

INSIDE MAYO CLINIC RESEARCH

Dr. Barry Gilbert reflects on 6 decades at Mayo

Sep. 19, 2023

Barry Gilbert, Ph.D., has spent 59 years at Mayo Clinic, along with his team developing technology that has changed the face of healthcare. In the first of a two-part series, Dr. Gilbert describes how he landed at Mayo and the technology that would not be possible today without the work of his team.

When [Barry Gilbert, Ph.D.](#), took a part-time position at Mayo Clinic in 1964, he never imagined that someday he would be leading a group of highly skilled engineers in groundbreaking research and technological advances.

“I earned my bachelor’s degree in electrical engineering from Purdue University,” says Dr. Gilbert, “and later on earned a Ph.D. in physiology and biophysics (now referred to as biomedical engineering) from the University of Minnesota and Mayo Clinic in a combined program. I had planned to be a research physiologist, with no idea that developing computers was to become a large part of my future.”

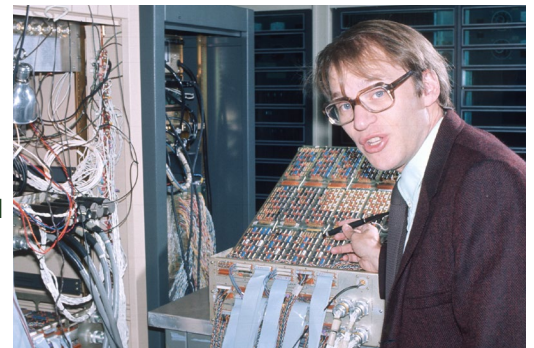
After 59 years at Mayo, Dr. Gilbert looks back on an amazing and unexpected career filled with advancements that have reached the patient’s bedside and far beyond, sharing his thoughts about what the future holds at the crossroads of technology and healthcare.

From the past to the future of healthcare

When Dr. Gilbert started work at Mayo in 1964, his mentor was the esteemed researcher [Earl Wood, M.D., Ph.D.](#), who was a co-inventor of the fighter pilot’s G-suit during World War II, a project that included the early development of cardiac catheterization. By 1969, Dr. Wood and his team, including Dr. Gilbert, had developed X-ray and video-based full-motion cardiac imaging, including a data analysis approach referred to as video angiography.

By the late 1960s, the Wood team was searching for even better approaches to image the heart and lungs of patients, which eventually led, beginning in 1970, to the design and construction of the Dynamic Spatial Reconstructor (DSR), a “four-dimensional” (3D plus time) X-ray computed tomography (CT) machine. The DSR was the first of its kind — a whole-body CT system that provided accurate visualization and measurement of the vital functions of the heart, lungs and circulation. Modern 3D and 4D X-ray CT machines can trace their lineage to the DSR.

In that year, Dr. Wood asked Dr. Gilbert to lead a team to develop two special-purpose supercomputers to calculate the 4D images from the raw data collected by the DSR, since no commercial computer was capable of these tasks. That project in turn resulted in the creation of the Special Purpose Processor Development Group (SPPDG), with Dr. Gilbert as its principal investigator.



Barry Gilbert, Ph.D., with the first special-purpose supercomputer in the early 1970s.

Dr. Gilbert's team

Since the group was established in 1970, Dr. Gilbert and his present staff of 45 engineers, IT specialists and technicians have published more than 350 papers and hold 35 patents, based on dozens of technology development efforts for, and funded by, Mayo Clinic and the U.S. government. These projects have included tiny handheld receivers for the Global Positioning System (GPS), deep data-mining software for very large clinical databases, and autonomous body-worn physiological monitoring units.

When speaking about the start of his career, Dr. Gilbert reflects on the national research environment in the mid-1970s.

“At least 10 laboratories across the U.S., including ours, were studying the possible uses of computers for biomedical research and the clinical practice, all funded by the National Institutes of Health (NIH). But in 1978, NIH leaders believed that ‘computers have nothing to do with the delivery of healthcare and never will,’” says Dr. Gilbert.

Fortunately, that view did not prevail; the subsequent technical and computational developments applicable to healthcare by several generations of physicians and scientists at Mayo and nationwide have been revolutionary.

Throughout his career, Dr. Gilbert has worked to secure funding for his team's work from groups such as the [Defense Advanced Research Projects Agency](#), the NIH, the [U.S. Air Force](#) and [NASA](#). He says that when some projects did not succeed or were not completed, often the issues were not technical, but rather due to insufficient long-term financial support.

In addition to large projects such as developing a GPS navigation system for the Mayo One helicopter and collaborating with the Air Force and NASA to demonstrate the value of “intelligent” satellites, Dr. Gilbert says that some of the smaller, lesser-known efforts that his team has conducted have added value as well.

For example, in a collaboration between the SPPDG team and other Mayo engineers, by 1997, the “electronic clocks” that time-stamped clinical records at all Mayo Clinic facilities were synchronized to within 70 nanoseconds of the reference clock of the National Bureau of Standards, now known as the [National Institute of Standards and Technology](#). This capability was unprecedented in the late 1990s.

Preserving history

Although newer technologies such as cell biology are now widely discussed and developed, advances in biomedical engineering continue at Mayo and in many U.S. and foreign laboratories.

Dr. Gilbert is working to ensure that the technical advances he and his team have produced at Mayo Clinic for the past 59 years are well documented and historicized.

“A relative once told me that we stand on dead men's shoulders, even if we don't know who the dead men are,” says Dr. Gilbert. “I'm trying to ensure that Mayo staff who strengthened the practice of medicine through technology developments are remembered.”

[Gregory Gores, M.D.](#), Kinney Executive Dean of Research and a liver specialist, has known Dr. Gilbert for many years. He's seen the work of Dr. Gilbert and his team evolve and benefit researchers and clinicians around the world.

“The accomplishments of Dr. Gilbert and his team over his long tenure at Mayo can't be overstated,” Dr. Gores says. “From imaging to GPS technology, the impact his work has had on research and patient care — and the legacy of dedication, perseverance and curiosity he leaves us — is something everyone at Mayo should know and treasure.”

When asked for his thoughts on his longstanding career at Mayo Clinic, Dr. Gilbert says, “The best decision that I ever made was to have my career at Mayo Clinic because of its open and supportive research environment; it's been a privilege.”



Barry Gilbert, Ph.D.