

In Memoriam: Robert Engelmores

March 7, 1935– March 25, 2003

*Bruce G. Buchanan,
Thomas C. Rindfleisch, and
Edward A. Feigenbaum*

■ Robert S. (Bob) Engelmores, who retired in 1998 from the Knowledge Systems Laboratory at Stanford University, died in an ocean accident in Hawaii on March 25, 2003. As the second editor of *AI Magazine*, he guided its development from 1981 to 1991; he was also elected a fellow of AAAI in 1992. He had been involved in many aspects of AI and was respected for his uncommon common sense and good humor.

Some Events in Bob Engelmores's Life

Bob Engelmores grew up in New York, the son of an advertising executive. He played football for Briarcliff Manor High School, learned to play the piano, and most importantly nurtured a deep interest in science. He won a nationally prestigious Westinghouse science scholarship to Carnegie Institute of Technology (later Carnegie Mellon University) and became a physics major. He had close friendships with (later-to-be AI scientists) Robert Lindsay and Ed Feigenbaum and roomed with Feigenbaum for six years of undergraduate and graduate school. During his graduate work, he met his future wife, Ellie, in Pittsburgh. They were married in 1958. Bob received his Ph.D. in physics from Carnegie Tech in 1962.

Bob came to Stanford in 1970 at Feigenbaum's invitation to work on the DENDRAL project and begin a new career in AI. His broad in-

terdisciplinary outlook across the physical sciences and computation were a perfect fit with the needs of the DENDRAL project. He had to unlearn Fortran and learn Lisp, which seemed easy for him. He contributed to the DENDRAL planning programs and started exploring other problems in science where AI might be applied. As the Heuristic Programming Project (HPP) began to explore MYCIN-like approaches outside biomedicine, Bob led the effort that produced SACON, the first engineering application of expert systems. SACON was a program that assisted structural and civil engineers in choosing the subroutines from a large finite-element package needed to calculate their structures.

When the HPP's goal shifted to studying information fusion from multiple data sources, Bob managed a complex and important project, CRYSTALIS, whose goal was to use X-ray diffraction data to elucidate the 3-dimensional structure of proteins in crystal form. Allan Terry's Ph.D. dissertation and several publications grew out of this work. Working with crystallographers Professor Joseph Kraut and Dr. Steve Freer from the University of California at San Diego, Bob and Allan designed and implemented the program as a blackboard system. It was an ambitious project, involving sophisticated mathematics and a lot of heuristics. It still stands as one of the largest applications of the blackboard system framework.

His book on blackboard systems,¹ which he edited with Tony Morgan, brings together many other successful demonstrations of the



technology. The book was one of Bob's biggest contributions and is still the premier reference on blackboard systems. On his retirement as editor of *AI Magazine*, a spoof on a review of his book ("Blackbird Systems") brought a characteristically hearty laugh.

In 1979, Bob took a two-year leave of absence from Stanford to work as a program manager for Intelligent Systems at the Defense Advanced Research Projects Agency (DARPA). In this role he traveled to nearly all the major AI laboratories in the United States and became acquainted with all the principal scientists. He never claimed to know everything about AI (or anything else), but he did bring considerable knowledge of science, and scientific good sense, to the job of nurturing and developing innovations in AI.

After AAAI started publishing a quarterly journal, Bob was asked to take over as editor in chief in 1981. His mandate was ambiguous because *AI Magazine* was to be neither an archival record of finished research nor a newsletter with informal notes of ongoing work. He established high standards for articles,² with strict reviewing guidelines, to shape the publication into a respected record of the growth of our field over the next decade.

After his return to the Bay Area from DARPA, Bob joined Teknowledge, Inc. (which he had helped form) as director for knowledge systems development, a position he held until 1985. He then resumed his academic ties at Stanford as executive director of the Knowledge Systems Laboratory (KSL), where he oversaw the administration and research of one of the world's major AI laboratories.

Because of his breadth of knowledge of the field as well as his role in experimental research using real-world applications, Bob was invited to join the program committee for the AAAI-sponsored Innovative Applications of AI (IAAI) conference. He was cochair of the IAAI-2000 conference and remained on the program committee.

After his retirement from Stanford in 1998, he continued to be involved in activities at the KSL and at a small start-up AI company, Sandpiper Software, as well as with technical consulting and occasional AAAI requests. He and Ellie traveled extensively during his retirement.

It was during a family trip to Kauai that he died. He and his five-year-old grandson, Jack, and about ten others, were in a lava pool known as the Queen's Bath next to the ocean. Although the surf had been normal, a ten-foot wave crashed into the pool and then another. In the words of his daughter, Alice:

"I had just gotten out of the water when a

huge wave came in, and another on top of it,' she said. 'People were screaming, and the waves were pushing people into the rocks. Jack was screaming and scared, and my father was trying to hold him up so he could breathe. I went back in—there were such heroic people there, working to make sure Jack was safe. Once we got Jack up on the rocks, my father relaxed and was washed out. Most of us received numerous cuts and bruises. There may have been one woman who was more seriously hurt.'"³

Bob was swept out of the pool but swam to a plastic pool toy that had washed out with him and was floating with it in no apparent distress. He waved to his family on the shore, but when lifeguards on jet skis reached him a short time later, his heart had stopped from an apparent heart attack.

Some Insights into Bob Engelmores Character and Contributions

For someone who was so smart, Bob was singularly easy to be with. He made everyone feel comfortable because he asked questions that showed he was genuinely interested, and he understood the answers. His personality was more than just friendly. He was expansively warm and generous with his time and with his attention to another person's needs.

In his good-natured, humorous way, Bob was totally honest about himself, the people around him, and the goals being pursued. He was not ambitious in the usual academic sense because he had so many other interests and because the hypocrisy that often accompanies ambition was so foreign to him. If he felt you were covering your own lack of knowledge with buzzwords, his deceptively simple questions made you realize it was time to stop talking.

Bob downplayed his role in projects to avoid overstating it. And if he heard any of his friends starting to overstate our own importance, he would gently correct us. This came not just from a wellspring of humility others should have drawn on more but from a scientist's deep sense of responsibility not to deviate from a correct account of the facts.

His honesty carried into every aspect of his life—from his claims about the significance of an experimental result to his line calls in tennis. He did, however, unnerve a particularly skilled tennis opponent once with his call on a service ace, "Too fast, Dave, take two."⁴

Bob's lifelong passion was classical music. He was a skilled pianist with a fondness for Beethoven's sonatas. For the last thirty years,

Bob loved good jokes and had a wonderful gift for seeing humor in the details of everyday life.

Bob Engelmores, Editor in Chief: A Remembrance

Robert S. Engelmores was editor of *AI Magazine* for 41 issues. He took the job shortly after the magazine was founded and left a mark on the publication that has proved to be indelible. Bob's goals for the magazine were simple and direct. He wrote them in his very first editorial (published in volume 3, number 1):

At this point, my plans for *AI Magazine* are evolutionary, not revolutionary, because the magazine has gotten off to a reasonably good start, all things considered. The first order of business is to try my best to make it a quarterly publication, as it's intended to be. Second, I'm going to emphasize articles that have broad appeal to AI researchers as well as to readers on the periphery of our community. The articles will be technical, but also understandable to nonspecialists. I hope to include more graphics, similar in quality to the excellent drawings and photographs one sees in *Scientific American*. I intend to start some new features that will appear on a regular basis. Also, beginning with the next issue, look for a change in appearance of the magazine as we shift the production activity to the AAAI office....

I started working with Bob on the

magazine about 1984. By that time, he was already well on his way toward meeting the goals he had published in his first issue, but AAAI was growing rapidly, and Bob needed some assistance. I was brought in to help with publication management, advertising, and production.

I still remember my first meeting with Bob at Teknowledge, which, at the time, was located in downtown Palo Alto. I confess to feeling quite nervous about meeting Bob for the first time. I really didn't know what to expect. The old adage, however, that first impressions are lasting ones proved true in Bob's case. My nervousness melted away immediately. Bob was charming, self-effacing, kind, low-key, funny, and genuinely considerate to me during our first meeting, and he was that way to me every time thereafter.

For many years, Bob and I met once a week to talk about *AI Magazine*. First at Teknowledge, later at Stanford's Knowledge Systems Laboratory, we would work out the contents of upcoming issues. Sometimes he would enthusiastically and patiently explain technical details of an article to me. Other times he would go to his whiteboard and chart out ideas and plans for the quarter. One time he took me out to the parking lot to proudly show off his new personalized California license plates: "AI Mag."

Bob truly enjoyed reading the new

ideas that came in every article, and although he might not choose an article for publication, I never got the impression that he didn't enjoy reading the submissions. Bob always approached his (volunteer, mind you!) job with enthusiasm and professionalism. He treated all the *AI Magazine* staff with courtesy and respect and kindness. His enthusiasm was infectious, and for as long as I worked with him, I can't remember disliking a day of the job. Bob simply made the work fun.

However, I don't want to give the impression that everything always went smoothly. Publishing isn't like that. Articles fall through for many reasons, but every time we encountered a problem, Bob would be unflappable. Occasionally, I would have to call him and tell him that an article could not be published, for one reason or another. Sometimes the call would be made late in the process of closing an issue. There would be no histrionics, no calling for someone's head. Instead, he'd say calmly, in a conversational tone, "Ok, let's see what we can use instead." Then he would go to his leather pocket organizer (this was in the days before handheld organizers or calendar programs) and look through all the cards to find an article that was far enough along to use as a substitute.

During Bob's tenure as editor, *AI Magazine's* pages read like a who's

his main instrument was his baritone voice. He sang many years with the Stanford Symphonic Chorus and then with the Masterworks Chorale (of the College of San Mateo). About the only achievement he described with noticeable pride was his performing at Carnegie Hall. He could name almost any classical com-

position on the radio after just a few seconds and took delight in any new piece that stumped him.

He was also quietly passionate about the wonders of the natural world and loved the mountains and the oceans and all unspoiled wilderness areas. He made an early commit-

who in AI. Knowing now how difficult it is to entice very busy successful scientists to write articles, I marvel at Bob's ability to bring so many notable writers to the magazine's pages. An accomplished writer himself, Bob also pushed for higher-quality writing and better storytelling, and so it was not unusual for us to publish, from time to time, the work of some of the best science writers. To get such important writers, Bob didn't use strong-arm tactics; he didn't pester people; he simply got the job done.

It is a tribute to Bob's extraordinary talent that he could not only convince successful accomplished people to write for the magazine but also recognize and nurture budding talent. It is remarkable to see the number of new authors in *AI Magazine* who would later go on to write books of their own—sometimes 5–10 years later.

Bob had wide-ranging interests, so readers never knew what would turn up in the pages of the next issue, always related to AI, but often in unusual ways. We published articles about the law, written by lawyers. We published articles about history of science, written by historians. We published articles written by professors in almost every area of academe, from classics to linguistics, mathematics to computer science, English to psychology, law to medicine. We published survey articles, how-to-build-it articles, corporate research survey articles, technology transfer articles, and university research-in-progress articles. Bob's leather organizer was really a cornucopia of people and topics, and the best of it went into the pages of the magazine.

Not everything that came in was published in *AI Magazine* however,

and one of Bob's many gifts was his ability to let people down easily. Many times, we received material that had been hastily written from a scientist of some stature. It is a credit to Bob that he didn't let that work go into the magazine, and that his rejection of it, far from creating a firestorm of controversy or hurt feelings, was accepted graciously by the author. Sometimes I think that Bob charmed authors so much that they didn't even know they were being rejected!

Bob had a long-standing interest not only in research but also in industry. One of the topics of our weekly meetings was what advertising would be in the next issue—not so the editorial pages could be tailored to it (he would never have stood for that)—but so he could simply be kept informed. He was always interested in what new products or services were being offered, what new companies were being founded, and what new directions industry seemed to be headed in. The advertisements we published (and in those days, we published quite a lot) gave him some insight into industry trends. He was also interested in the way the advertisements looked and suggested on several occasions that we engage the services of a specific designer because he or she had “done a good job with the advertisement” that we published.

Bob's sense of humor often cropped up within the pages of the magazine—there was playfulness about those early issues. Without the stranglehold of tradition, we were breaking new ground with every issue, and it was commonplace to see Bob's wit and humor reflected somewhere, whether in selecting cartoons from Sidney Harris; choosing riddles (how many AI scientists does it take

to screw in a light bulb?); or, most often, selecting letters to the editor. In one issue, for example, Bob published articles ranging from AI classification schemes to pattern-recognition techniques to AI research in Europe. Then, just for fun, he included a definition of *meta-ravioli* and a letter from a conference attendee who had gone around looking at the ring fingers of all the female attendees, and the girth of all the male attendees, and attempted to draw some conclusions from his observations. A firestorm of protest ensued from that letter, and all of it was published in the magazine. One could never say that *AI Magazine* was dull while Bob Englemore was editor!

There is an art to being a magazine editor. The good ones are clarifiers. They wade into a muck of new ideas and fringe suggestions and reshape them into coherent form, filtered, and ready to read. Bob was editor of *AI Magazine* during the youth of the publication, and the adolescence of the field it served. We had fun with *AI Magazine* in those days; we weren't afraid to take chances, and we weren't afraid to have a little fun with each issue. It wasn't unusual for Bob to present readers of *AI Magazine* with a story that they had seen nowhere else, and were unlikely to see elsewhere in the future. Those were exciting times in AI, and Bob's contributions to the field—those 41 issues—are all treasures. I am proud to have served under Bob during his tenure as editor as, I know, are my colleagues and friends in AAAI from those early days. We all miss Bob terribly.

—Davod Mike Hamilton
AI Magazine

ment to the Sierra Club and was a lifelong member as well as an enthusiastic backpacker and outdoor photographer. His sense of direction when hiking was almost as strong as his confidence in his sense of direction, and only occasionally were we lost in the wilderness.

Being with grandchildren brought out his

kind, gentle nature, and he loved opportunities to explore and explain and just be with them, preferably outdoors. He and Ellie have three grown daughters and four grandchildren, all of whom know what a soft touch he could be and how much his patience and loving nature shaped all of us who loved him.



IAAI-2000 Conference Chair Bob Englemore in Austin, Texas.

Bob loved good jokes and had a wonderful gift for seeing humor in the details of everyday life. On one of his first days at Stanford thirty years ago, he greeted his new coworker (BGB) with, "And don't call me Chief." One of his last e-mail messages to his friends was a joke, one of many he sent to brighten our days. Being with him and seeing the twinkle in his eye was even better, of course. Every day with him was fun and even when he rose to managerial ranks he was still funny, self-deprecating, and genuine.

Bob was well liked as a manager because of his capacity for nonjudgmental, objective advice and his well of good humor. He performed very skillfully as a lab director at Stanford because of the breadth of his knowledge and understanding of science, and of AI, and his capacity for sustained hard work. In a laboratory setting that was very interdisciplinary, he was able to integrate the often diverse contribu-

tions of the many scientists and technical support staff.

Bob was respected as an editor, program manager, scientist, and mentor to students because of his scientific knowledge and intellectual capacity to understand new material quickly. All who worked with him found his contributions to be substantive and thorough and found, at the same time, that he respected everyone else's ideas and individuality. He contributed a sense of fun and human warmth to his friends, to Stanford, to AAAI, and to the entire AI community.

A Robert S. Englemore memorial lecture is planned at the IAAI Conferences annually, with publication featured in *AI Magazine*.

Notes

1. Englemore, R. S., and Morgan, A. J., eds. 1988. *Blackboard Systems*. Wokingham, U.K.: Addison-Wesley.
2. One of us (BGB) has the dubious honor of having had an article turned down by Bob because it didn't meet his standards. It was a good article, or so the author thought, but not the sort of thing Bob wanted the readership to have to suffer through. He rejected it with such good humor and finality it was impossible to sustain an argument about it.
3. "Stanford Computer Scientist Dies in Hawaii," *Palo Alto Weekly*, March 28, 2003.
4. This opponent was David Wilkins, who had played varsity tennis as an undergraduate.