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Frank Heart, Who Linked Computers Before the Internet, Dies at 89

By Katie Hafner

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Frank Heart, the engineer who oversaw development of the first routing computer for the Arpanet, the precursor to the internet, died on Sunday at a retirement community in Lexington, Mass. He was 89.

The cause was complications of melanoma, his son Bennet said.

In 1969, Mr. Heart led a small team of talented young engineers to build the Interface Message Processor, or I.M.P., a computer whose special function was to switch data among the computers on the Arpanet. To this day, many of the principles Mr. Heart emphasized — reliability, error resistance and the capacity for self-correction — remain central to the internet's robustness.

Data networking was so new that Mr. Heart and his team had no choice but to invent technology as they went. For example, the Arpanet sent data over ordinary phone lines. Human ears tolerate low levels of extraneous noise on a phone line, but computers can get tripped up by the smallest hiss or pop, producing transmission errors. Mr. Heart and his team devised a way for the I.M.P.s (pronounced imps) to detect and correct errors as they occurred.

Mr. Heart demanded that I.M.P.s be made impenetrable, believing that curious graduate students would be tempted to poke around the machines to see how they worked and bring down the network with their tinkering.

"I took an extraordinarily rigid position," Mr. Heart said in an interview in 1994. "They were not to touch it, they weren't to go near it, they were to barely look at it. It was a closed box with no switches available."

As a result, the I.M.P. was encased in intimidating battleship-gray steel.

"It was part of Frank's personality to try to control uncontrollable events," said David Walden, a computer programmer who helped build software for the I.M.P.s.

Thanks to Mr. Heart's s relentless worry about errors, his team of 10 engineers, who called themselves the I.M.P. Guys, ended up inventing the field of remote diagnostics for computers. They also designed the I.M.P.s to run unattended as much as possible, bestowing on them the ability to restart by themselves after a power failure or crash.

This infant network "did a lot of looking at its navel all the time," Mr. Heart said in 1994, "sending back little messages telling us how it was feeling and telling us what kind of things were happening, where."

Bolt, Beranek and Newman, the Cambridge, Mass.-based technology company where Mr. Heart spent most of his career, beat I.B.M. and other larger firms in the bidding to build the I.M.P. for the federal government's Advanced Research Projects Agency, or Arpa.

The machine was built during nine frenetic months. Just before Labor Day in 1969, two members of the team flew to California to install the first machine — roughly the size of a refrigerator and weighing more than 900 pounds — at the University of California, Los Angeles. A few weeks later, the second I.M.P. went in, at Stanford Research Institute (now SRI International in Menlo Park, Calif.), and a computer network was born.

"His fanatical attention to detail paid off," said Alex McKenzie, one of the team members. "The first I.M.P. was delivered on time and on budget, and when it was plugged in, not only did it start working, but it hardly needed debugging."

The team led by Frank Heart that created the Interface Message Processor (I.M.P.) in 1969 at the Bolt, Beranek and Newman company in Cambridge, Mass. From left, Truett Thach, Bill Bartell, Dave Walden, Jim Geisman, Bob Kahn, Mr. Heart, Ben Barker, Marty Thorpe, Will Crowther and Severo Ornstein. Raytheon BBN Technologies

The public at large was so unfamiliar with computer networking at the time that when Bolt, Beranek was awarded the $1 million Arpa contract in late 1968 and the news reached the office of Senator Edward M. Kennedy of Massachusetts, the senator sent a telegram thanking the company for its ecumenical efforts and congratulating the company on its contract to build the “Interfaith Message Processor.”

Frank Evans Heart was born on May 15, 1929, in the Bronx and grew up in Yonkers. He inherited a penchant for engineering from his father, Herbert, an engineer at the Otis Elevator Company. His mother, Ada (Abramson) Heart, was an insurance agent.

Mr. Heart enrolled at the Massachusetts Institute of Technology in 1947 and paid his way through college by entering a five-year master’s degree program in which work and school were combined in alternate semesters.

In 1951, M.I.T. offered its first course in computer programming, and Mr. Heart signed up. He became fascinated by computers and finished his master's degree while working at Lincoln Laboratory, a military contractor at M.I.T. Mr. Heart was a research assistant on Whirlwind, a computer that controlled a radar defense system for tracking aircraft.

The Korean War was being fought at the time, and Lincoln Laboratory officials intervened with the draft board, winning a deferment for Mr. Heart for the essential work he was doing for the military. Mr. Heart received both bachelor's and master's degrees in electrical engineering in 1952.

While at Lincoln Lab, Mr. Heart met Jane Sundgaard, a programmer there. They married in 1959. Ms. Heart died in 2014 at 81. In addition to his son Bennet, Mr. Heart is survived by another son, Simon; a daughter, Rachel Heart Bellini; and six grandchildren.

Mr. Heart remained at Lincoln Laboratory until 1966, when he was recruited by Bolt, Beranek (now a part of Raytheon) to work on a hospital computing system. Shortly after he arrived, the hospital system was deemed a failure and set aside.

As luck would have it, the company had just been asked to submit a proposal to build the first I.M.P., and Mr. Heart was put in charge.

That first node spawned many more. I.M.P.s lay at the heart of the Arpanet until 1989, when the federal government decommissioned the network. Most of the I.M.P.s were disassembled and thrown away. A few remain, scattered in museums and computer labs around the United States.

The technology research company Gartner Inc. forecasts that 20.4 billion Internet-connected devices will be in use worldwide in 2020. Many of them are a tiny fraction of the size of the original I.M.P., and far more powerful.

Like other data networking pioneers, Mr. Heart could not predict the huge and lasting impact his invention would have; he ascribed much of his involvement to happenstance.

"I was extraordinarily lucky to latch onto a rising rocket," Mr. Heart wrote in an unpublished memoir, "and ride it to a huge change in our society."

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