Gartner’s Hype Cycle: A Simple Explanation

Jose M. Perez and Vladik Kreinovich
University of Texas at El Paso, El Paso, TX 79968, USA
jmperez6@miners.utep.edu, vladik@utep.edu

Gartner’s hype cycle. In the ideal world, any innovation should be gradually accepted. It is natural that initially some people are reluctant to adopt a new largely un-tested idea, but as more and more evidence appears that this new idea works, we should see a gradual increase in number of adoptees – until the idea becomes universally accepted.

In real life, the adoption process is not that smooth. Usually, after the few first successes, the idea is over-hyped, it is adopted in situations way beyond the inventors’ intent. In these remote areas, the new idea does not work well, so we have a natural push-back, when the idea is adopted to a much less extent than it is reasonable. Only after these wild oscillations, the idea is finally universally adopted. These oscillations are known as Gartner’s hype cycle.

A similar phenomenon is known in economics: when a new positive information about a stock appears, the stock price does not rise gradually: at first, it is somewhat over-hyped and over-priced, and only then, it moves back to a reasonable value.

Our explanation. Any system is described by some parameters $x_1, \ldots, x_n$. The rate of change $\dot{x}_i$ of each of these parameters is determined by the system’s state, i.e., $\dot{x}_i = f_i(x_1, \ldots, x_n)$. In the first approximation, we can replace each expression by the first few terms in its Taylor expansion, e.g., by a linear expression $\dot{x}_i = \sum_j a_{ij} x_j$. A general solution of such systems of linear differential equations is known: in the generic case, it is a linear combination of terms $\exp(\lambda_k t)$, where $\lambda_k$ are (possible complex) eigenvalues of the matrix $a_{ij}$, i.e., roots of the corresponding characteristic equation $P(\lambda) = 0$. When the imaginary part $b_k$ of $\lambda_k = a_k + i b_k$ is non-zero, we get $\exp(\lambda_k t) = \exp(a_k t) \cdot (\cos(b_k t) + i \sin(b_k t))$, i.e., oscillations.

Why do we see oscillations practically always? The more parameters we take into account, the more accurate our description. Thus, to get a good accuracy, we need to use large $n$. Any polynomial can be represented as a product of real-valued quadratic terms. Some of these quadratic terms have real roots. If $p_0$ is the probability that both roots are real, then for a polynomial of order $n$, the probability that all its terms have real roots is $\approx p_0^{n/2}$. For large $n$, this is practically 0, which means that practically all polynomials have at least one non-real root – and thus, almost all systems show oscillations.