International Conference on Managing Fatigue: Abstract for Review

Accepting Complexity & Maintaining Coherence: Results of a Research Project to Develop a Visual Representation Approach for the Field of Fatigue Management

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Problem

Fatigue Management is a challenge on various scales, from the individual worker, to a single worksite, to an entire business and beyond. The biological, psychological and social impacts of fatigue also occur in the families, communities and societies in which 24-hour, 7-day-per-week work occurs. There are clearly many dynamic variables involved in measuring, predicting and managing fatigue. Due to the various scales involved, and the wide range of bio-psycho-social elements, making sense of the whole field is an increasingly complex undertaking. The aim of this project was to initiate the development a practical, visual approach to represent the elements of Fatigue Management, at any scale and over any timeframe of interest. This reflects an attempt to support the acceptance of the complexity of the field, while maintaining coherence in the language, concepts and solutions for workers, companies and other stakeholders including researchers.

Method

Having seen human fatigue impacts in a wide range of environments over more than 20 years, the authors were able to initially collate relevant examples of dynamics, at various scales. From these examples, sub-elements were derived, and a causal loop systems analysis was completed to determine a case study example in an archetype format. The method used maintained functional consistency with representation formats applied to dynamic system mapping in other fields. The generic elements therefore included, but were not limited to, Key Variables, Industry-specific Drivers, Feedback Inputs, and Leverage Points. The iterative follow-up processes involved experimentation with available visual representation formats, to capture the dynamic complexity of Fatigue Management in a coherent way.

Results

The resulting approach and format allows for the visual representation of any aspect or cluster of Fatigue Management elements from a small scale (e.g. the key variables and dynamics related to recovery sleep for an individual worker) right up to a large scale (e.g. the health consequences of long-term shiftwork at a societal scale). Depending on the challenge of interest, related nested levels

(i.e. worker, work demand profile, and company productivity goals) can appear clearly within a single dynamic, in relation to identified constraints (i.e. time, quality, and cost). A proof-of-concept case study example, and discussions about the real-world practical applications of the project findings, will form parts of the presentation.

Discussion

The approach developed could be applied to reflect the necessary complexity of any Fatigue Management topic or cluster of topics, using the minimum dependent variables, while reflecting known dynamics in a visual format, to make understanding of and communication about Fatigue Management as simple as practically possible. The approach developed lends itself to being used to illustrate cause-level dynamics for almost all fatigue related questions. Testing to date has been conceptual, and while the elements and their interactions are consistent with the body of research available, no validation against experimental or naturalistic data has yet been completed.

Summary

The aim of the project was to initiate the development a practical, visual approach to representing the elements of Fatigue Management, at any scale and over any timeframe of interest. Elements included, but were not limited to, Key Variables, Industry-specific Drivers, Feedback Inputs, and Leverage Points. The resulting approach and format could allow for the visual representation of any aspect or cluster of Fatigue Management elements from a small scale (e.g. the key variables and dynamics related to recovery sleep for an individual worker) right up to a large scale (e.g. the health consequences of long-term shiftwork at a societal scale). Depending on the challenge of interest, elements (i.e. worker, work demand profile, and company productivity goals) can appear clearly within a single dynamic, in relation to identified constraints (i.e. time, quality, and cost). A proof-of-concept case study example will be presented, with discussions about the real-world practical applications.

NOTE:
Please be aware that this paper would only be of value to the audience as an oral presentation due to its dynamic and visual nature.