In 1957, Marvin Minsky patented a “microscopy apparatus”—the first description of a confocal system—making it the first description of a confocal system. While it is certain that Minsky could not have foreseen how this simple and elegant idea would revolutionize the field of microscopy, it is also clear that the technology at the time was not available to build it.

Confocality, which essentially describes the quality of light as being in the same focal plane, allows for the scanning of a sample to generate optical sections. Reconstruction of these individual images produces a sharp 2-D or 3-D final rendering, a boon for researchers seeking to visualize detail, especially in thick sections or even entire small organisms.

It took another few decades before a working version of Minsky’s design was actually realized (unfortunately for Minsky, this was after the patent had already expired). Among other things, the field had to wait for the development of reliable and powerful lasers that could excite fluorophores at a variety of wavelengths, necessary for visualizing cells and subcellular structures. But it was not always smooth sailing for confocal microscopy. Image acquisition speed was in constant tension with detection sensitivity, and increases in either of these negatively impacted the other.

Researchers and microscope makers alike are constantly striving to push the boundaries of sensitivity, resolution, and speed. Their determination has produced a steady stream of advances in microscope technology, and researchers armed with these ever-improving tools and techniques are squeezing ever more and better data out of their samples.