

IF WE EXCEL IN ANYTHING, IT IS IN OUR CAPACITY FOR
TRANSLATING
IDEALISM INTO ACTION.

CHARLES H MAYO M.D., 1931

A HISTORY OF INNOVATION AT MAYO CLINIC

A look at how engineers have teamed with physicians for over 100 years to improve patient outcomes.

This October, Mark Wehde, Section Head of Technology Development at the Mayo Clinic Division of Engineering, will join us at the [American Medical Device Summit](#) in Chicago to talk about how engineers at Mayo Clinic have teamed with physicians for over 100 years to find new ways to better care for their patients.

In advance of the summit, we spoke to Mark about this relationship and the culture of innovation at Mayo Clinic.

What does it mean to you to 'innovate'?

For most from my generation, technology has grown up around us. The things we take for granted today were only barely imaginable 30 or 40 years ago. To this day I still find it amazing that I can walk into our lab and make a radio. I can make an ECG monitor. I could make a respiratory monitor. This afternoon. To me, that is one of the singular pleasures of being an engineer—we can make the things we use.

These things don't have to be hard. In fact, the ones I mentioned are not.



MARK WEHDE

Section Head of Technology Development
Mayo Clinic Division of Engineering





"The Mayo brothers—Will and Charlie—are special to us because they have an acquired state of grace due to their association with our best traditions of caring for others."

But the knowledge to make them is hard-earned. The classes are hard, and that and the dedication and hard work involved in the pursuit of knowledge are the price of entry. This creates a barrier to entry and only when you have passed through it by mastering the fundamentals can you then truly begin to innovate.

Innovation is a subset of invention. An invention may be new, it may be novel, but this doesn't imply usefulness. An innovation must be useful; it must create a change. In a sense, invention is the purview of the scientist and innovation the aim of the engineer.

Innovation is a buzz-word across our industry now, but I will insist that there is no innovation without creating change. An idea is not an innovation. To innovate, you must have the ability to develop your ideas into a useful commodity. Many healthcare organizations have become very good at coming up with ideas. What many haven't solved well is how to move them into practice.



Mayo Clinic's Gonda Building in Rochester, Minnesota. Located at the heart of Mayo Clinic's campus, the Gonda Building is the centerpiece of Mayo's integrated practice.

I am, perhaps understandably, biased towards the creation of new devices. From my very first day at Mayo Clinic, that is what I've done. In my early career at Mayo, I was making good use of the advent of personal computers and the relatively recent introduction of microprocessors. I grew up in a time where electronics and computers were first being integrated in ways that allowed for new capabilities. I could shut my door for days and delve into the deepest depths of technology, learning and discovering things that very few other people knew.

"An idea is not an innovation. To innovate, you must have the ability to develop your idea into a useful commodity."

It's exciting to be on the front end of a massively disruptive technology. Each generation seems to have its opportunity and I believe there is a special joy in trying to do something that no one else has ever done.

What are the values of Mayo Clinic and how has the organization changed over time?

When you work at an organization like Mayo Clinic, discussions of values, of our values, of the values of the Mayo brothers are ever present. You will find very few people who can't immediately recite the primary value, *The Needs of the Patient Come First*. And the curiosity of our founders continues to influence us today.

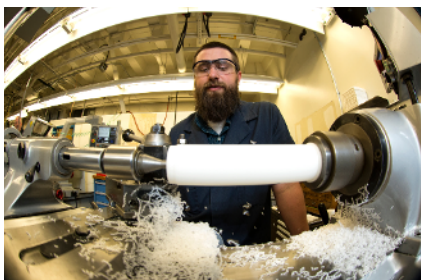
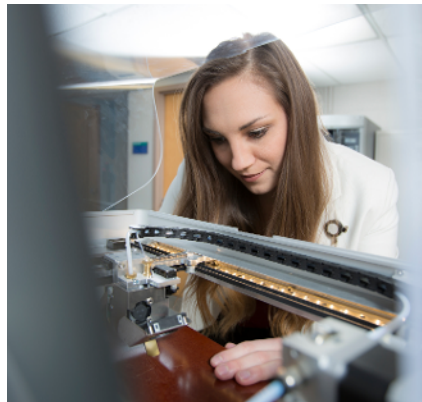
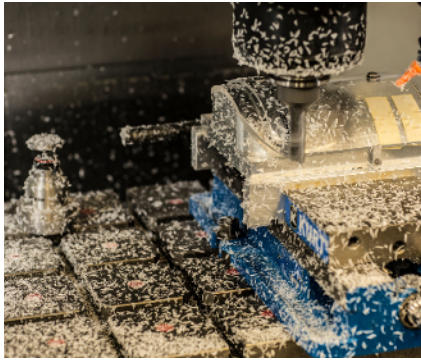
More than Apple with Steve Jobs, more than Walt Disney at Disney Studios, more than Warren Buffet at Berkshire Hathaway, the Mayo brothers—Will and Charlie—are special to us because they have an acquired state of grace due to their association with our best traditions of caring for others. They have led us to a place that exists only in our minds, a place where we work for the betterment of humanity and are better ourselves because of it.

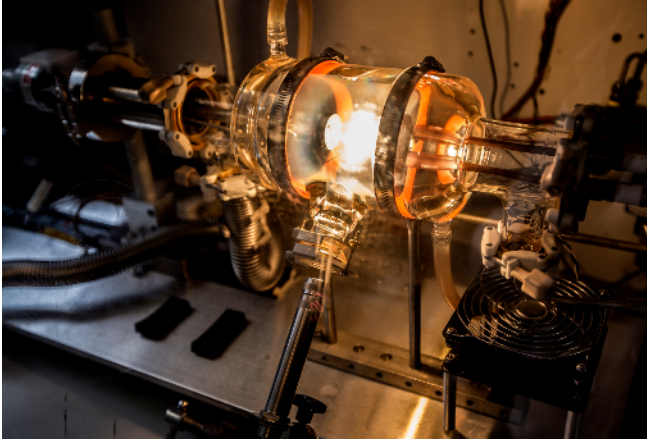
The stories we share around our founders have led, in a practical sense, to their deification. I can tell you stories of my own, times my team did something spectacular for the patient, at no ostensible benefit to us or to Mayo except for the reinforcement that we always do what is best for the patient.

While I believe that we have always stayed true to our values, to stay relevant we have had to accommodate significant changes to our culture. To create change requires that people change and to do so requires that they have an awareness of the reasons for change.



The entranceway of the Plummer Building in Rochester, Minnesota. The Plummer Building opened in 1927 to accommodate Mayo Clinic's expanding practice.





Blue diamonds occur both in nature and in the laboratories of the Division of Engineering at Mayo Clinic. These conductive boron-doped blue diamonds are used to detect neurotransmitters released by the brain.

How about the Division of Engineering - how has it changed over time?

The Division of Engineering has re-invented itself many times over. When the Mayo brothers began the practice, the combination of aseptic surgery and surgical anesthesia was leading to the modernization of surgery. As patients began to survive in much higher numbers, surgeons were able to develop new, successful techniques that wouldn't have been possible a generation before.

A hallmark of the Mayo practice has always been innovation and, to meet the growing demand for new surgical instruments, in 1915 the Mayo brothers formed the Instrument Shop. This centralized the development and repair of surgical instruments. Dozens of custom surgical instruments were created in the intervening years, many of which were made widely available around the world.

In 1948, recognizing that medical device technology was becoming increasingly sophisticated, Mayo Clinic responded by rebranding the Instrument Shop as the Division of Engineering with the addition of electrical and mechanical engineers. This new Division was asked to create devices that didn't exist using the best available technology.

In response to industry changes, the Division has developed rigorous processes based on FDA 21 CFR 820 in support of clinical trials. The industry emphasis on quality, effectiveness, and efficiency was readily adopted and has led to dramatic increases in the value of the work we perform.

As we move towards the end of the second decade of the 21st century, the Division remains focused on improving

the lives of our patients through the development of novel point-of-care sensors, explorations of new mechanisms for deep brain stimulation and treatment of epilepsy, and movement into minimally invasive surgical tools and orthopedic implants.

Of course, through the last 103 years, what hasn't changed is our commitment to the patient. Remnants of the original 1915 Instrument Shop are still seen in our modern-day machine shop where talented technologists continue to modify and create surgical instruments to make the surgeon's job just a little easier and the patient's outcome a little better.

What have you learned as you have developed as a leader within the Division of Engineering?

To become a manager is not a seamless transition for an engineer. As engineers, we learn to become consummate problem solvers. As managers, we are called upon to become problem finders. The complex interactions of systems that include people require a recognition that often solving the problem won't actually solve the problem. One must first find out what the problem really is. I was fortunate in my early years to manage a group of engineers and technicians whose expertise in their field greatly exceeded mine. I learned to ask questions and listen to answers and trust that my staff knew better than me how to solve the problem—once we agreed to what it was.

When one is a worker, one tends to think that managers have all the power. But as you move up in an organization, you realize that giving orders often isn't effective and you learn that the primary tool at your disposal is selling your ideas—though I think many make the mistake of thinking that selling is a one-way conversation. It's not. To sell an idea, you better be darn good at listening.

I can't emphasize enough the importance of education when developing as a leader. To excel requires a combination of formal learning, informal discussion and exploration of ideas and concepts, and an experiential approach based on trial and error. And this never ends.

How do you find the motivation to continue to push for advancements and bridge the gap between hospitals and medical device manufacturers?

Extrinsic motivation is not hard to find at Mayo Clinic. We all know why we are here. When you work at an organization that has a reputation for compassionate care for patients and, not incidentally, is regarded as one of the finest healthcare entities in the world, there is a self-imposed expectation to live up to these standards.

Opportunity is also a powerful motivator. Working with world-renowned physicians and scientists, one quickly recognizes that this creates an incredible setting for innovation.

With this many smart people in such close proximity, good things will happen. Our physicians are acting on behalf of our patients. As an engineer, I feel an obligation to represent my discipline as well as our physicians represent theirs.

One of the premises of continuous improvement is that most people are motivated to do good work. When you combine even a nascent intrinsic motivation with the existing extrinsic motivation provided by our organization, the reward we experience from knowing we are part of something so much greater than ourselves provides a reinforcing feedback loop.

It also helps that Mayo is a consensus-driven organization. While politics exist as in any organization, the ability to cross boundaries to solve problems is well established. We find common ground in our desire to serve the patient and in so doing so, minimize the cost of crossing organizational boundaries. While this isn't a motivator, it is an enabler in that it doesn't disincentivize behavior that is good for the organization, making us much more willing to take on challenging problems.



ABOUT MAYO CLINIC

Mayo Clinic is a nonprofit organization committed to clinical practice, education and research, providing expert, whole-person care to everyone who needs healing.

Hear more about how Mayo Clinic is innovating in the med device market - join us at the American Medical Device Summit!

[View the Program](#)

