing its own brands? P&G Asia-Pacific approached us to develop a value growth framework to answer these questions. To generate the answers for the above questions, we develop a three-step weighted random coefficient estimator that captures the heterogeneity across cross sections (different stock-keeping units and states) and the endogeneity of distribution. Based on the parameter estimates, we provide strategic recommendations to P&G for a field test to validate our suggestions. We developed a simulator for P&G managers so that they can generate appropriate marketing-mix strategies for achieving the desired value growth. As a result, P&G gained over $39 million in value growth over a one-year period by implementing the recommendations from our modeling approach.

Silva-Risso, Jorge and Irina Ionova (2008), "A Nested Logit Model of Product and Transaction-Type Choice for Planning Automakers' Pricing and Promotions." ***Marketing Science*** **27 (4), 545-566.**

We develop a consumer response model to evaluate and plan pricing and promotions in durable-good markets. We discuss its implementation in the U.S. automotive industry, which "spends" about $45 billion each year in price promotions. The approach is based on a random effects multinomial nested logit model of product (e.g., a vehicle model, such as Hyundai Tucson), and transaction-type choice. Transaction types include combinations of acquisition types (e.g., purchase versus lease) and pricing instruments (cash rebates, reduced APR financing, lease payment discounts). We estimate the model using hierarchical Bayes methods to capture response heterogeneity at the local market level. We find key characteristics unique to durable-good markets. First, consumers are heterogeneous in both their brand and transaction-type preferences. Second, consumers differ in their overall price sensitivity as well as in their relative sensitivity to alternative pricing instruments (e.g., cash discounts, reduced monthly payments). Third, the most effective pricing programs tend to be those in which automakers offer consumers a menu of options to choose from (e.g., a choice among a cash discount, reduced interest rate financing, or a lease payment discount). We illustrate the model through an empirical application to a sample of data drawn from J.D. Power transaction records in the entry SUV segment and discuss examples of actual implementations.

Shankar, Venkatesh, Pablo Azar, and Matthew Fuller (2008), "BRAN*EQT: A Multicategory Brand Equity Model and Its Application at Allstate." ***Marketing Science*** **27 (4), 567-584.**

We develop a robust model for estimating, tracking, and managing brand equity for multicategory brands based on customer survey and financial measures. This model has two components: (1) offering value (computed from discounted cash flow analysis) and (2) relative brand importance (computed from brand choice models such as multinomial logit, heteroscedastic extreme value, and mixed logit). We apply this model to estimate the brand equity of Allstate—a leading insurance company—and its leading competitor, which compete in multiple categories. The model captures the brand's spillover effects from one category to another. In addition, we identify the dimensions that drive a brand's image, examine the relationships among advertising, brand equity, and shareholder value, and build a decision support simulator for the focal brand. Our model provides reliable estimates of brand equity, and our results show that advertising has a strong long-term positive influence on brand equity, which is significantly positively related to shareholder value. The model, the brand equity estimates, and the decision support simulator are used by key executives across multiple functional areas and have enabled the company to substantially gain by reallocating its advertising resources to improve brand equity and shareholder value, and by offering better guidance to analysts and investors.

Natter, Martin, Andreas Mild, Udo Wagner, and Alfred Taudes (2008), "Planning New Tariffs at tele.ring: The Application and Impact of an Integrated Segmentation, Targeting, and Positioning Tool." ***Marketing Science*** **27 (4), 600-609.**

Tele.ring is a mobile phone organization selling contracts and cell phones in the Austrian market. The market situation in 2005 was highly competitive and dynamic, resulting in relatively short tariff life cycles. Excessively long lead times made tele.ring's management feel dissatisfied with their new tariff development process. Furthermore, a new competitor had entered the market, posing a major threat, and it was unclear how to effectively safeguard tele.ring's position in the market. In cooperation with the management, we implemented and tested a new segmentation, targeting, and positioning tool, which provides managers with information on their target markets, customer preferences, competitors' strengths, and customer segments. It allows for the simultaneous visualization of these data on a single map and facilitates timely and accurate decision making. In particular, we report on the design and the implementation of a new pricing scheme, "Formel 10," which became the most successful new tariff introduction in this competitive market. tele.ring's managers were very much impressed with our tool's ability to represent the market on a single map and with its capacity to allow for intuitive interpretation. In addition, the tool enhanced internal communication between its users and different stakeholders during the new tariff development process.

Kumar, V., Rajkumar Venkatesan, Tim Bohling, and Denise Beckmann (2008), "The Power of CLV: Managing Customer Lifetime Value at IBM." ***Marketing Science*** **27 (4), 585-599.**

Customer management activities at firms involve making consistent decisions over time, about: (a) which customers to select for targeting, (b) determining the level of resources to be allocated to the selected customers, and (c) selecting customers to be nurtured to increase future profitability. Measurement of customer profitability and a deep understanding of the link between firm actions and customer profitability are critical for ensuring the success of the above decisions. We present the case study of how IBM used customer lifetime value (CLV) as an indicator of customer profitability and allocated marketing resources based on CLV. CLV was used as a criterion for determining the level of marketing contacts through direct mail, telesales, e-mail, and catalogs for each customer. In a pilot study implemented for about 35,000 customers, this approach led to reallocation of resources for about 14% of the customers as compared to the allocation rules used previously (which were based on past spending history). The CLV-based resource reallocation led to an increase in revenue of about $20 million (a tenfold increase) without any changes in the level of marketing investment. Overall, the successful implementation of the CLV-based approach resulted in increased productivity from marketing investments. We also discuss the organizational and implementation challenges that surrounded the adoption of CLV in this firm.

Tirenni, Giuliano, Abderrahim Labbi, Cesar Berrospi, André Elisseeff, Timir Bhose, Kari Pauro, and Seppo Pöyhönen, (2007), "Customer Equity and Lifetime Management (CELM) Finnair Case Study." ***Marketing Science*** **26 (4), 553-565.**

The Customer Equity and Lifetime Management (CELM) solution is based on a decision-support system that offers marketing managers a scientific framework for the optimal planning and budgeting of targeted marketing campaigns to maximize return on marketing investments. The CELM technology combines advanced models of Markov decision processes (MDPs), Monte Carlo simulation, and portfolio optimization. MDPs are used to model customer dynamics and to find optimal marketing policies that maximize the value generated by a customer over a given time horizon. Lifetime value optimization is achieved through dynamic programming algorithms that identify which marketing actions, such as cross-selling, up-selling, and loyalty marketing campaigns, transition customers to better value and loyalty states. The CELM technology can also be used to simulate the financial impact of a given marketing policy using Monte Carlo simulation. This allows marketing managers to simulate several targeting scenarios to assess budget requirements and the expected impact of a given marketing policy. The benefits of the solution are illustrated with the Finnair case study, where CELM has been used to optimize marketing planning and budgeting for Finnair's frequent-flyer program (FFP).

Natter, Martin, Thomas Reutterer, Andreas Mild, and Alfred Taudes (2007), "An Assortmentwide Decision-Support System for Dynamic Pricing and Promotion Planning in DIY Retailing." ***Marketing Science*** **26 (4), 576-583.**

The main objective of this report is to describe a decision-support system for dynamic retail pricing and promotion planning. Our weekly demand model incorporates price, reference price effects, seasonality, article availability information, features and discounts. Building on previous research, we quantify demand interdependencies and integrate the resulting profit-lifting effects into the optimal pricing model. The methodology was developed and implemented at bauMax, an Austrian Do-It-Yourself (DIY) retailer. Along with the practical requirements, an objective function was employed that can be used as a vehicle for implementing a retailer's strategy. Eight pricing rounds with thousands of different Stock Keeping Units (SKUs) have each served as a testing ground for our approach. Based on various benchmarking methods, a positive impact on profit was reported. The currently implemented marketing decision-support system increased gross profit on average by 8.1 and sales by 2.1 percent.

Kitts, Brendan, Martin Vrieze, and David Freed (2005), "The Right Product for the Right Person: Product Recommendation from Infrequent Events," paper presented as 2005 ISMS-MSI Practice Prize Finalist, Emory University (June 17).

Presentation Summary from http://techtv.mit.edu/collections/isms:1135/videos.rss:

The authors describe five years of work developing, analyzing, and running one-to-one marketing systems in a successful cross-channel retailer. The problem is targeting the right customer with the right product. Previously our participating retail chain, Clickthrough, had sent e-mails to opt-in customers featuring products chosen by the marketing department. In 1999 they ran a pilot study in which they replaced the static products with product offers selected by a probabilistic one-to-one recommendation algorithm. The pilot test was very successful. Clickthrough increased profit by 40%, revenue by 38%, and units sold by 61%. The full system was deployed in October 2000 that generated a response rate increase of over 100%. From 2000–2005, the recommendation system has continued to be used each week, and the retailer continues to maintain control groups and report on performance.

Ailawadi, Kusum L., Bari A. Harlam, Jacques César, and David Trounce (2007), "Quantifying and Improving Promotion Effectiveness at CVS." ***Marketing Science*** **26 (4), 566-575.**

We quantified the net unit and profit impact of each promotion offered in 2003 by CVS, a leading U.S. drug retail chain, and analyzed the key drivers of variation in this net impact. We used this analysis to identify the least effective promotions and conducted a controlled field test to demonstrate the impact of eliminating them before chainwide implementation. Our key findings are as follows. First, approximately 45% of the gross lift from promotions is incremental for CVS. Further, for every unit of gross lift, 0.16 unit of some other product is purchased elsewhere in the store. Still, more than 50% of promotions are not profitable because the lower promotional margin is not sufficiently offset by incremental units. Second, there is substantial variation in net profit impact across categories. Our field test shows that eliminating promotions chainwide in 15 of the worst performing categories will decrease sales by about $7.8 million but will improve profit by approximately $52.6 million. This is very impressive given that CVS front store sales in 2003 were approximately $9 billion while the net profit impact of promotions was –$25.3 million.

Zoltners, Andris A. and Prabhakant Sinha (2005), "The 2004 ISMS Practice Prize Winner Sales Territory Design: Thirty Years of Modeling and Implementation." ***Marketing Science*** **24 (3), 313-331.**

Sales territory alignment is the assignment of accounts and their associated selling activities to salespeople and teams. Models, systems, processes, and wisdom have evolved over 1,500 project implementations for 500 companies with 500,000 sales territories. Optimization models have evolved over time to explicitly consider travel time along road networks and customer disruption. Personal computers with continually increasing speeds and storage capabilities, the Internet, and mapping databases have enabled the development of systems that communicate alignments visually to sales managers. Because of their combinatorial complexity, multiple conflicting objectives, and personnel aspects that touch everyone in the sales force, the alignment models were unable to completely solve the sales territory alignment issues faced by companies. Consequently, processes that add local managerial knowledge were used to communicate and enhance model-derived solutions, while achieving very high implementation rates. The territory alignment team gains knowledge with every sales territory alignment. Alignment insights get codified. Alignment experts improve every model-derived solution. This wisdom becomes part of subsequent alignments and triggers further innovation. Over time, the role of processes and wisdom becomes larger than the role of the models and systems.

Divakar, Suresh, Brian T. Ratchford, and Venkatesh Shankar (2005), "CHAN4CAST: A Multichannel, Multiregion Sales Forecasting Model and Decision Support System for Consumer Packaged Goods." ***Marketing Science*** **24 (3), 334-350.**

We discuss the development and implementation of CHAN4CASTa, sales forecasting model, by pack size, category, channel, region, customer account and a Web-based decision support system (DSS) for consumer packaged goods. In addition to capturing the effects of such variables as past sales, trend, own and competitor prices and promotional variables, and seasonality, the model accounts for the effects of temperatures, significant holidays, new product introductions, trading day corrections, and adjustments to the wholesale level. In general, the model forecasts sales volume satisfactorily for a leading consumer packaged goods company. The DSS enables top- and mid-level executives in sales, marketing, strategic planning, and finance to develop accurate forecasts of sales volume, plan prices, and promotional activities over a long time horizon; to track sales response to marketing actions over time; and to simulate forecast scenarios based on possible marketing decisions and other variables. CHAN4CAST is being rolled out for more users and more divisions in the company. The key take-aways are that successful development and implementation of a rigorous marketing science model require a strong internal champion, a careful balance between modeling sophistication and practical relevance, good diagnostic features, regular validations, and greater attention to the development of a fast and responsive DSS.

Sinha, Ashish, J. Jeffrey Inman, Yantao Wang, and Joonwook Park (2005), "Attribute Drivers: A Factor Analytic Choice Map Approach for Understanding Choices among SKUs." ***Marketing Science*** **24 (3), 351-359.**

We describe the implementation of Attribute Drivers (AD), a flagship panel product of Information Resources Incorporated, at Campbell Soup Company. AD combines the parsimony of a factor analytic choice map approach with the ability to incorporate the dynamics of choice decisions to understand consumers' choices among stock keeping units (SKUs). A key distinguishing feature of this methodology is its scalability and applicability to large-scale problems.

The application of AD helped Campbell's grow its revenues at twice the category growth rate. This revenue growth was achieved in a climate of high product proliferation, a slow economy, and a five-year decline in unit sales at a category level. Campbell has applied AD in four primary areas: making restaging decisions, identifying potential line extensions and estimating their volume and market share impacts at the brand and category level, performing price gap analysis for new products, and increasing responsiveness to consumers' needs. The model has been used by several other clients, testifying to its transportability.

Tellis, Gerard J., Rajesh K. Chandy, Deborah J. MacInnis, and Pattana Thaivanich (2005), "Modeling the Microeffects of Television Advertising: Which Ad Works, When, Where, for How Long, and Why?" ***Marketing Science*** **24 (3), 359-366.**

Most past research has focused on how aggregate advertising works in field settings. However, the information most critical to managers is which ad works, in which medium or vehicle, at what time of the day, at what level of repetition, and for how long. Managers also need to know why a particular ad works in terms of the characteristics (or cues) of its creative. The proposed model addresses these issues. It provides a comprehensive method to evaluate the effect of TV advertising on sales by simultaneously separating the effects of the ad itself from that of the time, placement (channel), creative cues, repetition, age of the ad, and age of the market. It also captures ad decay by hour to avoid problems of data aggregation. No model in the literature provides such an in-depth and comprehensive analysis of advertising effectiveness. Applications of the model have saved millions of dollars in costs of media and design of creatives.

Elsner, Ralf, Manfred Krafft, and Arnd Huchzermeier (2004), "Optimizing Rhenania's Direct Marketing Business through Dynamic Multilevel Modeling (DMLM) in a Multicatalog-Brand Environment." ***Marketing Science*** **23 (2), 192-206.**

We introduce Dynamic Multilevel Modeling (DMLM) to a multicatalog-brand environment to determine the optimal frequency, size, and customer segmentation of direct marketing activities. This optimization method leverages multicatalog-brand effects including the utilization of prior customer ordering behavior, maximization of customer value and customer share, and economies of scale and scope in printing and mailing. This enhancement of the original DMLM-approach is called Dynamic Multidimensional Marketing (DMDM). With DMLM alone, Rhenania, a German direct mail order company, turned its catalog mailing practices around and consequently rose from the number 5 to the number 2 market position. The DMLM approach was so effective that two major competitors could be bought out. Improvements provided by DMDM were threefold: more efficient resource allocation across all catalog brands, more accurate customer microsegmentation, and more effective reactivation. Presently, the company's target is to transform single-brand customer relationships into two- or three-brand relationships with higher revenue per customer. As a consequence, the Rhenania group's performance was decoupled from the overall market trend.

Tellis, Gerard J., Peter N. Golder, and Joseph A. Foster (2004), "Predicting Sales Takeoff for Whirlpool's New Personal Valet." ***Marketing Science*** **23 (2), 180-191.**

The introduction of really new products creates many dilemmas for managers. Initially, they must develop a launch strategy in the face of great uncertainty about the product's potential. After launch, they need guidance about whether to pull the plug on a new product with lackluster sales (prior to takeoff) or persist with a product that could ultimately be a failure. Our results and model of the takeoff in sales of new products provide some guidance on these complex managerial decisions. Prior to our study on sales takeoff, a manager's only recourse to analyzing new product growth would have been diffusion models. However, these models have typically used new product sales beginning at or around the takeoff, have assumed takeoff, and have not explicitly modeled it. In contrast, our model addresses the time from commercialization until takeoff, thus providing insights during the period of greatest uncertainty. Whirlpool Corporation used our model to guide their decision making in the testing and launch of a completely new consumer durable, the Personal Valet.

Roberts, John H., Charles J. Nelson, and Pamela D. Morrison (2005), "A Prelaunch Diffusion Model for Evaluating Market Defense Strategies." ***Marketing Science*** **24 (1), 150–164.**

This paper describes the development and application of a marketing model to help set an incumbent's defensive marketing strategy prior to a new competitor's launch. The management problem addressed is to assess the market share impact of a new entrant in the residential Australian long distance telephone call market and determine the factors that would influence its dynamics and ultimate market appeal.

The paper uses probability flow models to provide a framework to generate forecasts and assess the determinants of share loss. We develop models at two levels of complexity to give both simple, robust forecasts and more detailed diagnostic analysis of the effect of marketing actions. The models are calibrated prior to the new entrant's launch, enabling preemptive marketing strategies to be put in place by the defending company. The equilibrium level of consideration of the new entrant was driven by respondents' strength of relationship with the defender and inertia, while trial was more price-based. Continued use of the defender depends on both service factors and price. The rate at which share loss eventuates is negatively related to the defender's perceived responsiveness, saving money being the only reason to switch, and risk aversion.

Prelaunch model forecasts, validated six months after launch using both aggregate monthly sales data and detailed tracking surveys, are shown to closely follow the actual evolution of the market. The paper provides a closed-form multistate model of the new entrant's diffusion, a methodology for the prelaunch calibration of dynamic models in practice, and insights into defensive strategies for existing companies facing new entrants.

Web Appendix 4
Factor Analysis of Project Characteristics (Rotated Factor Matrix)

ITEM WORDING AND ASSOCIATED MNEMONIC	FACTOR 1 Analytic Resources	FACTOR 2 Strategic Leverage	FACTOR 3 Analytic Advocacy
Company advocate (This project would never have gotten off the ground without a strong advocate within the firm)	-0.330	-0.062	**0.991**
Unexploited value (While the project was impactful, I feel that there was a lot of value in the study left unexploited)	-0.302	-0.025	0.183
CEO essential (Top management support (at the CEO level) was essential to the success of this project)	-0.082	0.190	0.117
Communication tools (The key to the realization of the benefits was having a series of communications tools with which to diffuse the insights throughout the organization)	**0.563**	-0.108	-0.195
Analytic rewards (The firm has a recognized reward structure for those who contribute to its analytical capabilities)	**0.837**	-0.088	0.375
Analytic highlight (The firm's annual reports and other publications highlight the use of analytics as a core competitive advantage)	**0.657**	-0.215	-0.215
Quantitative support expected (The firm's senior management expects quantitative analysis to support important marketing decisions)	0.275	0.156	**0.426**
Adopt early (The firm adopts new modeling and data analysis approaches soon after they become available)	**0.656**	0.157	0.034

Analytic skills (The firm has mastery of many different quantitative marketing analysis tools and techniques)	**0.501**	0.139	0.256
Market-response models (The firm has market response models in place for most of its major products)	**0.601**	0.058	-0.189
Mix optimization (The firm has marketing mix optimization models in place for most of its major products)	**0.577**	0.059	0.148
Useful insights (The firm has found that the insights it obtains from marketing analytics are almost always very useful)	-0.040	**0.828**	-0.016
Satisfy customers (The firm generally feels confident that the use of marketing analytics improves its ability to satisfy its customers)	-0.010	**0.806**	-0.056
Improve profits (The firm feels that if it reduces its marketing analytics activities, its profits will suffer)	0.038	**0.913**	0.026
State-of-art IT (The firm has a state-of-art IT infrastructure)	**0.564**	-0.031	-0.062
IT advantage (The firm uses IT to gain a competitive advantage)	**0.604**	0.131	0.025

Note. The numbers in bold reflect the items that load dominantly on the associated factors.