

Governing Energy

Bounding the Boundless

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One of the difficulties of systemic risk management is to put a boundary or constraints around the problem. This is a major aspect of framing the initial challenge one is trying to solve.

One assertion about weather systems is the so-called “butterfly effect” whereby a butterfly flapping its wings in Brazil is one of the causal events for storms in Texas later.”ⁱ Additionally, economists define an *externality* as positive or negative economic consequence experienced by unrelated third parties.ⁱⁱ

While the butterfly in Brazil most likely has no impact on the weather a continent away, externalities are common. For example, pollution released from industrial complexes can impact local residents even if they are not employed by that firm or even work in the sector.ⁱⁱⁱ

Systemic risk management is a function of *Behavioral Economics*, the decision making model that incorporates societal, cultural, emotions and other human biases into the process as opposed to the classic *rational economic actor* theory.^{iv} The holistic nature of systems analysis presents the problem of the title.

Culture of Safety driven systems may include humans, machines, multiple processes and the environment.^v None of these may act with economic rationality. In fact, risk management systems such as the Bowtie recognize possible multiple points of failure and the necessity of redundant and *systemically removed* barriers and incident management processes.

By systemically removed we mean an exogenous variable or one outside and not dependent on the system. For example, redundancy may not remove the system dependencies, i.e., multiple sets of rams on the Blowout Preventer. While one may not fail, if all do for a variety of reasons, the system is compromised. The open hole bridging model is an exogenous self-killing of the wellbore independent of the BOP.^{vi} However, both are dependent on the quality of the well and reservoir models and in this sense are within model boundaries.

The Two Key Solution is an example of systemically removed economic actors. Two physically separate and independent decision makers must agree before a decision is taken.^{vii} This works unless there is a level of collusion between the two, in which case they are within system boundaries as well.

While the butterfly may not be responsible for severe weather, system planners must thoroughly assess the components of the system and their interactions. When externalities impact a system, they become endogenous within a newly defined system.

The R B C model is a useful tool helping the systemic modeler to define where logical and realistic boundaries exist.^{viii} A boundary is a **R**elationship in an environment or set of **C**onditions, exhibiting **B**ehaviors.

When these behaviors are meaningful, they must be considered in the systems analysis. A Sensitivity Analysis may help shed light on these boundary relationships and updated according to changes.

How does your organization bound your physical, organizational and virtual systems?

About the Author

Dr. [Scott M. Shemwell](#) has over 30 years technical and executive management experience primarily in the energy sector. He is the author of five books and has written extensively about the field of operations management. Shemwell is the Managing Director of The Rapid Response Institute, a firm that focuses on providing its customers with solutions enabling operations excellence and regulatory compliance management. He has studied cultural interactions for more than 30 years--his dissertation; *Cross Cultural Negotiations Between Japanese and American Businessmen: A Systems Analysis (Exploratory Study)* is an early peer reviewed manuscript addressing the systemic structure of social relationships.

End Notes

ⁱ <http://www.livescience.com/17455-butterfly-effect-weather-prediction.html>

ⁱⁱ <http://www.investopedia.com/terms/e/externality.asp>

ⁱⁱⁱ Ibid.

^{iv} Shemwell, Scott M. (2015). Structural Dynamics: Foundation of Next Generation Management Science. Houston: RRI Publications.

^v _____ (2014, August). The Emergence of a Culture of Safety Online Class. PennEnergy. <http://ogjresearch.stores.yahoo.net/the-emergence-of-a-culture-of-safety-class.html>

^{vi} <http://www.bsee.gov/Technology-and-Research/Technology-Assessment-Programs/Reports/400-499/408AA/>

^{vii} Shemwell, Scott M. (2015, April 1). The Two Key Solution. Governing Energy. PennEnergy.

^{viii} _____ (1996). Cross Cultural Negotiations between Japanese and American Businessmen: A Systems Analysis, (Exploratory Study). Unpublished doctoral dissertation, Nova Southeastern University, Ft. Lauderdale.