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EULOGY FOR WILLIS WARE
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I want to begin by thanking the entire Ware Family for ensuring that all of us who knew and admired Willis Ware have this chance to reflect on his extraordinary life:

- Willis’s daughters, Ali and Deb
- his sons-in-law, Tom and Ed
- his granddaughters, Arielle and Victoria
- his great-grandson, Aidan
- his brother, Stanley; sister-in-law, Sigrid; and niece, Joanne.

Thank you for asking me to be a part of this service. It is truly humbling.

The field of computer science is relatively young, but it has seen its share of visionaries and trailblazers. Few, however, have pushed the frontiers of technology with as much persistence and longevity as Willis Howard Ware.

Willis showed an early passion for engineering and circuitry. Working with salvaged parts and loaf pans that he pilfered from his mother’s kitchen, he constructed primitive two- and three-tube radios as a kid. He went to college at the University of Pennsylvania and earned a master’s degree in electrical engineering from MIT shortly after the start of World War II. He first job exposed him to new signals equipment at a time when, as Willis remarked, “the phrase ‘digital technology’ was not yet in the lexicon.”

When the war ended, Willis’s experience brought him to John von Neumann’s newly established computer development program at Princeton University’s Institute for Advanced Study. This gave Willis the chance to earn a tuition-free PhD and begin his lifelong association with computers.

Around the same time, a small Pentagon project housed at the Douglas Aircraft Company had also been probing the frontiers of computing technology. By the time the RAND Corporation was established as an independent organization in 1948, it had increasingly ambitious data needs that required something more powerful than a labor-intensive process involving slide rules, mechanical calculators, handwritten worksheets, and analog computer simulation. RAND sent a team to visit laboratories and universities across the country. The results were not very encouraging—until the team visited Princeton. There, Willis, John von Neumann, and other trailblazers were building what would become the model for the next decade-and-a-half of electronic computing technology.

After completing his PhD in electrical engineering in 1951, Willis moved west, taking a job at North American Aviation. In the meantime, RAND was building a clone of the Princeton computer. It was named the JOHNNIAC, for John von Neumann. In 1952, RAND lured Willis away from North American to help lead the JOHNNIAC project, and Willis would spend the next 55 years at RAND.

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1 JOHNNIAC actually stands for “John v. Neumann Numerical Integrator and Automatic Computer.”
He soon rose to become the head of RAND’s Computer Sciences Department, where his friend Paul Baran conducted his seminal work on packet switching and distributed communications. It was in this role that Willis demonstrated the two gifts that made him an iconic figure in computing history. One was the ability to spot brilliant talent and inspire it to invent dazzling new capabilities. The other was to think beyond the practical applications of the new technology to its effects on society and on individuals.

Willis predicted with remarkable accuracy how the digital revolution would change—and challenge—society. In 1966, he wrote that “the computer will touch men everywhere and in every way, almost on a minute-to-minute basis. Every man will communicate through a computer whatever he does. It will change and reshape his life, modify his career and force him to accept a life of continuous change.”

He also recognized that the ubiquity of computers would expose new vulnerabilities by distributing data processing and centralizing data storage. In 1967, Willis led a task force to help the Pentagon protect its classified computer systems from unauthorized access, user error, and data loss. The “Ware Report,” as it was known, established guidelines for security that remain standard practice today. Decades before data breaches, malware, and phishing began to make headlines, Willis’s paper *Records, Computers, and the Rights of Citizens* recommended, among other things, that there should be no secret data recordkeeping systems and that people should know what information about them was being recorded and should have a way of correcting it. Willis led several committees aimed at safeguarding computer-user privacy rights, including the Privacy Protection Commission created by President Gerald Ford. That commission led directly to the creation of the Federal Privacy Act of 1974.

Over his long career at RAND, Willis continued to hone his analytical talents, conducting research for the Air Force and eventually serving as deputy vice president of RAND’s Air Force division.

By the 1990s, as more and more personal, commercial, and government activities came to rely on the Internet, Willis continued his focus on the vulnerability of the nation’s information infrastructure to external attacks and other kinds of disruptions. In a study of privacy in medical recordkeeping, he argued for the need to hold organizations accountable for the use of personal medical data, recommending critical legal and procedural changes to safeguard patients’ privacy. In 1994, he was selected as a member of a committee to examine national cryptographic policy under the sponsorship of the National Research Council. Policies on data encryption had never before been examined in a cohesive way by a nongovernmental group.

Willis served on many influential panels and committees established by the National Academies—more than 30 in all. He was a fellow of the Institute of Electronic and Electrical Engineers and a member of the National Academy of Engineering, among other professional organizations. He received honors too numerous to list, including the Computer Pioneer Award from the IEEE Computer Society, a lifetime achievement award from the Electronic Privacy Information Center,
and a Pioneer Award from the Electronic Frontier Foundation. Last year, he was inducted into the National Cyber Security Hall of Fame.

I knew Willis for nearly 40 years. We worked on projects together and we traveled together, mostly during the time when my wife, Debra, and I were starting our own family. Naturally, we talked a lot about families and kids, so I can attest to how proud he was of his family. One of my fondest memories is of Willis at the celebration of RAND’s 50th anniversary, in 1998. We had an open house for families, and I brought my 13-year-old son, Will, over to meet Willis. Willis quickly discovered that my son was fascinated by computers, so he invited Will to sit between him and Paul Baran at lunch, thereby creating a memory for a lifetime.

For me, Willis was a cherished colleague and friend. For the institution I lead—the RAND Corporation—Willis was and always will be a mythic figure, one of the pioneers who made RAND the world’s foremost and most famous think tank. But, he was even more than that.

In Willis’s 2008 memoir, RAND and the Information Evolution: A History in Essays and Vignettes, he wrote, “the history of an organization is more than a sober presentation of such things as major accomplishments, key decisions, changes in corporate name, physical locations, and clients served. While each is important in its own right, the people who make them happen have their own importance and place in history.” Willis Ware did more than have a place in that history. He helped create that history. And because of what he achieved in the fields of data protection and personal privacy, millions of people will forever be in his debt.

For all of these reasons, Willis will be missed, but he will never be forgotten.