

Some Thoughts on
How to Optimize the Effectiveness of the
Internal Responsibility System

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Presentation Contents

1. Introduction - Motivation for Writing this Paper
2. The Origins of the Internal Responsibility System - Report of the Royal Commission on the Health and Safety of Workers in Mines
3. Problems with the Internal Responsibility System Identified Through the Mining Health, Safety and Prevention Review
4. Systems Design Applications for Improving the Internal Responsibility System
5. Potential Risk Assessment Applications for the Internal Responsibility System
6. Proposed Metrics for the Internal Responsibility System
7. Proposed Concept for a Performance Index for the Internal Responsibility System
8. Closing Remarks

Introduction - the Motivation for Writing this Paper

- **So why did I write this paper? What were the key motivational influences?**
 - *I was concerned about some of the things that had been concluded about the state of the Internal Responsibility System (i.e. the I.R.S.) in the Ontario Mining Sector from a formal review of mining health and safety led by the Ontario Ministry of Labour in 2014 and 2015.*
 - *I'd had the privilege of being involved in systems design work at other places I had worked. I asked myself, why not look at the I.R.S. through a systems design lens?*
 - *I had time on my hands. I had retired in late 2021.*
- **I was also curious about whether there could be:**
 - *a role for risk assessment to play in optimizing the effectiveness of the I.R.S. by formally identifying and quantifying the risks that can threaten the integrity of the I.R.S. in a workplace;*
 - *a series of performance metrics for the I.R.S. that could be relied upon monitor the performance of the I.R.S. in a workplace and to drive corrective measures when the I.R.S. is migrating off course in a workplace;*
 - *an I.R.S. Performance Index which could be developed to benchmark I.R.S. effectiveness at a workplace by integrating and evaluating a number of parameters which can influence the I.R.S.*

Introduction - the Motivation for Writing this Paper

- It needs to be emphasized that the ideas and suggestions proposed in this paper are strictly conceptual at this point.
 - *They have not been tried out, tested, piloted or evaluated anywhere.*

Report of the Royal Commission on the Health and Safety of Workers in Mines - The Origins of the I.R.S.

- It is widely accepted that the concept known as the I.R.S. had its origins in and was devised by the Royal Commission on the Health and Safety of Workers in Mines (i.e. the Ham Commission).
- The Ham Commission was launched in September, 1974.
- It was presided over by its Commissioner, Dr. James Ham and was authorized by an Order-in-Council approved by the Lieutenant Governor of Ontario under the provisions of the Ontario Public Inquiries Act of 1971.
- The mandate given to Dr. Ham was:
 - *To investigate all matters related to health and safety involved in the working conditions and working environment in mines in Ontario.*
 - *To identify the relevant data related to silicosis, lung cancer and other occupational health hazards of miners in Ontario.*
 - *To review the basis for Workmen's Compensation Board awards as they relate to environmental health matters affecting miners.*
 - *To make recommendations in relation to the above points as are deemed appropriate.*

Report of the Royal Commission on the Health and Safety of Workers in Mines - The Origins of the I.R.S.

■ Who was James Ham?

- *James Milton Ham was born in Coboconk, Ontario on September 21, 1920.*
- *He studied electrical engineering at the University of Toronto and graduated with a B.A.Sc. degree in 1943.*
- *He continued his studies at the Massachusetts Institute of Technology where he received his Science Masters in 1947 and his Science Doctorate in 1952.*
- *He returned to the University of Toronto as an Associate Professor of Electrical Engineering, became a full professor in 1959, head of the department in 1964, Dean of the Faculty of Applied Science and Engineering in 1966, and Dean of the School of Graduate Studies in 1976.*
- *He went on to serve as the tenth President of the University of Toronto from 1978-1983.*
- *From 1974 to 1976, he was appointed as Chairman to the Royal Commission on Health and Safety of Workers in Mines. The Commission's report on mine safety in Ontario was considered to be groundbreaking at the time.*



Report of the Royal Commission on the Health and Safety of Workers in Mines - The Origins of the I.R.S.

- **The Ham Commission Report consists of the following six sections:**
 1. *The Issues in Health and Safety in the Mining Industry*
 2. *Silicosis and Dust*
 3. *Lung Cancer and Ionizing Radiation in Uranium Mines*
 4. *Accidents and Injuries*
 5. *Other Environmental Hazards at the Workplace*
 6. *Policy for Occupational Health and Safety in the Mining Industry*

- **The Commission Report includes 117 recommendations.**
 - *Recommendation 59 on Pages 152 and 269 of the Report pertains specifically to the I.R.S.*

Report of the Royal Commission on the Health and Safety of Workers in Mines - The Origins of the I.R.S.

- **The Ham Commission established the notion of a responsibility system for health and safety encompassing the roles of all workplace parties.**

- **The Commission believed that within an operating mine, such a responsibility system is related to the following five factors:**
 1. *the quality and kind of industrial management and supervision;*
 2. *the degree of participation and commitment from employees, individually and collectively in labour unions or otherwise;*
 3. *the state of social expectation and concern in mining communities and in the public at large;*
 4. *the measure of political attention, as expressed in legislation, in the related governmental administrative practices for monitoring compliance and in the provision for compensation;*
 5. *the combined effectiveness of the above parties in operating as a system.*

Report of the Royal Commission on the Health and Safety of Workers in Mines - The Origins of the I.R.S.

- The Commission observed that these factors are characterized by a complex structure of relationships between workers, supervisors, management, unions, industry, government and the public.
- Moreover, the Commission concluded that the problems that underlie the issues of health and safety in mines are those of the performance of a responsibility system that strives ensure that these relationships function in a cohesive manner.
- A fundamental principle espoused by the Commission was that properly performed work will preclude accidents.
- The proper performance of work must therefore depend not only on the effectiveness of a system of work administration, through which worker activity is organized and coordinated, but also on the effectiveness of the means whereby this system monitors its own performance and adapts to changing conditions.
- The Commission was of the opinion that the fundamental basis for accident prevention resides in the ability of each person at a workplace to perform his or her duties in a self-determined manner within clearly defined boundaries of authority and responsibility.

Report of the Royal Commission on the Health and Safety of Workers in Mines - The Origins of the I.R.S.

- The Commission also believed that the system for the performance of work must be effective if workplace health and safety is to be realized.

- In order for the system to be effective, the Commission postulated that for each level within the hierarchy of an organization, the responsibilities be clearly defined, including responsibilities for:
 - *people;*
 - *work performance;*
 - *the direction of work;*
 - *relationships between workplace parties;*
 - *facilities and equipment;*
 - *conditions of work.*

- The Commission also thought it to be essential that there be in place the obligation to:
 - *recognize and respond to departures from standard conditions;*
 - *ensure that the internal responsibility system is in place and functioning effectively;*
 - *ensure that external auditing of the internal responsibility system occurs.*

Report of the Royal Commission on the Health and Safety of Workers in Mines - The Origins of the I.R.S.

- **Table 51 on Pages 150 and 151 (i.e. Internal Responsibility System for the Performance of Work) of the Commission report provides a detailed expression of the I.R.S.**

- **Recommendation 59 of the Commission Report reads as follows:**
 - *That senior management of each mining operation review the performance of its internal responsibility system, placing special emphasis on the delineation of:*
 1. *responsibility to detect and report departures from standard conditions at every level of the operation;*
 2. *location of responsibility for ensuring that identified departures are dealt with;*
 3. *procedures for committing the resources to correct anomalies;*
 4. *procedures for checking the action already taken and still to be taken.*

Problems with the Internal Responsibility System Identified Through the Mining Health, Safety and Prevention Review

- Throughout 2014 and in the early part of 2015, the Ontario Ministry of Labour (i.e. the M.O.L.) led a formal review of occupational health and safety in underground mining in Ontario known as the Mining Health, Safety and Prevention Review (i.e. the M.H.S.P.R.).

- Through a highly consultative process that involved labour stakeholders, employer stakeholders, health and safety associations, and Mining Sector health and safety subject matter experts, the M.H.S.P.R. identified ideas for improvement within the following six areas:
 1. *health and safety hazards that are prominent in underground mining;*
 2. *the impact of new technology and management of change;*
 3. *emergency preparedness and mine rescue;*
 4. *training, skills and labour supply issues;*
 5. *the capacity of the occupational health and safety system;*
 6. *the internal responsibility system (i.e. the I.R.S.).*

Problems with the Internal Responsibility System Identified Through the Mining Health, Safety and Prevention Review

- The M.H.S.P.R. was overseen by the M.O.L.'s Chief Prevention Officer and guided by an advisory group.
- This advisory group was structured according to a bi-partite model, whereby half of its members represented the interests of labour stakeholders in the Ontario mining sector, and half represented the interests of employer stakeholders.
- For each of the six aforementioned areas requiring improvement, the advisory group established a formal working group consisting of relevant subject matter experts.
- As with the advisory group, each of the six working groups consisted of subject-matter experts and was organized according to a bi-partite model.
- Each working group was provided with a formal scope of work which clearly defined its mandate as well as the manner in which it was to achieve its mandate.
- The M.H.S.P.R. was thought to have had a successful outcome and rendered eighteen recommendations, all of which were accepted by Minister Kevin Flynn, the Minister of Labour at the time.

Problems with the Internal Responsibility System Identified Through the Mining Health, Safety and Prevention Review

- For each of the six areas of improvement considered, the M.H.S.P.R. based its findings, conclusions and recommendations on a number of considerations, including:
 - *feedback provided from public consultations led by the M.H.S.P.R.;*
 - *feedback expressed in written submissions provided to the M.H.S.P.R.;*
 - *findings from the assigned working group.*

- The M.H.S.P.R. identified a number of issues regarding the state of the I.R.S. in underground mining in Ontario.

- Two of the key issues identified were as follows:
 - *Although the Ontario Occupational Health and Safety Act is in part based on the I.R.S., it does not reference it.*
 - *The I.R.S. is applied inconsistently throughout the Ontario Mining Sector, ostensibly due to the fact that there is a lack of a common understanding of how the I.R.S. should function.*

- I concluded from this that perhaps a more formal structure and framework is required for the I.R.S., while preserving its original intent.

Systems Design Applications for Improving the Internal Responsibility System

- In their book “Systems Leadership - Creating Positive Organizations”, Ian Macdonald, Catherine Burke and Karl Stewart (i.e. Macdonald et al.) define a system as:
 - *“a specific methodology for organizing activities in order to achieve a purpose”:*
 - *Ostensibly, the I.R.S. satisfies this definition.*

- Macdonald et al. have postulated that there are three primary reasons why systems are ineffective. They are as follows:
 1. *Their significance is underestimated or misunderstood.*
 2. *The difficulty and complexity of the work of systems design is underestimated and or assigned poorly.*
 3. *There is not a simple set of criteria to guide the design and implementation of the work.*

Systems Design Applications for Improving the Internal Responsibility System

- In response to the third reason as to why systems fail, Macdonald et al. have outlined criteria for systems design in the form of twenty questions that a designer should address. They are as follows:
 1. *Why has the system been chosen?*
 2. *Who is/should be the system owner?*
 3. *Who is should be the system custodian/designer?*
 4. *What is the purpose of the system?*
 5. *Is it a system of equalization or differentiation?*
 6. *What is the underlying theory?*
 7. *How is it to be measured?*
 8. *What are the current benefits of the poor system?*
 9. *What are the boundaries of the system?*
 10. *What are the linkages with other systems?*
 11. *What structural boundaries does it cross?*
 12. *Is the system one of transfer or transformation?*
 13. *Are authorities and accountabilities consistent with the role?*
 14. *Are there proper controls built into the system?*
 15. *Is there an effective audit process?*
 16. *Has the social process analysis been done?*
 17. *Is there a fully outlined flowchart?*
 18. *Is there full documentation?*
 19. *What is the implementation plan?*
 20. *What is the final cost of design and implementation?*

Systems Design Applications for Improving the Internal Responsibility System

- Answer to Question No. 4 Within the Context of the I.R.S.:
 - Question No. 4 asks “What is the purpose of the system?”
 - *Macdonald et al. contend that clarity of purpose is essential and that in the absence of a clear purpose statement, the rest of the system design will be incoherent.*
 - *They state that the purpose is “what is to be achieved by the system”.*
 - *They also suggest that the purpose should encourage and reinforce the behaviours that are vital for the system’s success.*
 - *As indicated Slide 9, the Ham Commission was of the opinion that the fundamental basis for accident prevention resides in the ability of each person at a workplace to perform his or her duties in a self-determined manner within clearly defined boundaries of authority and responsibility.*
 - *Therefore, the Ham Commission concluded that there was a need for better clarity with respect to the questions of:*
 - *Who is responsible for detecting departures from standards of work performance?*
 - *Who carries the responsibility of whether or not action is to be taken?*
 - *Who is then responsible for seeing that the anomaly is corrected?*
 - *It follows then, that it might be reasonable to suggest that the purpose of the I.R.S. at a workplace is:*

“To optimize workplace health and safety by clearly defining who is responsible for detecting departures from standards of work performance, for deciding whether or not action is to be taken, and then seeing that the anomaly is corrected.”

Potential Risk Assessment Applications for the Internal Responsibility System

- It is important that any threats to the integrity of the I.R.S. at a workplace be formally recognized and addressed. One way of doing this is through risk assessment processes.
- Risk assessments can be performed in many different contexts and are often performed to evaluate environmental, financial or health and safety risks. Regarding health and safety risks, a typical approach to evaluate a threat to health and safety (i.e. often referred to as an unwanted event) would entail estimating:
 - *the likelihood of its occurrence;*
 - *its consequence, should it occur.*
- Once values have been assigned to these two parameters for a particular threat or, what is referred to as a risk matrix is normally used to estimate its level of risk.
- For health and safety risks, a five-by-five matrix, such as the one shown below, is often applied.

	Consequence					
		1	2	3	4	5
Likelihood	5	Medium	High	Extreme	Extreme	Extreme
	4	Medium	High	High	Extreme	Extreme
	3	Low	Medium	High	High	Extreme
	2	Low	Low	Medium	High	High
	1	Low	Low	Medium	Medium	High

Potential Risk Assessment Applications for the Internal Responsibility System

- In the figure on the previous slide, both the likelihood and the consequence of a threat can be assigned according to a 1 to 5 scale.
- For each of these two parameters, 1 is at the lowest end of the scale and 5 is at the highest.
- Once likelihood and consequence levels have been estimated for a particular threat, its level of risk is determined as the product of the of the likelihood and consequence scores and can be identified on the matrix in terms of the following categories:
 - *Extreme;*
 - *High;*
 - *Medium;*
 - *Low.*

Potential Risk Assessment Applications for the Internal Responsibility System

- For assigning a value to the consequence parameter of a threat, the criteria shown in the table below are proposed.

Consequence Level	Description
1	The integrity of the I.R.S. is compromised to the extent that the workplace health and safety culture is eroded.
2	The integrity of the I.R.S. is compromised to the extent that the workplace health and safety rules and policies are routinely violated.
3	The integrity of the I.R.S. is compromised to the extent that regulatory obligations are not being satisfied.
4	The integrity of the I.R.S. is compromised to the extent that unsafe conditions or practices go unrecognized at the workplace.
5	The workplace I.R.S. is so dysfunctional that the occurrence of injuries or occupational diseases could result.

- For assigning a value to the likelihood parameter of a threat, the criteria shown in the table below are proposed.

Likelihood Level	Description
1	Rare - may occur
2	Unlikely - could occur
3	Possible - might occur
4	Likely - will probably occur
5	Certain - expected to occur

Potential Risk Assessment Applications for the Internal Responsibility System

- A list of potential unwanted events that could threaten the integrity of the I.R.S. at a workplace is as follows:
 - *occupational health and safety is not considered in the business plan for the workplace;*
 - *workplace parties are not provided with sufficient time and resources for health and safety purposes;*
 - *workplace incidents involving occupational health and safety are not properly investigated and resolved;*
 - *workplace health and safety hazards are not reported;*
 - *near-miss health and safety incidents are not reported;*
 - *information regarding workplace health and safety hazards is not properly communicated to all workplace parties;*
 - *workplace parties are not familiar with the health and safety hazards at the workplace;*
 - *workplace parties have not been properly trained;*
 - *workplace parties are not familiar with the health and safety rules or legislation that apply to the workplace;*
 - *the workplace joint health and safety committee is ineffective;*
 - *workplace parties are not encouraged to address health and safety hazards;*
 - *workplace health and safety programs are not well established;*
 - *controls for mitigating the risks associated with workplace health and safety hazards are not well managed;*
 - *the workplace leadership are not committed to health and safety;*
 - *the workplace joint health and safety committee is ineffective.*

Potential Risk Assessment Applications for the Internal Responsibility System

- List of potential unwanted events that could threaten the integrity of the I.R.S. at a workplace is as follows (i.e. continued):
 - *internal systems for monitoring the effectiveness of the workplace health and safety. are not in place;*
 - *there exists no external process for auditing the effectiveness of the workplace I.R.S.;*
 - *there is a lack of acceptance at the workplace that health and safety is part of the job;*
 - *there exists a fear of reprisals at the workplace when workplace parties attempt to resolve health and safety issues;*
 - *health and safety priorities at the workplace are unclear;*
 - *workplaces parties are not held accountable for their health and safety responsibilities;*
 - *workplace parties do not understand the meaning and purpose of the I.R.S.;*
 - *workplace social processes have not been analyzed and are not understood;*
 - *processes for communication between workplace parties are not well defined;*
 - *the responsibilities associated with all workplace roles are not clearly defined;*
 - *formal key performance indicators or metrics for the I.R.S. have not been established.*
 -

Proposed Metrics for the Internal Responsibility System

- In the conventional sense, a metric, otherwise known as a key performance indicator (i.e. a K.P.I.), is a measurable value that demonstrates how effectively a system (i.e. or a process) is meeting its objectives.
- Not only is a metric intended to determine or monitor the extent to which a system is achieving its desired outcomes, but it is also expected to inspire action on the part of the process or system owner if corrective measures are required to get the system back on track.
- In general, metrics should be:
 - *used to assess whether a system purpose is being fulfilled;*
 - *reflective of the objectives of the system;*
 - *simple to interpret and understand;*
 - *providing timely and accurate feedback;*
 - *reported on in a consistent manner over time;*
 - *precise about what is being measured;*
 - *based on data that is readily available and normally collected for the system.*
- Recall from Slide 17 that a proposed purpose statement for the I.R.S. is as follows:
“To optimize workplace health and safety by clearly defining who is responsible for detecting departures from standards of work performance, for deciding whether or not action is to be taken, and then seeing that the anomaly is corrected.”

Proposed Metrics for the Internal Responsibility System

- Proposed metrics for the I.R.S. are listed in the table below.

Metrics Related to the Principles Espoused by the Ham Commission	Metrics Intended to Assess Whether the I.R.S. at a Workplace Incorporates and Reflects Conventional Systems Design Principles	Metrics Designed to Determine Whether Threats to the Integrity of the Workplace I.R.S. Have Been Properly Risk-Ranked and Mitigated
<ul style="list-style-type: none"> ▪ The number of workplace personnel who have been trained on the Ham Commission findings. ▪ The number of workplace personnel who have been fully trained for their role. ▪ The number of departures from standard conditions that have been identified and corrected. ▪ The number formal audits (i.e. both internal and external) of the effectiveness of the I.R.S. that have been conducted for the workplace. 	<ul style="list-style-type: none"> ▪ The number of workplace employees who fully understand what the purpose of the I.R.S. is. ▪ The number of workplace employees who understand how the performance of the I.R.S. is to be measured. ▪ The number of workplace employees who understand the relationship between the I.R.S. and other workplace systems. ▪ The number of times the culture of the workplace has been assessed to confirm that it is compatible with the I.R.S. 	<ul style="list-style-type: none"> ▪ The number of times that the list of unwanted events that could threaten the integrity of the I.R.S. has been formally updated. ▪ The number of times that these threats have been formally risk-ranked. ▪ The number of controls that have been implemented to mitigate the risk associated with the highest risk unwanted events.

Proposed Concept for a Performance Index for the Internal Responsibility System

- The intention of a performance index for the I.R.S. would be to establish a single number that is reflective of its performance at a workplace by integrating multiple parameters that have an impact on its integrity.
- One of the key benefits of such an index is that it would enable an organization having several workplaces to compare and rank the performance of the I.R.S. across all of the workplaces that it operates.
- Indices have been successfully developed and applied within classification systems in many different contexts.
- There exist many examples in many different contexts where indices or classification systems have been successfully developed by integrating several different relevant parameters. Some example are provided in the table below.

Classification System	Purpose
Body Mass Index	To integrate two physical traits in humans (i.e. height and weight) to establish an index for identifying a predisposition to health issues.
Rock Mass Classification Systems	To integrate various rock mass characteristics (i.e. rock strength, joint characteristics and water effects) to establish a classification system enabling geotechnical engineers to predict the behaviour of exposed rock masses in mines.
The Myers-Briggs Type Indicator	To integrate four pairs of cognitive learning styles (i.e. extraversion, introversion, sensing and intuition, thinking and feeling, and judging and perceiving) to establish a profile indicative of personality type.

Proposed Concept for a Performance Index for the Internal Responsibility System

- The proposed I.R.S. performance index considers and integrates the following four parameters:
 1. *The extent to which workplace I.R.S. aligns with the I.R.S. principles outlined by the Ham Commission.*
 2. *The extent to which the workplace I.R.S. is regarded and functions as a system.*
 3. *The extent to which unwanted events that could threaten the integrity of the workplace I.R.S. are understood and addressed.*
 4. *The extent to which metrics have been developed and adopted to monitor the effectiveness of the workplace I.R.S.*

- Proposed scoring criteria for first parameter are shown in the following table:

Parameter Statement	Number of Points
Responsibilities are clearly defined at each level within the workplace.	1
Departures from standard conditions are recognized and responded to at each level within the workplace.	1
There are formal and effective processes of communication at all interfaces between levels at the workplace.	1
Formal external auditing processes are in place to audit the workplace I.R.S.	1
Total	4

Proposed Concept for a Performance Index for the Internal Responsibility System

- Proposed scoring criteria for second parameter are shown in the following table:

Parameter Statement	Number of Points
There is consensus amongst all workplace parties as to what the purpose of the I.R.S. is.	1
The context and underlying theory behind the I.R.S. are well understood by all workplace parties.	1
The boundaries between and linkages with other workplace systems are well defined and well understood by all workplace parties.	1
There is full documentation for the workplace I.R.S.	1
There is an effective internal auditing process for the workplace I.R.S.	1
Total	5

- Proposed scoring criteria for third parameter are shown in the following table:

Parameter Statement	Number of Points
A formal list of unwanted events that could compromise the integrity of the workplace I.R.S. is maintained and regularly updated.	1
Unwanted events that could compromise the integrity of the workplace I.R.S. have been formally risk-ranked and prioritized.	1
Causal factors have been determined for the highest risk unwanted events that have been identified.	1
Controls for the causal factors identified for the highest risk unwanted events have been established and implemented.	1
Total	4

Proposed Concept for a Performance Index for the Internal Responsibility System

- Proposed scoring criteria for fourth parameter are shown in the following table:

Parameter Statement	Number of Points
Performance ,metrics for the workplace I.R.S. have been developed and adopted.	1
The workplace I.R.S. metrics are formally tracked and analyzed.	1
Total	2

- Suggested criteria for interpretation of assigned scores:

I.R.S. Index Score	Category
12 to 15	The workplace I.R.S. is thought to be healthy.
8 to 11	The workplace I.R.S.is functional, but opportunities for improvement should be considered.
0 to 7	The workplace I.R.S. is dysfunctional and warrants radical corrective measures.

Closing Remarks

- The ideas and concepts presented in this paper are predicated on the belief held by the author that the I.R.S. at a workplace can be optimized by:
 - *re-visiting the principles expressed by the Ham Commission and ensuring that what the Commission had in mind regarding the I.R.S. is clearly understood by all workplace parties and is reflected in workplace practices;*
 - *regarding the I.R.S. as a “system” and ensuring that the workplace I.R.S. has a basis that is rooted in key systems design principles;*
 - *establishing a process for formally identifying the risks that could threaten the integrity of the I.R.S. at the workplace and adopting controls for mitigating these risks;*
 - *establishing meaningful I.R.S. metrics and tracking the performance of the workplace I.R.S. in accordance with such metrics;*
 - *utilizing a proposed I.R.S. performance index to assess and gauge the workplace I.R.S.*

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