

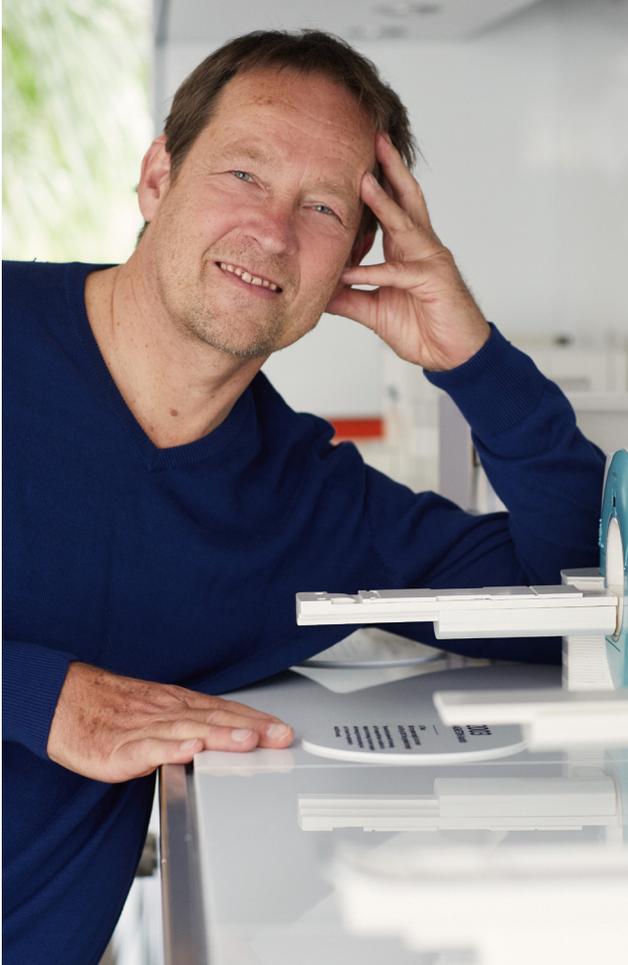
Exciting pioneering days

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## Markus Vester has been involved in the MRI's success story from the very beginning.

The pioneering days of the first MRI systems were exciting times for Markus Vester of Siemens Healthineers, and he has retained his passion for invention throughout his career. Most of his patents are connected with transmitting/receiving units in MRI scanners.

It is for this work that he has received the award in the Lifetime Achievement category.



**Dr. Markus Vester**

Principal Key Expert  
in Erlangen, Germany





### Dr. Markus Vester

Inventor of the Year 2017

**“I was part of a group of young people at the start of their careers, and setting out on an exciting pioneering journey. Despite all the intervening years, my enthusiasm hasn’t waned in the slightest.”**

Like a lot of other students, Markus Vester didn’t really have any firm ideas what he wanted to do after completing his degree in electrical engineering. As chance would have it, an old school friend he ran into in Erlangen recommended joining Siemens to work in the emerging field of MRI. Vester had serious doubts to begin with. Although he was an enthusiastic radio ham, and fascinated by the technology and its high-frequency connections, for him “Siemens was a company of old men in gray suits.” But once he’d actually joined the company, the budding engineer quickly changed his opinion: “I was part of a group of young people at the start of their careers, and setting out on an exciting pioneering journey. Despite all the intervening years, my enthusiasm hasn’t waned in the slightest.”

To begin with, Vester developed amplifier systems and improved the first MRI devices launched by Siemens in the mid-1980s. This was far more exciting work than it might sound. One day, there was a smell of smoke in the lab caused by a coil resistor overheating. Vester discovered that the transmit signal had been converted to heat, destroying the receive signal in the process. His redesign not only made the use of a resistor obsolete, it also improved signal transmission by the factor of 2. That was a pivotal experience for the inventor and he recalls “even using myself as a guinea pig in the scanner to test the improvements”.

Although this was a time in which Vester and his colleagues were developing groundbreaking technologies, fewer patent applications were filed then than now. “We were wary of helping the competition by revealing our inventions.” Things are very different today though, when even variants of familiar technologies are patented.

In order to complete his doctorate, Vester gave up his permanent position at Siemens, but continued to contribute as a freelance employee, remaining closely in touch with cutting-edge research. As he recollects with some amusement: “In the early days, MRI scanners were similar to large physics labs. We conducted experiments and obtained an image almost as a by-product.” Hospitals started using them around the middle of the 1980s, but because it took a really long time to produce useful images, commercial interest was limited at first. This all changed in 1991 with the market launch of the MAGNETOM Impact. “It was the first MRI scanner that was affordable to hospitals and could be paid for by health insurance companies”, Vester explains. And lowering costs continues to be a goal up to this day.



The focus of Vester's work was high-frequency technology, and this has remained unchanged over the years. In 1991, Vester rejoined the research center as a salaried employee. Among other things, he worked on the MAGNETOM Open, the first scanner to have an open, C-shaped magnet rather than a tubular one, with the poles arranged above and below the patient's table. This allows easier access to the patient during a scan, to take a tissue sample, for example. In this completely new layout, building antennas capable of transmitting and receiving enough signals for a usable image was a real challenge for Vester. With the models that followed, the focus was placed on creating high-resolution images in a shorter period of time.

This was achieved with the MAGNETOM Symphony, a 1.5 Tesla system launched in 1997 at the same time as the lower-priced 1 Tesla MAGNETOM Harmony. The advent of the Symphony system, to which Vester contributed a high-frequency power amplifier as transmitter, marked the breakthrough for Siemens on the world market. Vester developed a transmitter suitable for both field strengths – one equipped with low-cost, mass-produced transistors to replace the previous tube amplifiers. "With the technology of the time, it was only possible to generate a maximum of five MHz, but we needed 63 MHz." Using an array of tricks, Vester finally managed to solve the problem, also improving several other components at the same time. His work set new standards, and patents were filed for all the inventions. Up to this day, Vester still keeps one of the prototypes in his desk drawer.

Other milestones were parallel imaging, matrix technology – in which several local coils on the patient's body receive signals simultaneously – and larger magnet openings, with a diameter of 70 cm instead of 60. As well as experiencing and shaping the story of MRI, the inventor has also witnessed how the research process itself has undergone radical change. "There used to be a lot of trial and error. Nowadays, there's far more simulation." But you still get smoking resistors in the lab now and again.

High-frequency technology was a subject of fascination to **Dr. Markus Vester** (60) even as a schoolboy. And he had the good fortune to be able to turn his hobby into a career. In the 33 years he has worked for Siemens Healthineers, the expert for transmit and receive units in MRI scanners has registered 195 inventions, which have been protected by 370 individual patents and 188 patent families. According to Vester, the process of invention requires outside stimuli as well as quiet meditation. "People often picture the inventor as a loner who sits by himself in his room and gets sudden flashes of inspiration". And there may be some truth in this on occasions. But, at the very least, it's equally important to work within a group, interact with others and come up with solutions to problems as part of a team. "There are very few inventions that have been made by any one of us working totally alone."

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