TITLE OF PRESENTATION: WHAT MEASURES BEST INDICATE THE SUCCESS OF A RAIL SAFETY MANAGEMENT SYSTEM

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International Rail Safety Conference, Perth October 2004

Conference Paper

Abstract

What measures best indicate the success of a rail Safety Management System?

Safety Management Systems (SMS) - range from basic to sophisticated. Their success depends on factors such as:

- the operating environment;
- how the SMS was developed;
- how it is implemented;
- and on-going monitoring.

Management Teams and/or Boards require regular and accurate feedback on the degree of success of the SMS to fulfil their accountabilities and responsibilities, and to take action and make changes when needed.

In a complex environment like rail, measures of SMS success are needed to provide the 'big picture'. The emphasis should be on predictive measures looking beyond the typically immediate causes of accidents/failures. Accident precursors and latent conditions often go undetected until it is too late. To go beyond those precursors and latent conditions requires a degree of lateral thinking when it comes to the measures of SMS success. This paper aims to provide innovative stimulation and challenge to the current measures of SMS success.

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'They're funny things, accidents. You never have them till you're having them.'

Eeyore, 'The House at Pooh Corner'

Introduction

What I propose to do with this paper is consider and review some of the basics that go along with the topic of measuring success, in this case of a Safety Management System. I shall probe into the meaning of some of the words and terminology that are used, to see if we are really saying what we mean to say. I shall then distil out of my experience a measurement device that aims to provide the top echelons of the organization with an accurate picture of where they are at with their Safety Management System and whether it is likely to be successful. This will not be a multi-layered and complex audit tool but a simple and clear process that Boards and senior managers can readily relate to.

What are the features of a Safety Management System?

Many different words and terms are used to describe what a Safety Management System is and does. They include the following, with a brief explanation of each:

Comprehensive

For an SMS to be **comprehensive** it must ensure that all control measures are implemented and maintained.

Integrated

Normally with reference to the control measures, recognising that failures in complex systems are often the result of a combination of circumstances. For an SMS to be **integrated** it needs to ensure that control measures work together where necessary, are not in conflict and provide defence in depth.

Accessible

All employees (and others such as contractors) can gain easy access to the parts of the SMS they need to know about.

Comprehensible

The SMS is written in such a way that those who need to understand it can do so.

Documented

The SMS is in an appropriate controlled format, hard copy, electronic or both.

Organisation – wide

All parts of the organisation are aware of and have ready access to the SMS.

Realistic

The SMS should reflect the actual practices of the organisation.

Dynamic

The SMS should be able to adapt to changing conditions.

Improving

The SMS should seek and drive continuous improvement in safety performance.

An initial measure of success may be to see how the SMS stacks up against such a listing. The successful SMS should incorporate all of these high level criteria. Anything missing will impinge upon that success. It should also be focussed on the prevention of the previously mentioned 'negative events', particularly major negative events. In order to do that the SMS is going to need more than just the kind of features listed above.

Semantics – what do the words actually mean?

The business of measuring safety is a tricky business, but it is has been said that in order to properly understand something you need to be able to measure it. Hence the need for measures of SMS success. However, before getting into what those measures may or may not be, it is important to understand what we mean when we speak of terminology such as 'a Safety Management System'. I would suggest that no single agreed definition is possible. I would like to propose the following, for the purposes of this paper:

*A **Safety Management System** comprises all policies, objectives, roles, responsibilities, accountabilities, codes, standards, communications, procedures, processes, tools data and documents for the management of safety risks in the organisation's operation. A SMS is not just documentation but is the actual implementation of processes, procedures and practices. The SMS should both include and reflect the **safety culture** of the organisation.*

So what do you do when you measure something? This might seem to be blindingly obvious, but some things are harder to measure than others. In the Paper title we are talking of '*measures*', in other words nouns rather than verbs. The Collins English Dictionary gives 20 variations for the definition of *measure*, as a noun. I have chosen the following four to consider in our context:

- The extent, quantity, amount, or degree of something, as determined by measurement or calculation.
- A standard used in a system of measurements (for example SI)
- A basis or standard for comparison.
- An assessment of the nature, character, quality etc of something

To further assist in understanding what this paper aims to address, I think it is also necessary to define ***success*** and offer the following in the given context:

***Success** is a favourable outcome in achieving set objectives and endeavours.*

Traditionally the success of a Safety Management System has been (and still is in many cases) judged on the prevention or reduction of what I shall call 'negative events', or the mitigation of consequences of such negative events. In the rail industry such negative events include collisions, derailments and fires. The consequences include fatalities, injuries and damage. In recent times there have been moves to include prevention or reduction of the immediate precursors to negative events, such as SPADs, broken rails, unsafe acts etc. All these matters are routinely recorded and to varying degrees analysed.

In the 1980s the standard measure of success in relation to worker safety was *Lost Time Injury Frequency Rate* (LTIFR), where a Lost Time Injury was generally a work related injury or illness that resulted in the individual losing 3 or more shifts or days of work. Apart from fatalities there was little attempt to go beyond this to measure success and indeed most organizations did not even have anything in place that could reasonably be called a Safety Management System.

More recently a typical rail organization would have statistics on derailments, collisions and safe working 'irregularities' plus a few immediate precursors such as Signals Passed at Danger (SPAD), broken rails and other track defects. Few would delve into systemic precursors that may lead to negative events.

So we are talking about something that is relatively new and still evolving. One should take nothing for granted and the application of imagination and lateral thinking will be essential and likely to produce interesting results.

Next I would like to discuss my thoughts on further evolution, not quite revolution, based on my own experiences.

What are the measures of success?

'One thing a person cannot do, no matter how rigorous his analysis or heroic his imagination, is to draw up a list of things that would never occur to him.'

Thomas Schelling's Impossibility Theorem

First of all the overall approach needs to be based on **knowledge** of what negative events are possible and recognition that there may be potential for serious negative events that haven't yet been thought of or identified by the organisation. I think that this dilemma was neatly captured in a pronouncement made earlier this year by the US Secretary of Defence, Donald Rumsfeld. At the time it was not considered to be particularly profound but I have found that careful analysis of the words shows that it sums up our situation precisely. So I quote the man unashamedly:

> *'Reports that say that something hasn't happened are always interesting to me, because as we know, there are known knowns. There are things that we know that we know. We also know there are known unknowns. That is to say, there are things we know we don't know. But there are also unknown unknowns. These are things we don't know we don't know'*

There is always a scenario that is either simply written off as totally unrealistic (such as the *Titanic* hitting an iceberg and sinking) or just stays hidden to those charged with identifying such things. **Clearly an unknown or unidentified risk cannot and will not be managed** - little like the dilemma captured by the famous Forrest Gumpism: '*if you do not know where you are going, you probably will not get there.*'

In addressing such issues this is where a key component of the Safety Management System comes into play, what I choose to call the Risk Management Strategy. The Risk Management Strategy details the overall risk management philosophy of the organisation, defines the methodologies and tools to be used as well as the criteria against which identified safety risk will be assessed and managed. If it is effective it will provide an in-depth understanding of the nature of the risks faced by the organization. If it is effective, its output will prevent a *Titanic* type scenario.

How will those responsible assure themselves of that effectiveness? Ultimately these days we talk about 'corporate governance' and the accountability that goes with it. The Board, the CEO and the Management Team are all subject to legal accountabilities. Not knowing what is going on is no excuse.

So what should they know about? It's not just about statistics, even if those statistics address 'before the event' factors, precursors and, for me, the famous 'latent pathogens' of Tripod[2], as well as the usual raft of after the event stuff.

In the typically complex rail environment, a number of factors should be considered, such as:

- Where does the Risk Management Strategy fit within the organisation's overall strategic objectives and approach, particularly in relation to systemic risk problems? What kind of profile does it have in corporate planning and does safety risk receive as much attention at senior management level as business risk? Are the two recognised as mutually exclusive?
- Has the organization achieved staff 'buy-in' of the Risk Management Strategy at all levels? Do the lower echelons and front line personnel of the organization believe in, understand and support the Risk Management Strategy?
- Does the Risk Management Strategy achieve a balance between ease of use, traceability and a structured comprehensive process? Is there in-house capability in the defined methodologies and tools? Can the outputs from these be readily followed, including any or all assumptions that may have been made?
- Are the Risk Management Strategy and its associated processes clearly, appropriately and unequivocally linked to the wider Safety Management System?
- Does the Risk Management Strategy accurately reflect relevant legislative and regulatory requirements as well as the cultures and methods of the organization and the society in which it operates?

Within the above bullet points above are the keys to the measures that will best indicate the likelihood of or actual success of the Safety Management System. Working through the various points raised, keeping the measures as simple as possible and giving each an indicative score:

- Where does the Risk Management Strategy fit within the organisation's overall strategic objectives and approach, particularly in relation to systemic risk problems?

  Where are the strategic objectives and approach to be found? Probably they will be found in the Annual Report, a Board Report or similar. What do these Reports have to say about safety risk management?

  No mention in the Reports ***– zero*** *score*
  Specific mention, objectives spelled out & particular coverage of systemic risk issues, indicating they know what these are ***– three*** *points*
  (Something in between ***– one to two*** *points only)*

- What kind of profile does it have in corporate planning and does safety risk receive as much attention at senior management level as business risk?

*No profile in corporate planning – **zero** score*
*Good coverage and evidence that senior management actively participate **– two** points*
*Safety & business risk treated equally **– one point***

- Are the two recognised as mutually exclusive?

  *No evidence that this is the case **zero** points*
  *Evidence exists that safety risks are considered to be business risks - **one** point*
  *CEO & **all** his reports demonstrate that they understand the reasons for this **– two** points*
  *The Board also demonstrate a similar understanding **– two** points*

- Has the organization achieved staff 'buy-in' of the Risk Management Strategy at all levels?

  *No evidence that this is the case **zero** points*
  *Clear evidence senior management have actively sought and achieved this **three** points*
  *(Some evidence **- one – two** points)*

- Do the lower echelons and front line personnel of the organization believe in, understand and support the Risk Management Strategy?

  *No evidence that this is the case **zero** points*
  *Clear evidence that would indicate this to be the case **three*** points
  *(Some evidence **- one – two** points)*

- Does the Risk Management Strategy achieve a balance between ease of use, traceability and a structured comprehensive process?

  *No evidence that this is the case **zero** points*
  *Clear evidence that this is the case **- one** point*

- Is there in-house capability in the defined methodologies and tools?

  *No evidence that this is the case **- zero** points*
  *Trained personnel who demonstrate knowledge and understanding with little or no reliance on continuing external support **– three** points*
  *(Something less but better than nothing **- one – two** points)*

- Can the outputs from these be readily followed, including any or all assumptions that may have been made?

  *No evidence that this is the case **- zero** points*

Yes ***– two*** *points*

- Are the Risk Management Strategy and its associated processes clearly, appropriately and unequivocally linked to the wider Safety Management System?

  No evidence that this is the case ***- zero*** *points*
  All critical control measures are identified and linked to the SMS with performance standards etc ***– three*** *points*
  (Some evidence ***- one – two*** *points)*

- Does the Risk Management Strategy accurately reflect relevant legislative and regulatory requirements as well as the cultures and methods of the organization and the society in which it operates?

  No evidence that this is the case ***- zero*** *points*
  Relevant legislative requirements are spelled out and there is evidence they are understood by those who should ***– one*** *point.*
  The actual culture of the organization is reflected in the Risk Management Strategy, rather than some 'pipedream' ***– one*** *point*
  The Risk Management Strategy reflects the expectations and standards of the society in which the organization operates ***– one*** *point*

From the above measures a maximum score of 29 points is possible. A zero score on **any** one issue is considered to mean that the SMS will not be successful. A less than maximum score on any one issue is considered to mean that the SMS will not be fully successful. It will also point to the weaknesses. A maximum points score is considered to mean that the SMS will be completely successful, in due course.

Final thoughts

I would like to leave you with a look in more detail at just one area of the measures I have outlined above – **culture**. An organization supposedly has a culture, even a safety culture, and again there is a variety of definitions to go with this. The one I like is 'our organisational culture is the way we do what we do.' Keep it simple. What I have found is that if the Safety Management System does not take account of the organisational culture, it will fail, or at least be less successful than if it did.

In view of the international nature of this Conference, I think it is worth reflecting on the obvious, that there are distinct cultural differences between countries and ethnic groups in the way people are likely to behave in a work situation. Equally Australia is often referred to as a 'multi-cultural society', whatever that means. Many years ago, in a previous life, I worked here in Western Australia on the North West Shelf Project. During the first major construction phase I was the Safety Manager at Woodside Petroleum. Faced with a mixed and itinerant contract workforce of up to 4000 people

working at the main construction site on the Burrup Peninsula I felt we needed to understand just who and what they were, from a demographic point of view. Amongst what we discovered was the following:

- Over 50% of them did not have English as their mother tongue
- Many could barely communicate in English
- There were around 110 different identifiable ethnic groups (including 6 Eskimos!)
- The average age was about 23
- They were 95%+ male

Armed with this knowledge we did things somewhat differently than we would probably have done otherwise. A Safety Management System that does not recognise such factors in the organization will almost certainly not be successful.

So can the culture be measured, bearing in mind what was said earlier? Of course – **anything and everything** can be measured. An accurate measure of culture within an organization will, in turn, be a measure of success for the Safety Management System. I have found that some work done by Geert Hofstede[1] in the 60s and 70s is very helpful. He developed 4 main indicators of human behaviour, by the use of which comparisons can be made between one group and another and/or strategies developed that allow for the differences.

The indicators developed by Hofstede are:

1. **Power Distance** (Inequality)
2. **Uncertainty Avoidance**
3. **Individualism**
4. **Masculinity**

There is not time in this Paper to go through all of this in detail, but I give as an example, and by way of introduction, a definition of one of the indicators:

Power Distance The extent to which a society accepts that power in institutions and organizations is distributed unequally.

In Hofstede's study Australia ranked first out of 40 countries with a 'score' of 10 against a mean of 51 (the higher the score the greater the Power Distance dimension). Some likely impacts of the Australian position on the success of a Safety Management System could be:

(i) The method of measuring and monitoring safety will need to be 'sold' to the workforce, otherwise it is likely to be challenged or not believed.

(ii) The full and active participation of the workforce should be sought in dealing with anything that may be considered 'unsatisfactory safety performance'.

(iii) In seeking that full and active participation the management should affirm that this in no way reduces overall management accountability for safety.

Some other examples of interesting impacts that flowed from this approach are:

(iv) Employees should be strongly & actively encouraged to develop or propose specific initiatives which will improve safety performance or remedy particular deficiencies *(Individualism)*.
(v) There is likely to be a desire to be the best performer *(Masculinity)*
(vi) Where safety rules/regulations are clearly unenforceable or cannot be kept, they should be changed *(Uncertainty Avoidance)*

In other words if the Safety Management System did not take these factors into account in an environment such as Australia it would be likely to fail.

A modification of this general approach was used in developing the approach to safety management in Eurostar, the company that operates high-speed trains between London, Paris and Brussels, through the Channel Tunnel. The operation began as a tri-nations venture between British, French and Belgium railways. Culturally there are distinct differences in the way those three nationalities do things (*vive la difference !*) and it was necessary to distil an overall approach that was going to take into account those differences.

Conclusions

What I have tried to do with this Paper, in the available time, is to show that the more traditional approaches to measuring the success of a Safety Management System do not give a complete picture and may create a false sense of security. Measurements of success that can be relied upon need to go much further than is usually accepted by the industry. My scoring system is aimed fairly and squarely at those in the organization who have the authority and power to make things happen. That controlling influence and what is done with it is they key. Shown in simple graphical form overleaf.

Bibliography

1. Hofstede, G ‘Culture’s consequences’, SAGE Publications, 1980
2. Reason, J; Wagenaar, W; Groeneweg, J, ‘Tripod : A principled basis for safer operations’ Shell internal Report EP 89-0310, 1989

A graphical representation of the Paper

The simple diagram below attempts to sum up what the Paper has addressed. A typical Safety Management System may comprise items 3, 4 and 5, possibly not tightly linked in the way that a Safety Case may be. The tight linkage of 3 and 4 into a Safety Case is often presented as a best practice approach but that approach can be fatally flawed because it does not guarantee that those who have most control are **fully** aware of what is going on. It also does not guarantee that critical aspects of organisational, societal and safety culture will, firstly, be known and understood and, secondly, be appropriately addressed by the Safety Management System and the Risk Management Strategy.