



The era of our ways

All things have a lifespan, whether they are living things, inanimate things, or even the universe (the ultimate collection of things). They start out as nothing, become something, and ultimately become nothing again. This pseudo-philosophical statement begins a discussion about technological change, a subject dear to everyone's heart.

- The handset typesetting (and letterpress printing) era began in 1439 and ended in 1970 (500+ years).
- The offset era began in earnest in 1936 and will probably last until 2040 (100+ years).
- The machine typesetting era began in 1886 and ended in 1986 (100 years).
- The phototypesetting era began in 1945 and ended around 1990 (45 years).
- The laser imagesetting era began in 1978 and might end in 2008 (30 years).
- The off-press CTP era began in 1991 and will probably last until 2016 (25 years).
- The on-press CTP era began in 1991 and might extend farther into the future.
- The digital printing era began in 1976 and might extend far into the future.

Every technology solves a problem, often replacing the previous technology. Handset typesetting became machine typesetting which became phototypesetting which became laser imagesetting which then disappeared in the CTP and digital printing worlds. Off-press CTP will probably be supplanted with on-press CTP. It is reasonable to expect that digital printing, the ultimate CTP approach, will affect the longevity of offset.

Lithography was around for more than 100 years before it became offset and another 60 years before it replaced letterpress. Based on the past, would it be incorrect to predict a replacement for offset? Offset still has problems to overcome: makeready, drying, and waste. On-press CTP addresses the makeready problem, reducing makeready from more than an hour to 15 minutes to 4 minutes to perhaps 1 minute.

The life cycle of technology

New technology begins with some enabling breakthrough. Senefelder found the perfect type of stone that made lithography work. Moyroud and Higgonet found the Xenon flashlamp for stroboscopically imaging characters photographically. CTP was born because the laser became commercially available. These enabling technologies are integrated into a new approach and it challenges the status quo. Because it is at an early stage of development, acceptance is restrained, but slowly it improves and

is accepted, eventually replacing the status quo—thus becoming the new status quo.

Along the way the new technology is improved. It is advanced in speed, quality, and capability. Users upgrade from model to model

and version to version. In predicting technological change, the most important consideration is distinguishing between improvement and innovation. Innovation is a paradigm shift—something so different that it changes the way things are.

Digital printing

Xeikon and Indigo arrived in 1993, Xerox's Docutech in 1990, the Apple Laserwriter and HP LaserJet in the 1980s. But in 1976 the first digital printer was introduced. The IBM 3800 had a lightning speed of 215 pages per minute, but a resolution of 240dpi and severe font limitations; yet it was intended to replace line printers. Printed pages in the mainframe computer environment were generated on mechanical impact printers—dot matrix printers, chain printers, train printers, flying-drum printers, and others. The 3800 was faster, quieter, more flexible, and did not use pin-fed green bar paper. IBM sold more than 8000 model 3800s, and some are still running.

The 3800 revolutionized the data center; later the HP LaserJet revolutionized the office, and digital color printers have started to revolutionize the printing industry. The Xerox 9700, introduced in 1978, printed 120 pages per minute at 300dpi. Fonts were stored in memory (at 8kB to 32kB of bitmap memory, for about 8 fonts at 10 point). A separate font was needed for each different size, and larger sizes used more memory. The 9700 became the 8700 which became the 5700 which became the 2700, which, in 1980, was part of the Star office system that gave the world the mouse, a graphical user interface, the local area network, and more.

Today we have output devices with full color, high resolution, and print speeds comparable to an offset press that we only dreamed about when the industry began.

Frank Romano is a professor at the Rochester Institute of Technology and founder of this publication 26 years ago.

