

COMPUTING

Life's ups and downs

Natural population dynamics can help us predict the growth and decline of computer products, argues **Theodore Modis**

WHAT do computers and rabbits have in common? They can multiply. What's more, they do it in just about the same way. Whether it is rabbits in a fenced-off meadow or computers in a market niche, the process follows a natural growth pattern shaped like the letter S.

There are limits to natural growth, and the rate of growth slows down as the population of a species or a product nears its limit. If you put two rabbits in a meadow, their population will go through an exponential growth pattern at first, but slow down later as it approaches a ceiling — the capacity of the ecological niche.

Over time, the rabbit population traces a trajectory that is S-shaped. The rate of growth traces a curve that is bell-shaped and peaks when half the niche is filled. But a niche in nature rarely remains partially full (or empty), so one should expect a natural growth process to proceed to completion, thus making the evolution of the process predictable.

A product's sales follow the same pattern as the product fills its market niche. The quarterly sales go up and down according to the life-cycle pattern and define different business seasons for the product. At the peak of the cycle, when the rate of sales is highest, the business season looks like summer: the living is easy and the profits are high. When the sales are low, perhaps because the product has become obsolete, the season becomes a difficult one like winter.

I became involved in fitting S-curves to populations of computers when I realized that competition in the marketplace is intrinsically the same as in the jungle. The first computer model I tried — one of Digital's early successful mini-computers, the VAX 11/750 — illustrated the point. The graph shows the product's life cycle in terms of the number of units sold each quarter, the dotted line demonstrates my (then) predictions.

When I produced this graph in 1985, I concluded that the product was phasing out — a business season corresponding to fall — something the marketers denied at the

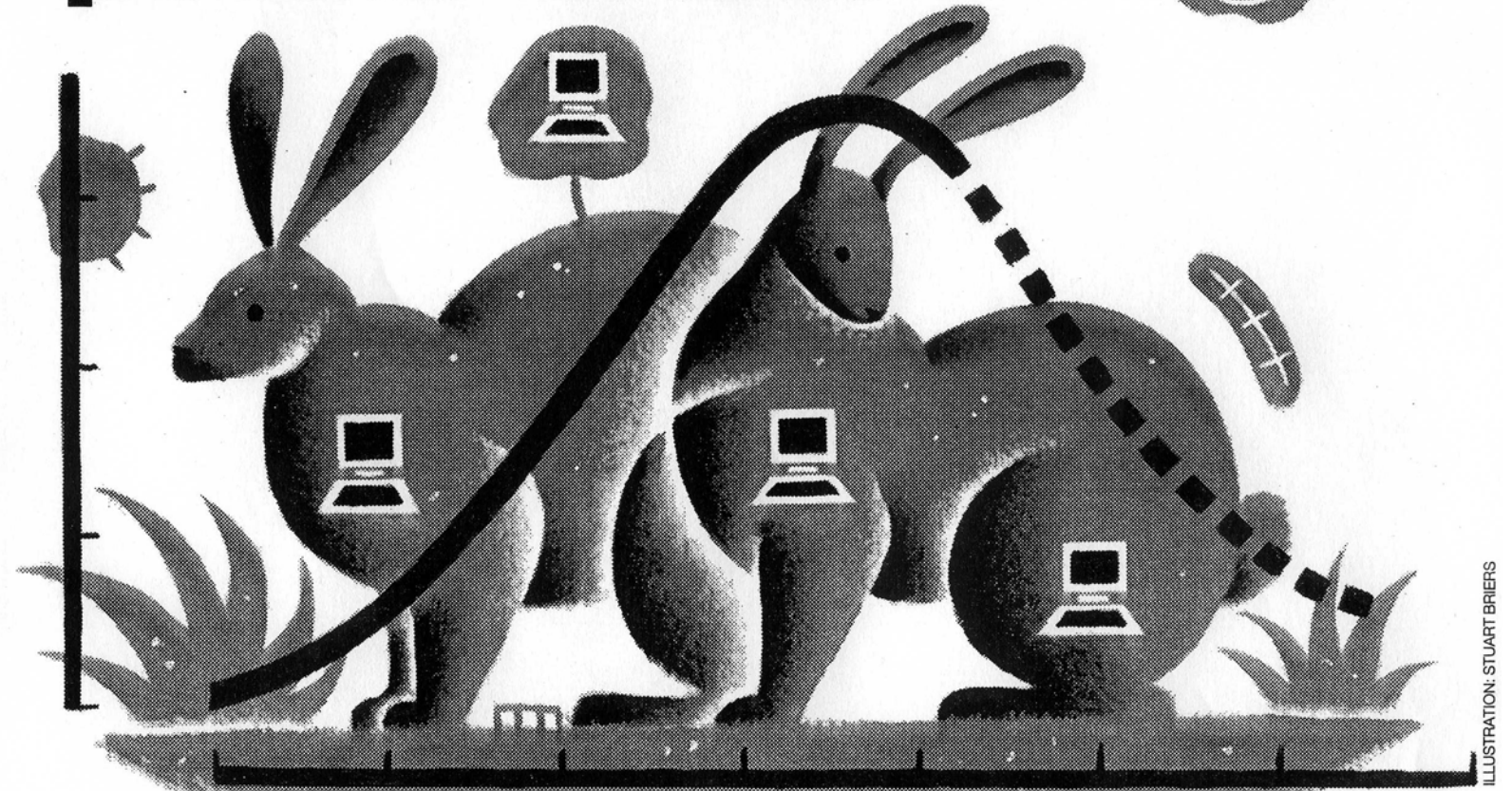


ILLUSTRATION: STUART BRIERS

time. They had plans to advertise and repackage the product to boost sales. They explained the recent lows by pointing to seasonal effects, like holidays.

Sales during the following three years turned out to be in line with my projections, following the dotted line in the graph. I believed this proved that seasonality, promotional activities, price changes, and competition in general were conditions present throughout a product's life cycle and would not alter the course of a natural phasing-out process. The new programs that marketers put in place were not significantly different from those of the past and therefore did not change the established trajectory.

SINCE THEN I have tried to fit S-curves to many products, but this has become harder because of the number of new computers entering the market in rapid succession, with little differentiation. The 11/750 was a long-lived, well-positioned product that had its own market niche. But today's models overlap and often share the market niche with other products. Life cycles are shorter and behave too irregularly to be fitted by an idealized curve. So rather than modeling single products, we can look at a growth-curve description of a whole family of products (such as

PCs or workstations) or a whole generation of technology (32-bit machines versus 64-bit ones).

The PC family of products has experienced dramatic growth and changes during the past decade. As PCs became more powerful and less expensive, they gave rise to a steam-rolling downsizing effect, progressively stealing market share from workstations, minis and even mainframes. But these trends are now coming to an end. I have tracked the downsizing effect in a quantitative way by looking at the evolution of the increase in sales associated with a drop in price. I found that the downsizing phenomenon has followed an S-shaped pattern — a natural-growth process — that went through a steep rise between 1989 and 1992 but has now reached a ceiling. During the past two years, the distribution of revenue across the range of computer products did not get any more skewed towards the PC.

The maturity of the computer industry is also visible in price trends. PCs went through several years of price cuts. At first glance, it looks as though PC prices continue to drop today since greater performance and new features appear under old price tags. In fact, the average PC price has hardly fallen since 1992. Performance keeps going up, but like cars, houses and

the products of all other mature industries, a PC now claims a stable fraction of one's income.

Sales of portable computers have been growing exponentially for the past couple of years. Exponential growth is what we encounter during the early phases of a natural growth process when the niche is still less than half full. The business season looks like spring, with better days (summer) still to come. But the IT industry as a whole has been growing at a declining rate for several years. When the rate of growth is declining, the season corresponds to fall, a time to sow the seeds for the next generation of crops, just as farmers do. What will replace the IT industry?

BESIDES portables, there are other sectors of the industry that find themselves in one fair-weather business season or another. Examples include networks, wireless telephony, consulting, software, and knowledge-based services. All these linked together by computers — preferably portable ones — constitute, what Peter Drucker would call, Knowledge Technology. In this context, the computer no longer plays the pivotal role. Now it is but one of many elements — albeit a key element — of a much larger infrastructure. It serves as the glue holding together a large number of

interfaces from terminals and telephones to databases and entire markets. It enables individuals to work from almost anywhere, and access just about anything, around the clock, if they wish.

Approaching a winter for IT implies business process re-design, decentralization, segmentation, the firing of bureaucrats, and the pursuit of horizontal niche markets. These are indeed the management policies found among most of today's computer manufacturers. At the same time, Knowledge Technology is enjoying a spring. Policies there revolve around product innovation, increasing investments, continuous improvement, and the hiring of specialists.

When summer comes for the Knowledge Technology industry in two or three years, do not be surprised to see the industry evolve accordingly: to become more conservative, vertically integrated, centralized and practically bureaucratic, with strong leadership that likes to indulge in long-range strategic planning. Each business season entails an optimum behaviour. Is your company appropriately dressed for its season?

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