

FAST COMPANY

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Where is the Auto Industry's Moore's Law?

By Fred Collopy

In the April 19, 1965 issue of Electronics Magazine, Gordon Moore, co-founder of Intel made an observation about the development of integrated circuits, which are at the heart of the modern computer's ever improving price-performance.

“The complexity for minimum component costs has increased at a rate of roughly a factor of two per year ... Certainly over the short term this rate can be expected to continue, if not to increase. Over the longer term, the rate of increase is a bit more uncertain, although there is no reason to believe it will not remain nearly constant for at least 10 years.”

Around 1970, Caltech professor Carver Mead christened this observation Moore's law, and in 1975 Moore modified it to predict a doubling every two years.

This observation has proven remarkably prescient and is among the most frequently referred to “predictions” of the 20th century. But Moore's law is less a prediction than an assertion. It represents a good case of what systems scientists call feed-forward and lawyers refer to as conscious parallelism.

Feed-forward is a systems concept in which signals from outside a system are in some way predicted and fed in to control the system of interest. Sometimes these are psychological predictions, as when people anticipate a shortage of gas, buy ahead, and thereby induce gas shortages.

Conscious parallelism is usually used to describe a kind of price-fixing among competitors that happens without actual written or spoken agreements among the parties. Rather, being sensitive to the environment and the various signals that are available there, each party adjusts its behavior to achieve a desired outcome. But conscious parallelism can apply to terms other than price.

It is hard to overstate the contribution that human expectations make to the functioning of our systems. What American who was living at the time doesn't recall how in 1962 President Kennedy motivated us to reach for the moon?

“We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are

willing to accept, one we are unwilling to postpone, and one which we intend to win, and the others, too.”

As for the incredible price reductions in computing, they did not happen for any essential technical reason. Nor were they the result of a simple set of scientific, engineering, production, marketing, or financial forces. Indeed the forces at work have been changing over the four decades in question.

Carver Meade said it clearly when he pointed out that Moore’s law is “not a law of physics, it’s about human belief, and when people believe in something, they’ll put energy behind it to make it come to pass.” And Gordon Moore himself eventually assessed the many developments that had contributed to his observation’s persistent relevance this way. “Every company knows that unless they keep moving at that pace, they are going to fall behind. ... It has become the driver of what happens.”

So, is there a Moore’s law of the automotive industry?

One good candidate is Alfred P. Sloan’s “a car for every purse and purpose.” This objective led designers at General Motors to focus on styling for many years. GM’s unique strength in the 1920s and beyond was that it found a way to reconcile providing variety with mass manufacturing. Many of the same large parts and systems were used in a Chevy Coup and an Oldsmobile convertible; yet the two could be sold to different markets and at different prices. A proliferation of distinguishing features, or “options” led to ever more complex products, logistics, sales, and management systems. When it came time to simplify, it was often by combining all of the features so that cars became, like the most elaborate Swiss army knives, loaded with features most of which any particular driver might ignore.

Another candidate for Moore’s law status might be performance. By this I don’t mean the kind of performance that matters to those of us using our cars to get to and from work everyday, but the kind that wins races and dazzles the critics who pour over spec sheets. I would not be surprised to learn, for example, that acceleration has improved along much the same line as price-performance in computing has.

But how might the automobile industry develop if someone with the veracity of a Gordon Moore or the clout of an Alfred Sloan declared that fuel efficiency was going to double every decade for the foreseeable future? What if everyone in the transportation industry’s research, design, and manufacturing communities took as a given that such improvements were part of what is required to compete? To repeat Carver Meade “when people believe in something, they’ll put energy behind it to make it come to pass.” Or, quoting Picasso “He can who thinks he can, and he can’t who thinks he can’t. This is an inexorable, indisputable law.”