Future Skills and Workforce Evolution: Systems thinking and its need in the workforce of tomorrow

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ABSTRACT

The demands on the mining industries workforce are constantly evolving with the deployment of smarter and smarter technologies into the environment. Operations are becoming increasingly complex, with systems more tightly interconnected and relied upon to provide productivity and safety. This in turn is creating additional pressure on teams and departments to manage operational complexity, particular in projects, engineering, and asset management. To ease this pressure, teams and departments must be equipped with the skills necessary to manage the growing operational complexity now inherent in mining. New skills in systems thinking must be learnt to complement the wealth of knowledge and operational excellence already present in the mining industry. For no longer can systems be developed independently of their operational environments, systems managed without consideration of connected systems, and problems solved in isolation of other systems.

These challenges of complexity are not limited to mining workforce and have been faced by other industries, particularly aerospace and Defence. These industries employ and train their workforce in systems thinking (often as part of systems engineering) to manage complexity. Mining should leverage this experience and adopt a similar approach. To date in the mining industry, systems thinking and by extension systems engineering, have often been regarded as a process to be applied selectively, rather than a discipline that can be employed to tackle a range of problems. This perspective of systems thinking dilutes its value and reduces it to a process-driven approach, for systems thinking is not systematic thinking, rather it is thinking holistically and thinking in terms of systems. Systems thinking promotes the idea of breaking down complex systems-of-systems into logical sub-systems and components while understanding their relationships and desired functionality. It enables people to focus on the full context of the thing in which they are analysing (systems, systems-of-systems, problems, etc) and prevents the use of 'band-aid' solutions. Systems thinking enables root cause determination and mitigates both downstream and upstream flow on effects. Further, systems thinking is fundamental to the management of operational complexity. If applied effectively in the mining context in conjunction with the already present operational excellence, systems thinking would complement existing skillsets and enhance rates of project success. It would enable more efficient, effective, and productive operation of mines, and it would allow the mining workforce to manage the increasing operational complexity and risks associated.

This paper seeks to discuss systems thinking and the importance of its addition to the mining workforce's skillset moving forward. For with the growth in the skillset of its workforce, combined with the wealth operational excellence already present, the continued prosperity of mining operations will be assured in the face of this ever-growing complexity.