

# AHEAD OF ITS TIME

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WHEN IT COMES TO DATA, FEW SEE THE FOREST FOR THE TREES THE WAY ALFRED KUEHN, E '52, PH.D. '58, DOES. KUEHN WAS ANALYZING DETAILED DATA ON STEEL SHIPMENTS AND CONSUMER PURCHASE BEHAVIOR AND DEVELOPING MARKET PROJECTIONS — AND HELPING BUSINESSES HARNESS IT — LONG BEFORE “BIG DATA” BECAME A BUZZWORD.

The founder of Management Science Associates Inc. (MSA), one of the world's premier data and market analysis research firms, Kuehn helped transform how companies run their businesses. He founded MSA — then known as Market Science Associates Inc. — in a small office at the business school (then GSIA) and in a student's cellar. Today MSA has 900 employees and contractors working in the U.S., Asia and the U.K.

A pioneer in applying analytical methods to study consumer behavior and dynamic marketing processes, Kuehn was one of the founders of the disruptive concept of “management science,” a quantitative approach to decision-making and business analytics that now forms the foundation of a Tepper School of Business education.

#### FROM OIL TO DETERGENT

The son of Austrian and German immigrants, Kuehn was born and raised near steel smokestacks in North Braddock, Pennsylvania. His father, a tool and die maker, often invited young engineers to his house to work on their problems or patent applications. “My mother told me they ‘got it made,’” Kuehn remembered. “They were all grads from Carnegie Tech.”

Few of his school classmates went directly to college, but Kuehn carried newspapers and saved for years to become a chemical engineering major in 1948 at the Carnegie Institute of Technology, now Carnegie Mellon University. His study of hydrocarbons helped him get a summer pilot plant research job at Gulf Oil research and development, where he identified operational changes to improve its end product. He continued working with Gulf Oil through his undergraduate career.

Kuehn made a connection with the business school's founding dean, George Leland Bach, who encouraged Kuehn to pursue business education. During the second year of his master's program, Kuehn took a Ph.D. course with Herbert Simon, Nobel laureate and founding GSIA faculty member. Part of the course included modeling behavior. Kuehn was intrigued by consumer brand-choice marketing behavior, which he saw as being a continuous flow over time impacted by

advertising, promotions, price and other factors — analogous to the way crude oil is impacted by heat, pressure and mixing within a refinery.

“We were then pioneering and introducing operations research and numerical methods,” Simon told the Pittsburgh Business Journal. “He got fascinated by that. The thing he could do best was not provide people with marketing information by being a pollster but by having sophisticated ways of analyzing the data.”

Kuehn's consumer behavior modeling generated interest at Lever Brothers — a Unilever subsidiary — and its data suppliers, MRCA and the Chicago Tribune. He developed a simulation of the detergent

Cooper had become aware of the model and had recommended that it be developed as the Carnegie Tech Management Game, which would differentiate GSIA from business schools whose models did not provide students with the opportunity to test their skills analyzing data from realistic detailed models of actual consumer products.

“GSIA was trying to bring analytics into management courses,” Kuehn remembered. “Case studies in marketing were always about the past, but the world keeps changing. You don't want to learn how to solve last year's problems — you want to learn how to solve current and next year's problems.”

“MSA WAS GEEK CHIC FROM THE BEGINNING, LONG BEFORE IT BECAME FASHIONABLE.”

market and later developed his Ph.D. thesis on a similar analysis of frozen orange juice, incorporating how elements like product characteristics, price and advertising would influence consumer behavior, brand switching and repeat buying. This was the first — and a highly sophisticated — marketing mix/attribution model, although not so named at the time.

#### MANAGEMENT GAME

Kuehn's detergent model was a hit not just at Lever Brothers, which had several uses, including as an executive training tool for marketing managers, but also at the business school. Former faculty member William

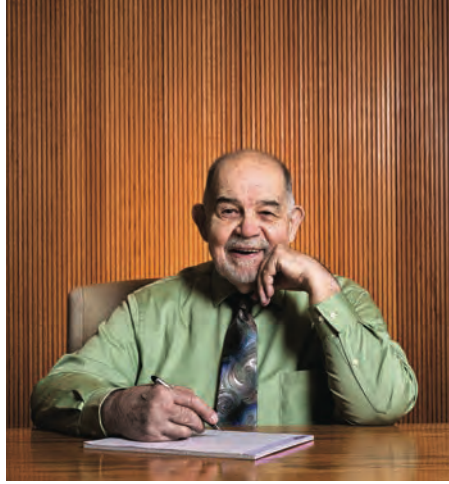
Kuehn noted that Lever Brothers used the marketing version of Management Game to explain how different consumer tests (repeat vs. single tests) provided different levels of confidence regarding consumer preferences. The game was perfect as a teaching tool for that purpose. It also provided students with an opportunity to learn analysis that would support decisions and the interactive nature of marketing factors.

“When our business school was created, every business program in the world was teaching business more as an art, and using case studies as a primary tool,” **DAVE LELAND LAMONT**, associate



teaching professor, explained. “The philosophy here was fundamentally different. We emphasized a quantitative evidence-based approach to making business decisions, as opposed to an intuitive one. It was a fundamental shift in the way that business education was taught. AI was a part of that. All of the business programs in the world started moving in that direction.”

“ONE OF THE THINGS I THINK IS REALLY UNIQUE ABOUT MSA: I DON’T KNOW ANY OTHER ORGANIZATION THAT HANDLES ALL COMPANIES IN AN INDUSTRY.”

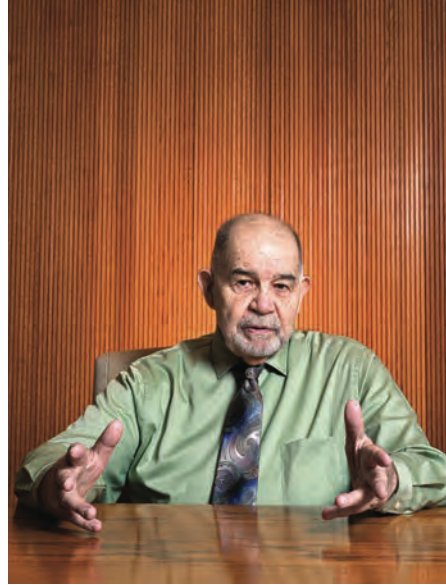


Today, some form of GSIA’s original academic model — appropriately referred to as “management science” — is taught at every leading business school. “The difference is that management science tries to take a more proactive perspective and a more quantitative perspective,” said **WILLEM-JAN VAN HOEVE**, Carnegie Bosch Associate Professor of Operations Research, who serves as the faculty head for the new Master of Science in Business Analytics and coordinator of the business analytics track in the MBA program at the Tepper School. “The quantitative approach allows you to objectively measure the impact of certain decisions, and then act accordingly.”

#### BUSINESS CONTINUITY

As part of a landmark \$246 billion settlement between six big tobacco companies and 46 states’ attorneys general, MSA’s technology has been used to determine the annual amount each tobacco company pays, and how much each state receives, for the past 20 years. Kuehn says many individuals in the industry over the years expressed surprise that no one ever challenged the accuracy of MSA systems or work MSA has done during those years. Kuehn hopes the care that MSA has given to developing and maintaining that system, which served the tobacco industry and states so well, may enable it to perhaps also provide similar benefits to states now trying to develop appropriate rules and procedures for such diverse industries as medical cannabis, casinos and internet gaming.

When a firm like MSA handles confidential data for every competitor in an industry, data security becomes paramount. “A tremendous amount of care and some redundancy are required to handle, store and analyze

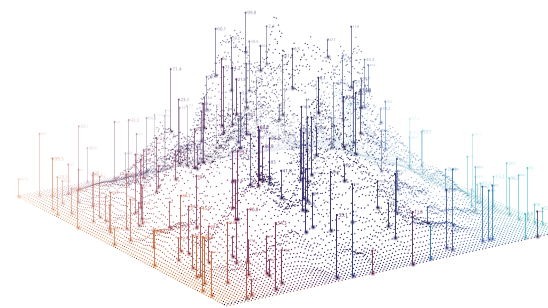


such confidential information,” Kuehn said. When MSA first found itself working with participating companies in the same industry, a significant amount of distrust existed. Companies were willing to guarantee accuracy of their information but wanted significant checks built in the system to check on others.

To store, retrieve and analyze that sensitive information, MSA operates several secure data centers in southwestern Pennsylvania connected by a closed fiber-optic redundant network managed completely by MSA. These data centers include a sprawling state-of-the-art facility at RockPointe in Tarentum, a newer facility in Ross Township, and a third facility at MSA’s headquarters in Pittsburgh, which MSA built in 1987 when it set out to build what MSA’s clients considered to be state-of-the-art. The three facilities have personnel available 24 hours per day for 365 days a year.

“Few companies define ‘business continuity’ like MSA, where our goal is to never have our top service ever go down,” Kuehn said. “Data centers often provide assurance that systems won’t be down for more than a specified short period and that clients won’t lose what is needed to recover from a disaster. Some of our clients are surprised every five years at renewal time to learn their systems have not failed or perhaps even shut down for maintenance. We may have the most secure system for protecting data. We’re not merely lucky that we haven’t gone down; we developed technology to try to assure we can handle it.”

“WE HAVE MANY CLIENTS WHO SAY THEY HAVE NO PROBLEM FINDING SOMEONE THAT WILL DO WHAT WE DID FOR THEM LAST YEAR. WHAT THEY’RE INTERESTED IN IS WHAT WE DO THIS YEAR.”



Kuehn said MSA’s mission is to help companies enhance their capabilities and effectiveness through data analysis. “People must be incentivized to continue to improve capabilities,” Kuehn said. “Continuing growth is needed to compensate for unexpected business losses. Innovation has been key to enable MSA to continue growing, and we must constantly create better information that is more relevant for today’s marketplace. MSA’s continuing innovations for its Industry Services have led clients to say that they want to maintain our working relationships because we’re likely to come up with something new and significant each year.” That’s the approach that has kept MSA at the forefront of analytics and informatics decades after its inception in Kuehn’s GSIA office. —

## MANAGEMENT GAME AT GSIA

From 1960 to 1995, thousands of business school students played a Management Game. An evolution of the mathematical model **ALFRED KUEHN**, E’52, Ph.D. ’58, developed for Lever Brothers, Management Game was the first in the world to use real-world data. As the only capstone to the master’s program for 35 years, its goal was to help students connect the dots between things like financing, accounting, advertising and production as they ran a business.

“It was a fabulous learning opportunity for the students — it forced you to think like an owner,” said **DAVE LELAND LAMONT**, associate teaching professor and the current director of Management Game, who played it as a student.

Three teams of students competed against each other in a simulation of the detergent industry. They represented the three largest companies in the industry in 1960: Lever Brothers (now Unilever), Proctor & Gamble, and Colgate (now Colgate-Palmolive).

From meeting multiple times with their board of directors (played by alumni) to making hundreds of decisions about things like product characteristics, advertising, pricing and distribution, the teams played out three years in the business over the course of one semester.

In terms of product characteristics, for instance, teams could create a detergent with varying degrees of gentleness, cleaning power and sudsiness by mixing seven different ingredients. “All of the seven components had different lead times and shipping cost as well,” Lamont said.

“It was way ahead of its time,” Kuehn remembered. “It had you make real business decisions.” He also made every employee at MSA, including its executives, play the game.

In 1996, the game was altered to make the simulation more strategic and international, but the original game lives on in the minds and hearts of those who played for over three decades. “Kuehn’s model was 50 years ahead of its time,” and business analytics has only grown in importance, Lamont said. “If anything, MSA’s work has become even more valuable and relevant.”

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# TEPPER

M A G A Z I N E

**FOLLOW THE LEADER**  
Christa Quarles, BSE '95

**BUSINESS MODEL**  
Alfred Kuehn, Ph.D. '58, E '52

**NOTHING VENTURED, NOTHING GAINED**  
Alison Alvarez, MBA '16, CS '07  
Jay Jovick, MBA '15  
Kalpesh Kapadia, MSIA '99  
Ari Rabban, MSIA '97

**VIEWPOINT: BUSINESS MODEL  
TRANSFORMATION AND STRATEGY  
IN THE AGE OF DISRUPTION**  
Maria Taylor, executive director,  
Executive Education

NEXT GEN C SUITE

Carnegie  
Mellon  
University