

Governing Energy

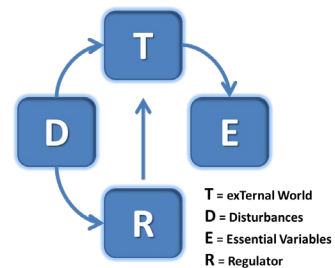
Requisite Variety

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Readers of this blog may recall that we have put forth the Relationships, Behavior and Conditions model as a construct to enable the energy industry to achieve a Culture of Safety. This is a dynamic systems model of complex interactions. In this edition, we will extend this discussion further.

Collective human experience has shown over millennia that the more complex the system, the more difficult it is to understand the relationships and their behaviors. Therefore, as system density increases, it acquires greater *variety*, that is systemic behavior becomes more uncertain.ⁱ

In 1952, W. Ross Ashby first described requisite variety. This axiom states that, “*R’s capacity as a regulator cannot exceed R’s capacity as a channel of communication.*” In other words, ex(T)ernal (D)isturbances to the system that go unregulated may drive system (E)ssential variables outside appropriate limits. Communications between these variables are represented in the arrows (→) in the graphic.ⁱⁱ



In non-technical terms, “*the variety in the control system must be equal to or larger than the variety of the perturbations in order to achieve control.*”ⁱⁱⁱ Similar to Game Theory, a table of possible outcomes or payoff matrix can be either Good or Bad.^{iv}

It is not our intention to drift too far into Behavior Economics or Cybernetics (control and communications). The point is that the complex human and machine systems that govern high tech field operations cannot be properly controlled if we do not understand them and have the appropriate level of control systems in place—“*it is necessary to have such a number of actions that is equal to the number of system’s states.*”^v

Operations Management Systems (OMS) should consider this established principle to assure appropriate system controls are in place and functioning properly. This is the essence of Strong Bond Governance model put forth for managing critical infrastructure such as energy operations.^{vi}

Does your organization’s system regulation have requisite variety?

About the Author

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End Notes

ⁱ http://stpk.cs.rtu.lv/sites/all/files/stpk/lecture6_2010.pdf

ⁱⁱ <http://www.panarchy.org/ashby/variety.1956.html>

ⁱⁱⁱ <http://www.wyrdology.com/mind/creativity/variety.html>

^{iv} <http://pcp.vub.ac.be/Books/AshbyReqVar.pdf>

^v http://stpk.cs.rtu.lv/sites/all/files/stpk/lecture6_2010.pdf

^{vi} Holland, Winford "Dutch" E. and Shemwell, Scott M. (2014). [Implementing a Culture of Safety: A Roadmap to Performance-Based Compliance](#). New York: Xlibris.