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HOW DO SYSTEMS BECOME COMPLEX?

Many systems—the economy, technology, organic chemistries, language itself, genetic regulatory networks, computer languages such as Lisp, mathematics—build by creating new components that are combinations of already existing ones. In other words, they build themselves out of themselves, bootstrapping their way from few elements to many, and from simple elements to complicated ones. Prof Arthur will talk about this “evolution by combination,” and will demonstrate an agent-based system that evolves by combination. He will discuss how this applies to the development of economies and to advanced technology.

BIOGRAPHY

Brian Arthur is a leading economist and technology thinker. He is best known for his pioneering theoretical work on positive feedbacks or increasing returns in the economy—what happens when products that gain market share find it easier to gain further market share—and their role in locking markets in to the domination of one or two players. Brian is also one of the pioneers of the science of complexity—the science of how patterns and structures self-organize. He is one of the founders of the Santa Fe Institute, and has served many years on its Science Board and Board of Trustees.

Brian has been Dean and Morrison Professor of Economics and Population Studies at Stanford, and Citibank Professor at the Santa Fe Institute. He holds a PhD in operations research from Berkeley, along with other degrees in economics, mathematics and electrical engineering. He is a Fellow of the Econometric Society and the World Economic Forum. He is the recipient of the Schumpeter Prize in Economics in 1990, the inaugural Lagrange Prize in Complexity Science in 2008, and two honorary doctorates. His books include *Increasing Returns and Path Dependence in the Economy* (1994); and *The Nature of Technology, What it Is and How it Evolves* (2009).