Safety As An Operational Enabler

by **CPT Bertram Ang Chun Hon**

Abstract:

There is a need to refute the assumption that people are perfectly rational and that safety is simply "common sense." Accidents should be seen as the product of a causal chain of separate, yet interdependent factors rather than solely the result of an unlucky twist of fate or a moment of carelessness. The building of a strong autonomous-team safety culture in the Singapore Armed Forces (SAF) is imperative, not only to ensure that the SAF retains public confidence, but because it will act as an enabler for the SAF to grow its operational capacity.

Keywords: Safety Culture; Public Confidence; Enabler; Operational Capacity

INTRODUCTION

There is a perennial debate in the Singapore Armed Forces (SAF) regarding the role of safety in our operations and exercises, with the perception that having too strong a focus on safety would lead to a decrease in operational realism.[1] Given the peacetime context that the SAF finds itself in, the need for realism in our training is indeed paramount if we are to maintain a certain level of operational readiness. In 2011 and 2012, there were several high-profile cases of safety incidents that took place within the SAF spanning all three services, with each receiving intense media scrutiny in their turn. Even as additional safety measures were immediately undertaken and committees of inquiry (COI) convened at the Parliamentary level,[2] some argued that the safety measures taken were reactive in nature and would lead to greater risk aversion and lower operational readiness in the long term,[3] while other observers worried about the impact such incidents would have on public confidence in the SAF's capabilities and the perceived negative impact on our deterrence policy.[4]

It is clear then that the debate on safety is an important one, given its nature as a concrete manifestation of our leadership's care for its people

Source: MINDEF

"Safety" was added to the SAF's list of core values in 2013.

and the seeming potential for the SAF's deterrence building measures to be seriously undermined one way or the other—either through decreased realism during training due to higher risk aversion or because of reduced public confidence. The question then is whether the SAF can resolve the apparent dilemma between ensuring that it continues to grow operationally, while preserving the safety of its servicemen and retaining public confidence in the process. This article argues that not only will the SAF succeed in growing its operational space in the long term with an emphasis on safety, but that it will only

be able to do so by building an even stronger safety culture. This article will elaborate on how the SAF can improve its safety culture, and discuss how safety acts as an enabler for future mission success.

SWISS CHEESE MODEL

A few misconceptions about safety must be addressed. First, there is a need to refute the assumption that people are perfectly rational and that safety is simply "common sense." Instead, we must recognise that people take certain risks precisely because they deem that those particular risks are tolerable. This is the case even if reality ultimately dictates otherwise because of the failure of individuals to "think through the consequences of uncertain alternatives."[5] This implies an inherent disparity in perceptions of safety simply due to the lack of information and experience available to different individuals. Second, we must address the belief many hold that having "zero safety incidents" is an insurmountable task. This view is difficult to counter, given our fallible nature and propensity for mistakes. However, if one were to view accidents as the result of multiple, interlinked factors rather than the consequence of a single human error, then the goal of having "zero safety incidents" becomes a realistic and achievable one. This concept is best exemplified by Professor James Reason's Swiss Cheese Model.

Given that the nature of military operations is a hazardous one, we cannot hope to eliminate risk completely, but we must seek to mitigate it to a level that is acceptable, taking into consideration public tolerance.

Reason's Swiss Cheese Model is a model that is widely used in multiple contexts, especially in the aviation and medical industries, including the
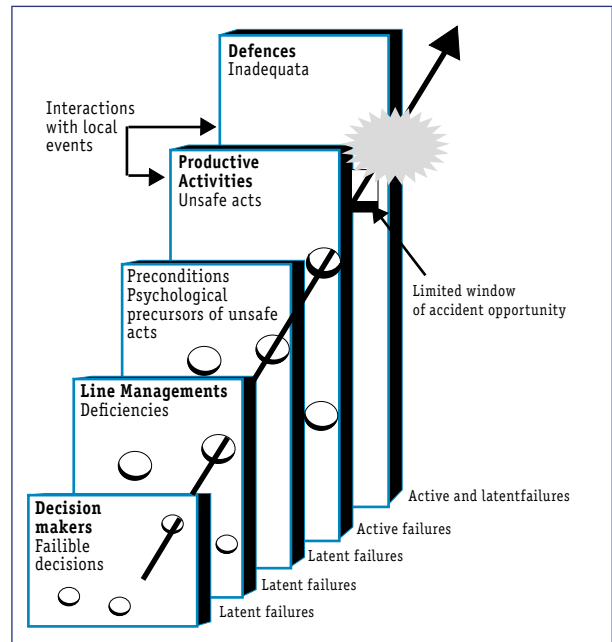

Figure 1: James Reason's Swiss Cheese Model. [6]

International Civil Aviation Organisation (ICAO) and various hospitals. It defines five defensive layers that must be penetrated before an accident can occur, namely the "Decision-Making," "Line Management," "Preconditions," "Acts," and "Defences" layers. In an ideal world, these layers would be solid and impervious. However, in reality, holes exist in each layer of defence. The holes in the first three layers are described as *latent conditions*, which Reason describes as the "inevitable 'resident pathogens' within the system," that act as "long-lasting holes or weaknesses in the defences." These "holes" lie dormant within the system until they combine with unsafe acts to result in accidents.[7] *Active failures* describe the unsafe acts that represent the proverbial last straw, acting as the trigger for the incident to occur.

If one were to subscribe to the Swiss Cheese Model as a mental framework, the accidents should be seen as the product of a causal chain of separate, yet interdependent factors rather than solely the result of an unlucky twist of fate or a moment of carelessness. This implies that accidents can be prevented through first, proactive identification of the "holes," and

second, their effective removal or mitigation to prevent them from lining up to result in an accident. Furthermore, the delineation of individual layers suggests that accidents are not just the result of the unsafe act itself. As Major-General (NS), Ng Chee Kern, then Chief of Air Force observed, "corrective actions can be incomplete if we focus only on the incidents and immediate causes."[8] We cannot afford to ignore the whys behind the final unsafe act if we are to eventually learn from our mistakes. A further implication is that all levels of an organisation are responsible for ensuring that accidents do not occur, from the decision-making or policy creating level of leaders, the line management layer of supervisors and managers, and the people on the ground who must have the safety awareness to look out for both their own safety and the safety of those around them.

If we are unable to even ensure the safety of our soldiers, sailors and airmen in peacetime, our ability to execute our wartime mission is easily called into doubt not just by our people, but by potential aggressors.

This connotes another positive safety value that is essential-ownership.

KNOW, OWN, PREVENT

Extrapolating from the above, there are three safety principles that are essential for the building of a strong safety environment in the SAF. These can be summed up as "Know," "Own," and "Prevent." First, for "Know," all personnel must have a strong awareness and knowledge of the hazards and risks that are present in their respective work environments, including those that are unintentionally created as a result of the decisions and policies at the higher echelons of leadership. Second, for "Own," we must recognise that safety is not just a command responsibility, but it is the responsibility of every single individual. We are all
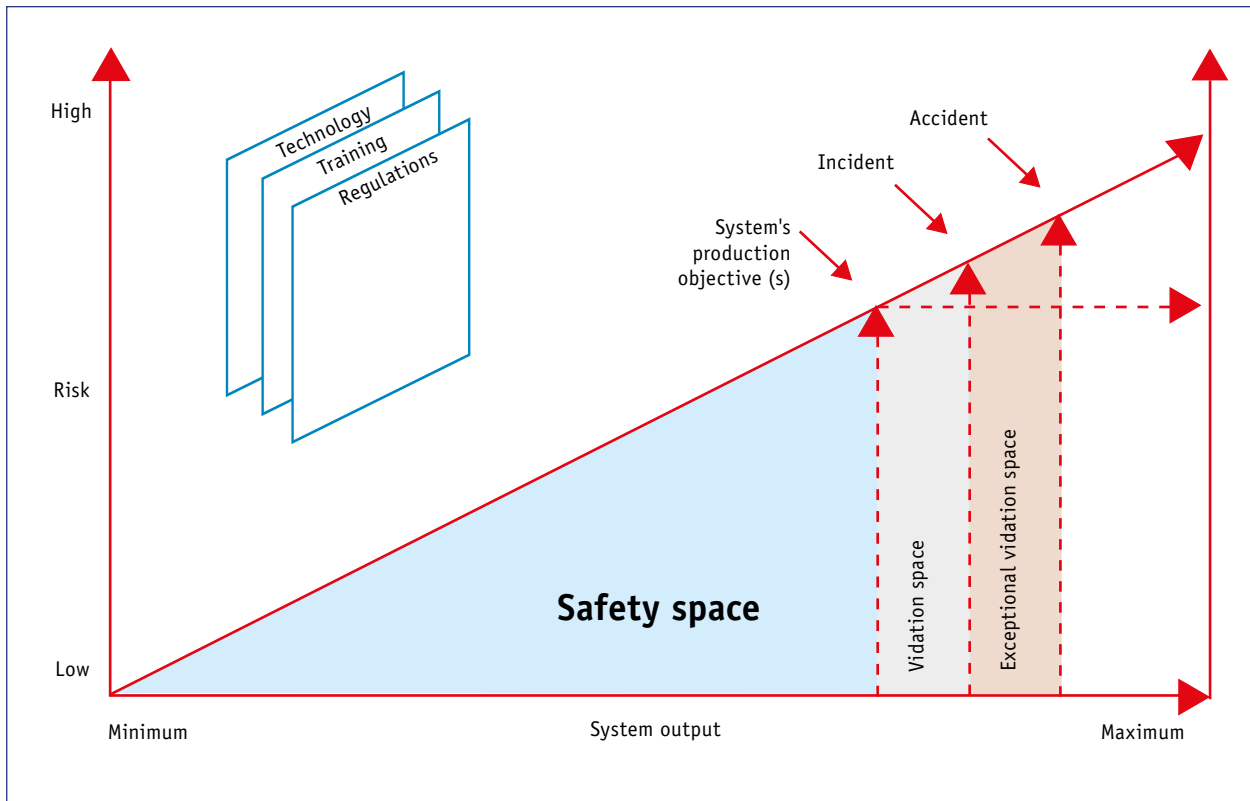

Figure 2: Safety Space Diagram.[9]

responsible for both our own safety as well as the safety of the teams that we are part of. Leaders and supervisors among us must be aware of the risks and hazards generated as a result of the decisions we make and the safety environments we shape. Third, for "Prevent," we must proactively work towards preventing the hazards through risk management and mitigation. Given that the nature of military operations is a hazardous one, we cannot hope to eliminate risk completely, but we must seek to mitigate it to a level that is acceptable, taking into consideration public tolerance. This is made imperative by a novel regulatory trend especially in Western countries that places the onus of safety *solely* on the creator of risks to demonstrate that the operations carried out are safe. This is argued on the basis that current prescriptive regulations, standards and guides simply cannot act as a one size fits all assurance of safety in the spectrum of unique operations the military undertakes.[10] The SAF could be the sole entity held liable for any safety incidents in the future if this current trend is maintained.

While mitigating risks to a tolerable level for the public seems to entail compromising operational realism in order to cater to a generally risk averse population, we must recognise that the fundamental and arguably erroneous assumption underlying this perspective is that operational realism is diametrically opposed to safety. The reality is that we both can, and must, ensure that our safety space grows in tandem with our mission space and operational realism. We *must* because the reality is indeed that the SAF operates in a peacetime context as a largely conscripted force. If we are unable to even ensure the safety of our soldiers, sailors and airmen in peacetime, our ability to execute our wartime mission is easily called into doubt not just by our people, but by potential aggressors. We must therefore consider our safety space to be our mission space. We *can*,

Source: cyberpioneer

Mr Alan Chan (front) and two members of the External Review Panel for SAF Safety (ERPSS) viewing the live grenade-throwing training session at the Basic Military Training Centre in Pulau Tekong. The ERPSS was established in 2013 to review various aspects of the SAF's safety system.

because technology, training and regulations exist to aid us grow our defences even as we seek to expand our mission space, and more importantly, because it is possible to *engineer* a strong safety culture that will serve as a robust foundation for these defences.

The safety space diagram illustrates how organisations derive their optimal system production by weighing the balance between acceptable system output and the tolerable safety risk. Organisations establish defences in the form of technology, training and regulations to defend against safety risks produced as a result of its output. The safety space therefore "represents a protected zone" where the "defences that the organisation has erected guarantee maximum resilience to the safety risks" that are the result of the planned system output.[11]

Given that the acceptable risk level in the SAF can be assumed to be permanently constrained by public perception, we should expect that it will remain constant in a peacetime context. Therefore, in order to engender a growth in the SAF's scope of operations (system output) and the corresponding safety space, it will be necessary to ensure that the increase in the former is matched with the establishment of additional defences. It is through the increase in defences that the SAF will be able to expand into what would previously be "violation space." This should involve the use of more and better technology, training and/or regulations.

However, keeping in mind the Swiss Cheese Model and its derivative safety principles of "Know," "Own" and "Prevent," the additional defences cannot be constrained to technology, training and regulations. These defences will merely aid in the prevention of accidents, but will not address the latent conditions that lie within the system. Rather, we must ensure that a strong safety culture is established within the SAF that incorporates the self-awareness and situational consciousness that is fundamental to the principles of "Know" and "Own." Indeed, James

Reason, the author of the Swiss Cheese Model, states that an ideal safety culture is "the 'engine' that drives the system towards the goal of sustaining the maximum resistance towards its operational hazards."[12] This links the concepts of safety space and safety culture, given that safety space is maintained through "maximum resilience to the safety risks" as mentioned above.

SAFETY CULTURE

To define safety culture, we must first examine its origins. The interest in the term "safety culture" can be traced to the Chernobyl nuclear accident and the "response of the Western nuclear industries to the human preconditions." Then, safety culture was described as a "combination of administrative procedures and individual attitudes to safety."[13] Pidgeon and O'Leary justifiably criticise this approach, arguing that safety culture further incorporates a "set of assumptions, and...associated practices, which permit beliefs about danger and safety to be constructed."[14] At its core, a strong safety culture is defined as an environment where people do the "right thing" even when no one else is watching, because of a set of assumptions that result in a healthy level of wariness and awareness of hazards and risks. As Reason notes, a poor safety culture can "undermine a system's protection," and such a culture stems from "a failure to understand and fear the full range of operational hazards."[15] A safe culture can therefore be equated to an "informed culture" where members of an organisation individually "understand and respect the hazards facing their operations."[16]

Reason suggests that in general, organisations with an informed culture have successfully established a "reporting culture" where near misses are compiled by a safety information system that "collects, analyses and disseminates the knowledge gained."[17] In this way, important feedback is obtained, distilled and debriefed to the appropriate and relevant parties, allowing lessons to be learned and shared throughout the organisation. An example of

such a practice would be that of aircraft carriers, which ensure that when errors occur "immediate investigations are conducted" and lessons learned are debriefed.[18] However, even before such a reporting culture can be created, Reason further expounds that a "just culture" would be needed as a prerequisite, where individuals understand what the difference is between "unacceptable behaviour deserving of disciplinary action" and other forms of behaviour where punishment would not be "helpful."[19] Clear knowledge of where the line is drawn would allow trust to be built among individuals in the organisation and encourage open reporting.

A culture where there is ownership of safety by all individuals, teams, and sub-communities within the organisation is described as an "autonomous-team" safety culture.

In terms of developing a "reporting culture," the SAF has indeed successfully incorporated immediate feedback systems and open reporting systems for all three services. This includes the Before Activity Review (BAR), During Activity Review (DAR) and Post Activity Review (PAR) model where time is allocated before, during and after an operation to review its conduct, encompassing its safety aspects. The SAF has also established individual safety information services (SISs) for each service where open reports can be drafted, submitted and shared. However, there is still room for improvement. For example, accessibility to the safety information services can be vastly improved. Currently, the SAF's open reporting systems are accessible only via the intranet. However, NSmen and junior personnel often do not have personal access to the intranet, and these two groups of people are often highlighted as the personnel who are most at risk due to their inexperience and resultant lack of situational awareness. Similarly, there is the challenge of disseminating useful and intelligible feedback from safety incidents and near misses directly to this group of users for the same reason.

Second, the SAF could examine the concept of a "just culture" more carefully. First, there could be a clearer demarcation between what types of unsafe behaviour are deemed serious enough to result in harsh punitive consequences and what merits lighter penalties.

While a complete "no blame culture" in open reporting would seem superficially attractive, Reason argues that such a practice would undermine credibility and destroy trust, as individuals on the ground "know who the habitual rule-benders are" and feel that their personal safety is compromised. The removal of habitual and reckless violators will therefore improve the safety culture at the workplace by eliminating the source of unsafe acts and encourage those who are safety conscious by proving that the organisation is serious about ensuring their safety.[20] At the same time, the SAF should not punish all unsafe acts, and must distinguish between different types of hazardous actions. The SAF could utilise Reason's suggestion that "neither the error nor the magnitude of its consequences should be the focus," but rather the emphasis should be on "the individual's underlying conduct at the time the error was committed."[21] For example, Reason cites the need to differentiate between "corner-cutting violations," where procedures are deliberately bypassed so as to take the path of "least effort," and "necessary violations," which arise "from inadequacies of the equipment…that make it impossible to carry out the work and comply with the procedures."[22] Furthermore, instead of relying merely on punishment as a means to encourage compliance with safety, the SAF could also look into establishing a parallel rewards-based system where safe behaviour is acknowledged and rewarded, allowing safety values to be reinforced in a positive manner.[23]

In addition to having a "just culture," the SAF should also look towards moving away from a culture that is reliant on command emphasis on safety. While command emphasis on safety should not be reduced or devalued, its *over-emphasis* can result in the relinquishment of individual ownership of safety to be solely the responsibility of commanders. This can be
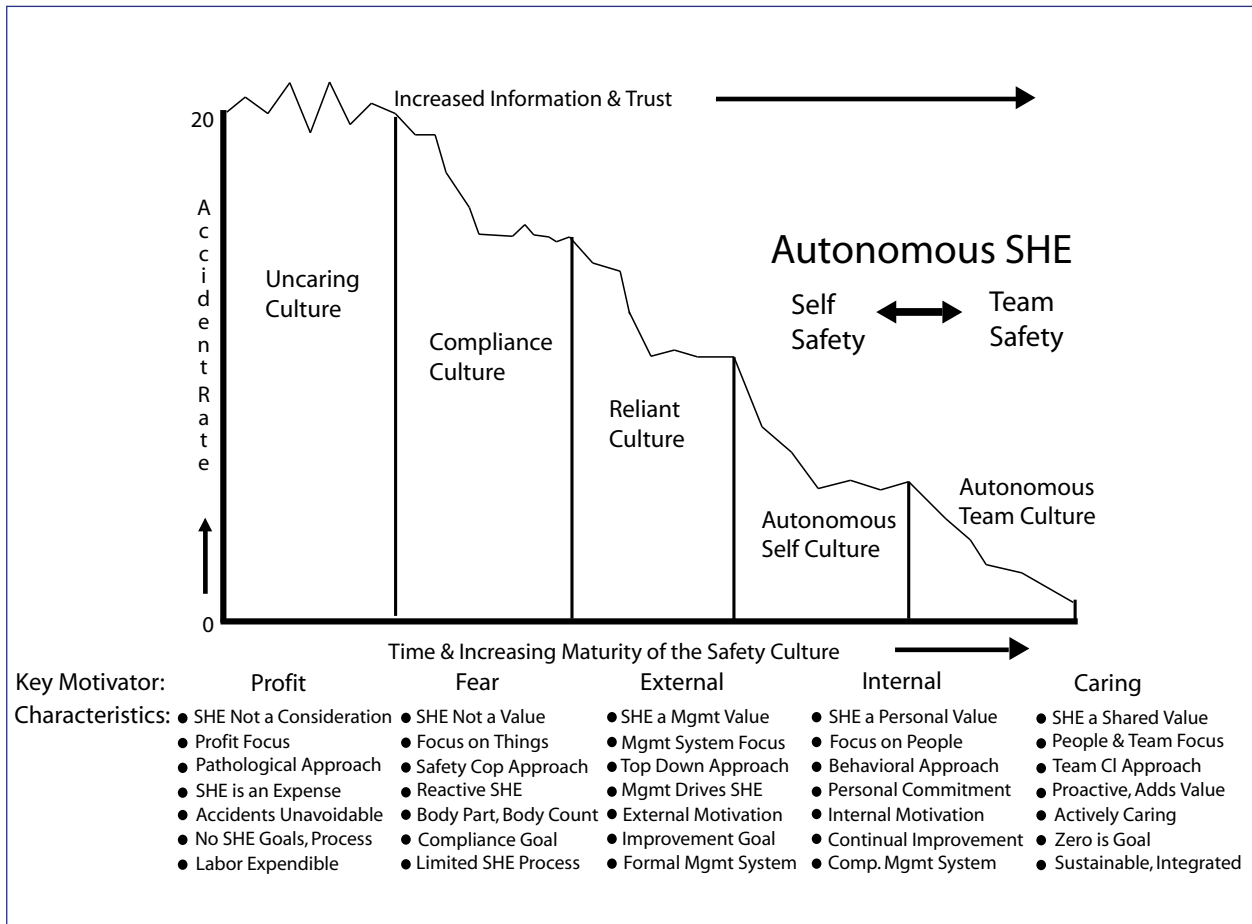
Figure 3: Safety Culture Diagram.[24]

described as a reliant culture that directly contradicts the principle of "ownership" that is necessary in a strong safety culture. A culture where there is ownership of safety by all individuals, teams, and sub-communities within the organisation is described as an "autonomous-team" safety culture.

Examples of organisations that have successfully engineered such a safety culture are known as High Reliability Organisations (HROs) in the safety literature. These organisations are able to conduct high risk operations successfully with a minimal record of accidents, and include aircraft carriers, nuclear power plants and air traffic control systems. The stakes are extremely high for such organisations, as they operate in an "unforgiving social and political environment [and] an environment rich with the potential for error,"[25] on top of the fact that any error could potentially lead to disastrous consequences

on a large scale. Indeed, the technology involved in the above mentioned operations is such that the "consequences and costs associated with major failures...are greater than the value of the lessons learned from them."[26] HROs therefore need to sustain a virtuous cycle where near misses are learned from effectively to prevent the occurrence of actual, disastrous incidents. They are able to do so by building precisely the type of informed culture that reason advocates. The SAF can be viewed as a type of HRO, in the sense that it must similarly develop a learning, just, reporting and informed culture, in the process engineering a strong autonomous-team safety culture that will enable it to sustain and expand its scope of operations.

To resolve any lingering doubts about the role of safety as an operational enabler rather than a driver of risk aversion, a relevant case study to examine and

emulate would be that of the Aluminium Company of America (ALCOA). In 1987, Paul O'Neill took over as Chief Executive Officer (CEO) of ALCOA and immediately proclaimed safety to be his management emphasis, with the lofty goal of "zero injuries."[27] ALCOA's net income would be five times larger when O'Neill left in 2000, and its astonishing increase in productivity and output would be attributed to O'Neill's insistence on safety as a guiding philosophy. In this instance, safety served as a "keystone" habit, defined as "a pattern that has the power to start a chain reaction, changing other habits as it moves through an organisation."[28] A manifestation of this at ALCOA was its organisational habit of safety suggestions that ultimately created new feedback loops, which were in turn utilised for suggestions from ground personnel for business and productivity improvements.

While ALCOA's context is certainly distinct from the SAF's, it is an intriguing example of how an organisation with a strong, communal culture of safety was able to positively change other organisational habits that in turn expanded its operational capacity. As a keystone habit, safety triggered the building of a learning, reporting and informed culture, that in turn influenced productivity and output positively. In the SAF's context, safety can have a similar impact and allow the organisation to grow as a learning community that is able to assimilate feedback and lessons learned effectively and efficiently to improve operational capacity and expand the scope of missions that the SAF is able to undertake. This suggests how safety can in fact lead to operational expansion rather than the generation of additional risk aversion.

CONCLUSION

In summary, the building of a strong autonomous-team safety culture in the SAF is imperative, not only to ensure that the SAF retains public confidence, but because it will act as an enabler for the SAF to grow its operational capacity. Instead of the risk aversion and shrinkage in mission space that is feared by many, a focus on safety will have the opposite effect of ensuring the SAF remains a force that can continue to achieve mission success even when undertaking a much wider scope of operations in the future. 🌐

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