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Exploring the Criticality of Critical Controls

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ABSTRACT

In the management of safety risks, a key task in treating these is the identification of controls. Naturally, it is paramount to make sure that the best possible set of controls are implemented and maintained, in order to create safety. To do this well, many companies identify their most critical controls, and put extra effort into making sure they are designed, implmented and maintained effectively.

Critical controls are identified through many processes, but a common approach is with bowtie analysis. Performed correctly, using the bowtie process is very effective at supporting companies to identify a useful set of critical controls. But very often within a set of bowties for a plant, the consequences in one bowtie overlap with the causes of another. Also, there are common critical controls across multiple bowties, such as emergency response. In other words, the bowties can be linked together into a causal network, based on these overlapping events and controls.

Causal Network Topology Analysis (Caneta), is used to represent the set of interlinked bowties as a directed graph. Each node in the graph is an event: a, cause, unwanted event, consequence or control failure. The causal relationships between them are the edges of the graph.

The key idea in this paper is that the location of the critical controls within that network can influence how critical they are. Through the application of various network topology metrics, we explore what criticality means when viewing material unwanted events, their consequences, and critical controls as part of the causal network.

Various case studies will be used to explore criticality in this context to demonstrate that consideration of the causal context enriches our understanding of critical controls.

KEY WORDS

Risk treatment, critical controls, causal context, network analysis

BIOGRAPHY

Ben Seligmann is a risk specialist, systems thinker and teacher. Over the last 12 years he has worked in academia, engineering consulting, HSE and risk and compliance, across the mining, infrastructure, healthcare and education industries. He currently focusses on risk management research at the

Minerals Industry Safety and Health Centre (MISHC), part of the Sustainable Minerals Institute at the University of Queensland. His particular research interests are causal network topology analysis, risk assessment in practice, modelling of accident scenarios and engaging with the complexity of socio-technical systems.

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