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**Exploring Complex Academic**

**Health Center Systems**

**Using Computer Simulation**

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**1999 Forum on Emerging Issues**

**April 28-29, 1999**

**Gregg Conference Center, Bryn Mawr, PA**

*Hedwig van Ameringen*  
**ELAM**

**EXECUTIVE**

**LEADERSHIP IN**

**ACADEMIC**

**MEDICINE**

*Program for Women*

# 1999 ELAM Forum on Emerging Issues: Proceedings

## December 1999

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### In Appreciation

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## **The ELAM Program**

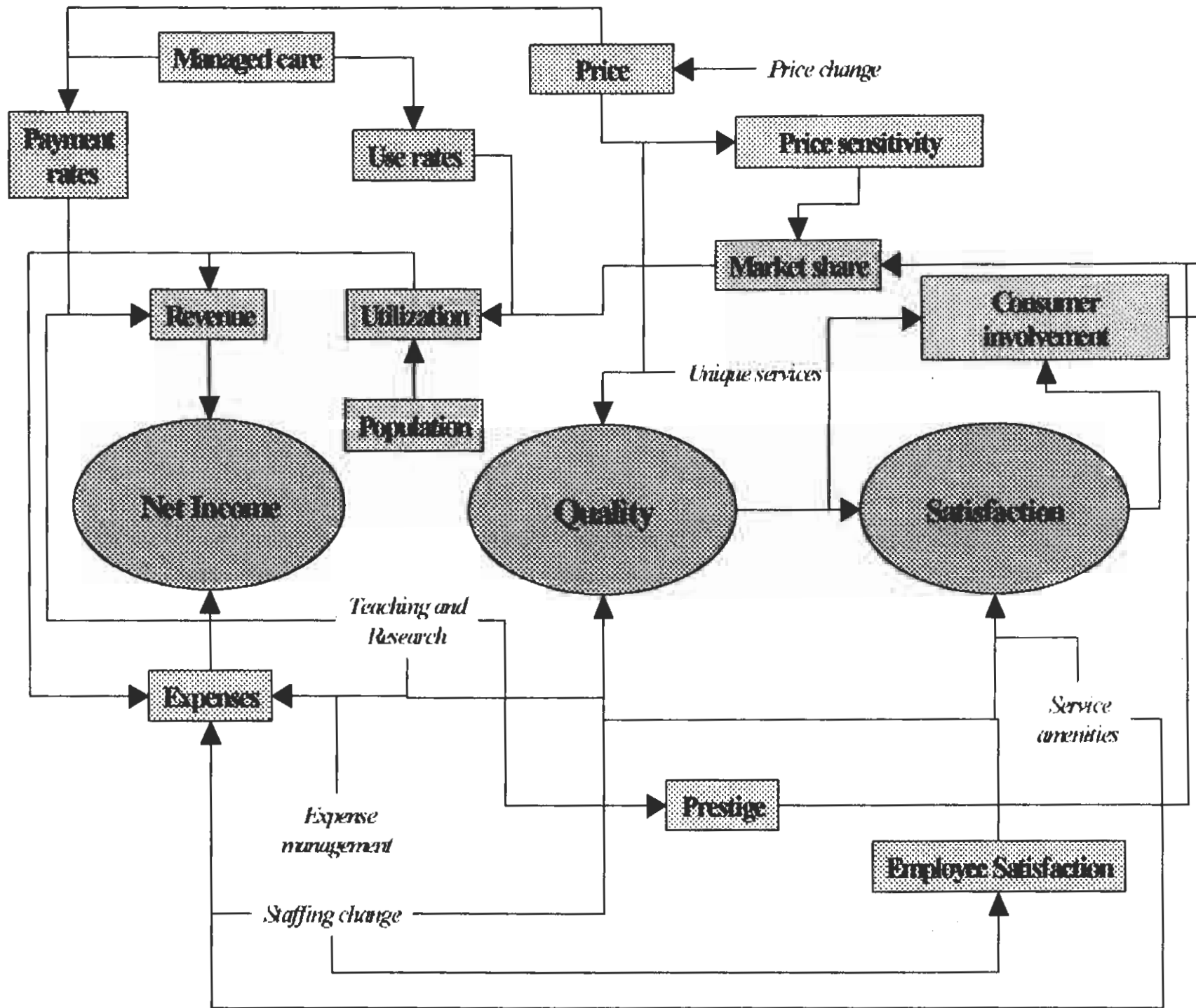
The *Hedwig van Ameringen* Executive Leadership in Academic Medicine (ELAM) program for women reflects the heritage of the Medical College of Pennsylvania, founded in 1850 as the country's first medical school for women. The goal of ELAM is to increase the number of women chairs, deans and other senior academic administrators in medical and dental schools in the U. S. and Canada.

During the last week of April 1999, a group of present and future leaders of academic medicine and dentistry met at the Gregg Conference Center in Bryn Mawr, Pennsylvania. The 34 senior women medical and dental school faculty who attended already were leaders at their institutions, seeking to improve their executive leadership skills. The ELAM fellows held professional titles such as Chair, Vice Chair, Director, Department Head, or Associate Dean, and most were Professors or Associate Professors.

The gathering was for the **1999 Forum on Emerging Issues**, for which the fellows were joined by senior delegates, most often the deans, from their home institutions, along with invited guests (see Appendix A for list of participants). This year's topic was to explore state-of-the-art computer simulations to examine strategic decisions for the operations of an Academic Health Center.

The ELAM fellows were finishing their year of continuing executive education in the ELAM program, where the women learned about such topics as converging paradigms of corporate, government and academic leadership; financial management; strategic planning and organizational transformation; emerging issues in academic medicine: communications; personal dimensions of leadership and career advancement.

# Fitzgerald Health Sciences Center Simulation Model Overview



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# 1999 FORUM ON EMERGING ISSUES

## Exploring Complex Academic Health Center Systems Using Computer Simulation

**“Complex problems have simple, easy to understand, wrong answers. Grossman’s Law**

The Forum is the capstone event of ELAM, during which the fellows and leaders from their institutions explore ‘Emerging Issues in Academic Medicine.’ The Forum provides a framework to focus on the future, to elicit diverse information and perspectives from the participants, and to frame present efforts and future directions.

The 1999 Forum facilitator was Bruce Gresh, Ph.D., founder and head of Edgewood Research, a consulting practice focused on simulation analysis of complex systems. He designed the model that was used specifically for ELAM, to play out the effects of implementing management decisions for complex Academic Health Centers.

The intention of the session was to have the participants use the model and to challenge the scenarios, and also to answer the personal question of *“What is my theory of how the ‘academic medical system’ works?”*



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## **PRE-FORUM PREPARATION**

The ELAM Forum may be considered an “off-campus laboratory,” designed to be a safe environment in which to experiment without people risking their jobs or affecting patient care and research. The Forum provides an opportunity for participants to explore new ideas and practice new skills, without affecting their own positions or those of the people dependent on their decisions for their livelihood.

Dr. Gresh met with the ELAM fellows several days prior to the Forum, to discuss concerns about one’s superior watching as they make decisions about the operations of the AHC. The fellows concluded that they had high respect and trust for their senior institutional representative; however, they were still concerned that they might be “judged” inappropriately. Dr. Gresh presented the concerns to the senior institutional representatives at a pre-Forum meeting with them and found that they had the same concerns of being “wrong” or “computer illiterate” in front of their faculty and dean colleagues.



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# THE SIMULATION DESIGN

**THE TRUTH ABOUT SIMULATIONS: “All models are wrong; some models are useful.”** **Edward Deming**

The model used for the 1999 Forum on Emerging Issues was a highly interactive computer simulation designed specifically for ELAM. Pairs of ELAM fellows were grouped with their respective senior institutional representative, so that each computer station had four participants discussing and making the decisions.

Academic Health Centers (AHCs) have teaching, research and service missions. One question is how each mission ranks at an institution. What is “The Mission of the AHC”? And how, in these difficult times, can one maintain and fulfill it? When asked for metaphors to describe the agility of AHCs to adjust these missions for a changing environment, the following were cited: *ossified, rheumatic, trying to turn the Titanic, petrified wood*. The Fitzgerald Health Sciences Center (HSC) simulation was presented as a method to move beyond this block.

To work with the simulation scenario, each group of four was considered the executive management team. Their role was to steer the Fitzgerald HSC through the turbulent business environment by making internal management decisions that influence four factors. Participants also were asked to identify and rate *performance drivers* for each factor on importance and certainty/uncertainty of being influenced by their management decisions.

- Pricing
- Cost
- Quality
- Satisfaction.

Fitzgerald HSC has as a traditional three-part mission of teaching, research and service; and typical Academic Health Center institutional components: a School of Medicine, a Hospital and a Faculty Practice Plan. The executive management team had to decide how much each mission meant for its particular institutions, with each of these components concerned about pricing, cost, quality, and satisfaction.

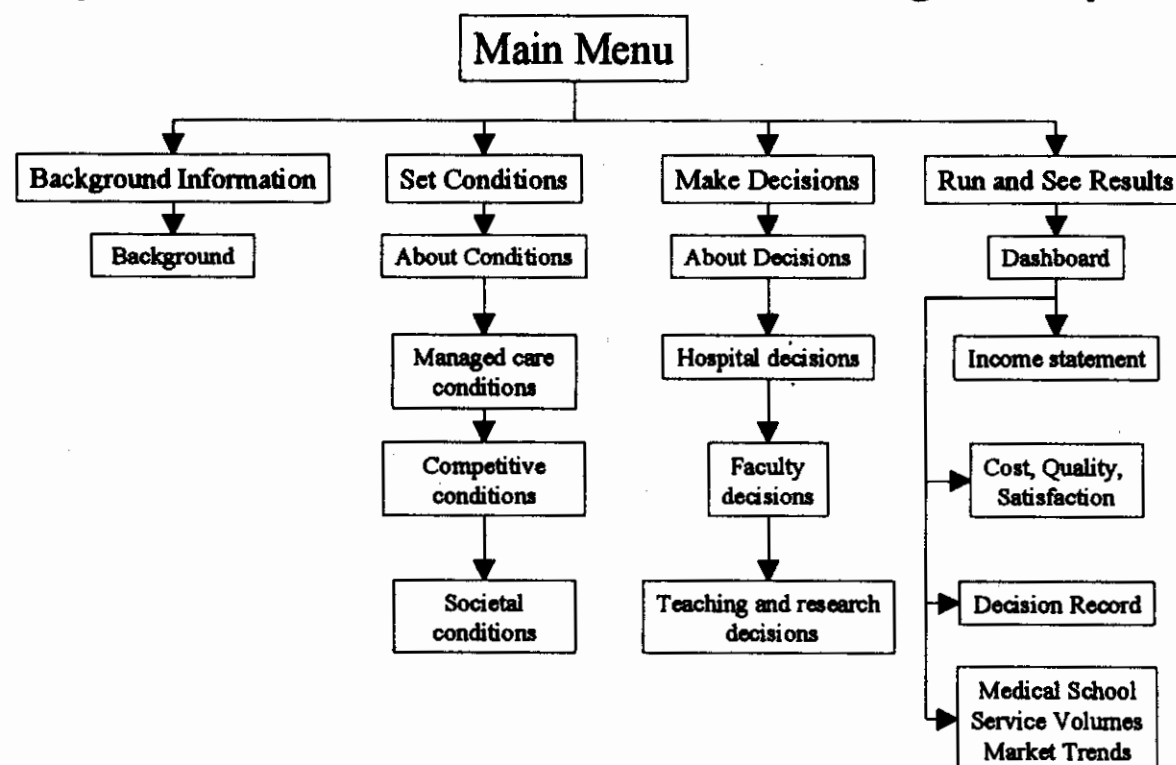
The simulation also included environmental components that could be modified. There were initial settings for market share, managed care penetration, and the relative rates of growth of managed care. The team was supplied with initial hospital data for demographics: patient admissions per year, average daily census, annual budget, number of FTE's, etc. Data was provided for the medical school affiliation and the current number of undergraduate medical students, faculty and residents, as well as the income and expenses that each generated.

A major objective of the simulation was to see how complex and inter-related decisions and actions become in a system with so many parameters (and this was a simplified model!). There is no predetermined outcome in a simulation, and no "right" answers. However, a simulation does:

- provide ability to compress time and calculate a great deal of data
- reveal cumulative, nonlinear interrelated effects under changing environmental conditions
- translate general business conditions into organizational consequences
- tie decisions clearly to results, and
- provide a "straw man" for analysis.

Each group had to make internal management decisions for the hospital; faculty; and teaching, clinical service, and research efforts for each year of a five-year period. There were associated costs with many of the decisions. For instance, if the executive management team downsized the staff, there was a cost of 20 % of salary and benefits added for everyone who was "laid off." If expense management was too aggressive in cost containment, the actions adversely affected satisfaction and, therefore, reduced admission rates and market share.

#### Fitzgerald Health Sciences Center Simulation Navigation Map





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# EXPERIMENTING WITH THE SIMULATION

## ROUND ONE – FIRST AFTERNOON

The teams first ran the computer simulations and adjusted the internal management parameters, leaving the external environmental conditions at their initial settings. Group members were encouraged to take on one of four roles: strategist who considered what decisions to make and anticipated the likely outcomes; advocate for the teaching and research missions; advocate for pragmatic business concerns; and observer of the group decision process. After about one hour, the large group convened and discussed the results. Decisions differed among the teams, according to the strategy each decided to pursue. Most teams found it very difficult to maintain a positive balance among cost, pricing, quality, and satisfaction across the three missions.

The teams used two general approaches to the experimentation:

- “*Fast look*” approach: Made a set of decisions, let the simulation run for the entire five years, saw the results quickly, then modified the decisions and re-ran the simulation for a second round or more.
- “*Careful analysis*” approach: Changed one or two decision parameters only, perhaps on an annual basis, and therefore studied in depth the effects of one parameter.

## ROUND TWO – NEXT MORNING

Dr. Gresh increased the complexity of the Fitzgerald HSC simulation for the teams, by adding the possibility of modifying the external environmental conditions, e.g. managed care penetration, market share, etc. He presented relevant statistics and national trends, showing the growth of managed care and its effect on inpatient days and utilization of services.

Dr. Gresh challenged the participants to think about *what was out there*, not just *what they wished it were*. He showed the life cycle of an industry (e.g. introduction, growth, maturity, and decline). Forum participants were asked: “Where along this cycle would you place each of the health care industry segments (health care delivery, research, education)?” For example, were capitation, ambulatory, and inpatient health care delivery all in the growth cycle? He also challenged the groups to think about transition strategies and pitfalls as health care industry segments traversed industry life cycles to maturity. For example, do AHCs cling to “higher quality” as an excuse for not meeting aggressive pricing and

marketing moves of competitors in health care delivery, education, and research?

Forum participants considered the basic strategies – cost competition or differentiation – for the more complex Fitzgerald HSC simulation. The teams used these singly or in combination in two approaches:

- Some teams used data comparable to their own particular academic health center environmental situation.
- Other teams experimented with 'best case' and 'worst case' environmental conditions.

## RESULTS

After several trials, the teams reported how they had fared over the five-year period. Some lost money and prestige over the five-year period, while others made money.

Several challenges were identified and discussed for leading an organization with all of its relationship and system implications:

- Past successes can get in your way, e.g. static mental models can route leaders to continue decisions that worked for the organization 5-10 years ago, but are no longer appropriate in the current environment.
- Institutionalized management practices promote continuation of out-dated management decision processes.
- There is always a glut of data whose accuracy can be questioned, and therefore an "information uncertainty" and tendency for "analysis paralysis."
- There is also the discomfort period with the emergent behavior in the new arena. The executive management teams sometimes found it difficult to "stay the course" with an original management decision over the five-year period. Sometimes the decisions led to a neutral or relatively poor performance in the first year, but then provided substantial positive performance by the end of five years. Rosabeth Moss Kanter has called this "sticky moments in the middle of change."
- In the real world, the relationship between cause and effect is unclear, because of the delay in effect. The simulation made some of the cause-and-effect relationships more explicit.

After the process of making internal management decisions for Fitzgerald HSC and changing the environmental parameters, running several simulation trials, and discussing results in individual groups and then in the large group, the 1999 Forum participants concluded with: (1) analysis of the usefulness of the simulations and the scenarios for their own institutions, and (2) how the simulation enhanced the ability of each team to develop and test its mental models about how things should function.

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## LESSONS LEARNED

**“We learn from history that people learn nothing from history.”** **Hegel**

There was much learned, with many insights, some anguish and a lot of fun exchanged. By the end of the Forum, participants were discussing important and uncertain performance drivers and attempting to identify their patterns of interaction. Some of the lessons learned were that:

- Systems are very complex and relatively minor divisions can have unintended consequences down the road. It is important, therefore, to develop new management methods that can help determine the second-, third- and fourth- order effects. Currently, our management tools focus on linear methods, which consider only the primary effect of a decision.
- There may be a “Tsunami effect.” In complex systems, one can experience a feeling of being on an island with a tsunami wave approaching, where “everything seems to be fine” until just before the Tsunami hits. “By the time one recognizes that the tsunami is on its way, it is too late to get out of the way or to take corrective action.”
- There is a danger in complex systems when the underlying mental models are not articulated explicitly, because the implicit mental models can run on:
  - incorrect assumptions
  - intuition, whereas the right decision sometimes is counter-intuitive.

Some comments from the participants were:

***“The system challenges some thinking; if you just tried to engineer out the inefficiencies, it sometimes backfired.”***

***“I liked the active play and then reflection on what we observed.”***

***“Organizations are difficult to turn vis-a-vis the rapidly changing environment.”***

***“The simulation showed that decisions and actions over time in a complex system have outcomes not always expected!”***

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# **APPENDICES**

**List of 1999 Forum Participants .....Appendix A**

**Bibliography .....Appendix B**

**Forum Facilitator .....Appendix C**

**Order Form for Simulation Software .....Appendix D**

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*Note: Titles and institutions at time of participation in 1999 Forum.*

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## **Appendix B: BIBLIOGRAPHY**

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### **Recommended**

- Kotter, J.P. *Leading Change*. Boston, Harvard Business School Press.
- Mintzberg, H. *The Rise and Fall of Strategic Planning*. New York: The Free Press.

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## **Appendix C: FORUM FACILITATOR**

**Bruce Gresh, Ph.D.**, is founder and head of Edgewood Research, a consulting practice focused on simulation analysis of complex systems. He has used simulation to explore a wide variety of strategic and operational issues in health care, and he has extensive experience in both discrete event and systems dynamics simulation methodologies.

Bruce has a broad management and consulting background that includes experience in environmental scanning, competitor analysis, and capacity planning. He also has managed a large multi-year cost reduction effort in a large teaching hospital, and led and facilitated numerous process redesign projects.

Bruce is a member of the Society for Computer Simulation. He received his B.S. degree from Tufts University and his M.S. and Ph.D. degrees from Pennsylvania State University.

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# Appendix D: ORDER FORM FOR SIMULATION SOFTWARE

The 1999 Forum, "Exploring Complex Academic Health Center Systems Using Computer Simulation," introduced an innovative computer simulation model, designed exclusively for ELAM by Bruce Gresh, Ph.D. Gresh is founder and head of Edgewood Research, a consulting practice focused on simulation analysis of complex systems, and creator of numerous computer simulations for the health care industry and executive education programs of The Wharton School, University of Pennsylvania. The simulation offers a computerized "practice field" for thinking about and planning for the challenges facing AHCs in the rapidly changing business environment. Using the simulation, you can:

- **test the impact and consequences of changes**, such as utilization, payment, and competition;
- **probe a variety of possible management strategies**, without having to risk "crashing and burning" in real life; and
- **examine over a 5-7 year range the outcomes of decisions** about pricing, expense management, physician-AHC relationships, and teaching and research and support, involving real-life tradeoffs.

Included in this package are:

- *ithink* software and computer simulation model on 3.5" diskettes (PC format)
- *Simulation User's Guide*

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Send order to ELAM Program, MCP Hahnemann University, The Gatehouse, 3300 Henry Avenue, Philadelphia, PA 19129-1191.

Name \_\_\_\_\_

Address \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Phone \_\_\_\_\_

Fax \_\_\_\_\_

E-mail \_\_\_\_\_

\_\_\_\_\_ Number of sets of diskettes/User's Guides @ \$100.00 (includes shipping and handling)