Reverse Swiss Cheese – Driving Safety Culture from the Blunt End

Barry Kirwan[1], Ben Wood[2] & Beatrice Bettignies-Thiebaux[1]

[1]EUROCONTROL, [2]RNLI (Royal National Lifeboat Institution)

SUMMARY

For two decades, Swiss Cheese theory has been an influential metaphor in safety science and accident prevention. It has made barrier theory and the impact of safety culture on operational safety more understandable to the upper echelons of high-risk organisations in many industrial sectors. Yet sometimes the Swiss Cheese model is used to focus on the operational 'sharp end' and *unsafe acts*, like a magnifying glass that acknowledges organizational influence, but still targets the human operator. It is time to 'turn this lens around', and allow organisations to focus on the upstream factors and decision-making that can engender these unsafe acts in the first place. This paper reports on an approach to do this, under development in the Maritime sector, called *Reverse Swiss Cheese*.

KEYWORDS

Safety Culture, Swiss Cheese, Maritime

Introduction

Reason (1997) proposed the Swiss Cheese accident model, in which safety barriers are like slices of cheese with holes in them (because no barriers are perfect), and if the holes line up you get an accident. The initial focus was on those barriers closest to the accident outcome, in the form of 'unsafe acts'. Later, however, he focused more on the organisational antecedents of accidents, as decisions made and actions taken at these levels can lead to many accidental outcomes. These 'upstream' barriers, if deficient, put pressure on the downstream ones. Today, however, in the Maritime domain, whilst it is common to talk of human error on the ship, it is less common to hear anyone talking about 'error' onshore, whether management decisions that make safe work harder on board ships, design choices that make operations more error-prone, programmer errors that can lead to system faults, or even the effects of weak regulation on safety at sea. Because of this, and inspired by a safety researcher in the air traffic domain[1], an attempt is being made to focus on these *upstream* factors. This approach is being called 'Reverse Swiss Cheese'.

Reversing the Swiss Cheese model is a challenge, and requires the mindset at the top of the organisation that human error does not only affect those aboard ships, but affects us all, and that human error is a normal process, the flip-side of human flexibility that is key to our ever-adaptive, and generally successful performance. We all make mistakes. Most mistakes onshore have little consequence. Yet decision-makers, who define policy, procure solutions, set procedures, and shape culture, are key in laying the foundations both for future success, and future failures. It is difficult to have a safety culture and an effective safety learning culture when it is believed that only seafarers make mistakes of any consequence (Kirwan et al, 2022). In such a case, there will be a tendency to

[1] Alessandro Boschiero, of the Italian Air Navigation Service Provider, ENAV.

blame those who make mistakes at sea, and replace people when things go wrong, rather than addressing and fixing underlying factors. This is the opposite of safety learning.

This shift in mindset is a journey that any industry has to undertake if it is serious about increasing safety. This does not mean that managers, those at the so-called 'blunt end', will find themselves in the dock or even imprisoned following accidents, as has happened once or twice in aviation and elsewhere. Managers are also subject to the full range of Human Factors, constraints and pressures and – as with seafarers – there is almost never an intention to cause harm. Rather, this means asking hard questions, such as *'how are our [Management] decisions onshore influencing crew performance, safety and safety culture at sea?'* The first step is to determine what the layers – the blocks of cheese – comprise, and an initial model has been developed for the EU SAFEMODE project[2], and is shown in Figure 1. The next step is to determine how upstream activities are helping or hindering safety downstream, and several approaches are possible (Kirwan et al, 2022).

One approach is *investigating differently* (Dekker, 2015), primarily listening rather than judging. This can use group incident reviews, as well as '*deep dives*', to explore constraints and pressures that may lead to operations being more at risk. The aim is to understand where those pressures are coming from, then making senior and middle management aware of their impact, and finally developing better protections and safeguards. Another approach involves a four-layered *taxonomy*, developed in SAFEMODE, which includes organisational antecedents of incidents and accidents, which often only emerge when looking across repetitive incident or accident trends. *Safety culture surveys* also identify factors at the organisational 'blunt end' that are impacting negatively (or positively) on operational safety. Some of these factors may be perceived as being outside the organisation's control, e.g. factors linked to competitiveness or the regulatory environment, or else may constitute 'standard practices' adopted industry-wide, also known as 'the business model' for the industry. It is only by linking these factors, accepted constraints and management practices to unsafe outcomes, that decisions can be made about whether or not the business model needs to change, to become safer. Reverse Swiss Cheese can begin to identify these factors and links.

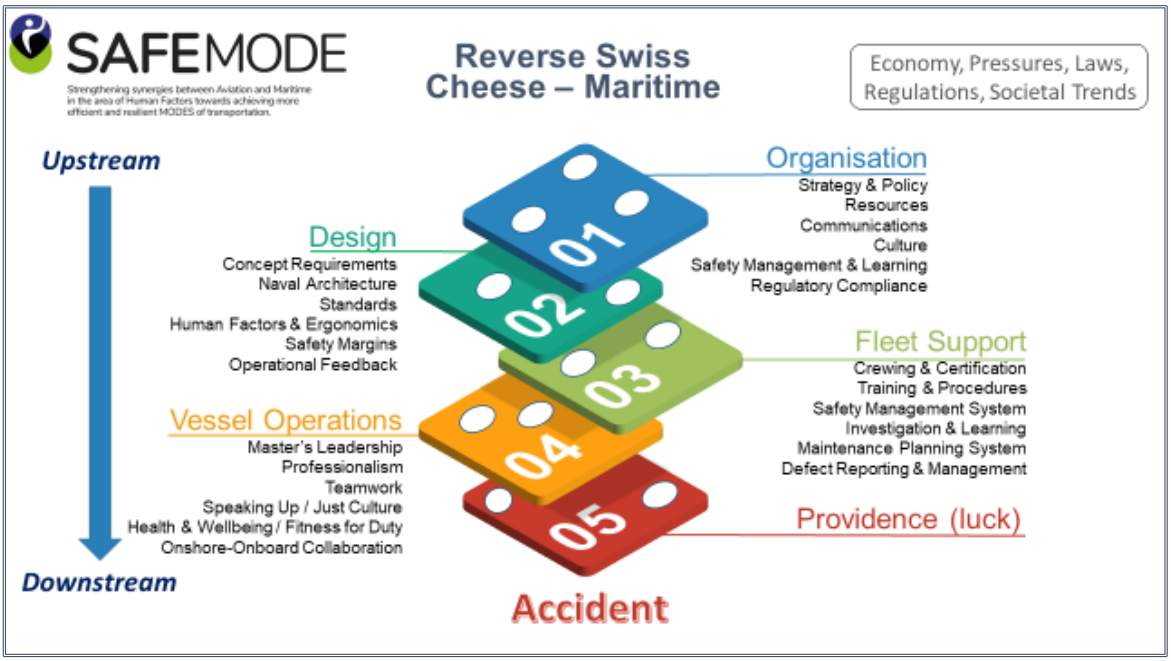

Figure 1: Preliminary Reverse Swiss Cheese Layers for the Maritime Domain

[2] https://safemodeproject.eu/

References

Dekker, S. (2015) Safety Differently: Human Factors for a New Era. CRC Press: Aldershot, UK.

Kirwan, B., Bettignies-Thiebaux, B. and Cocchioni, M. (2022: in press) Towards a Safety Learning Culture for the Shipping Industry - A SAFEMODE White Paper.

Reason, J.T. (1997) Managing the Risks of Organisational Accidents. Aldershot, UK: Ashgate.