



Operations Research Seminar

Factors That Affect the Optimal Amount of Central Control in Complex Systems

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Complex systems are systems whose behavior results from highly nonlinear interactions among their constituent components, referred to here as *agents*. Examples include, human and animal societies, business organizations, the military, and the Internet. While there is much work dealing with self-organization—and its associated emergent properties—this talk focuses on one role of central organization in which four factors are conjectured to be key in determining the optimal amount of central control. To validate this hypothesis, these factors are represented as controllable parameters in a model. For different combinations of parameter values, the optimal amount of central control is found, either analytically or by simulation. The model is shown to provide results that match well with the level of control found in many specific complex systems. This model also provides general guidelines as to when various combinations of these factors suggest that low, moderate, or high levels of control are desirable.

Biography: Daniel Solow was born in Washington, D.C. at a very young age. He soon learned that Danny was his name and mathematics was his game. He received a Ph.D. in Operations Research from Stanford University and has been a professor at Case Western Reserve University since 1978. His research interests include discrete, linear, and nonlinear optimization and he uses these tools in modeling complex systems. He has also developed systematic methods for teaching mathematical proofs and reasoning, computer programming, and operations research.

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