# Learning Journal 7

## Overview: The Success Story of the US Submarine Safety Program (SubSAFE)

### Introduction:

The US nuclear submarine safety program, known as SubSAFE, stands as a remarkable success in the realm of government and military initiatives operating in a commercial, profit-driven context. With a history spanning 60 years, SubSAFE has achieved an unparalleled safety record, losing no SubSAFE-certified submarines since its inception in December 1963. The program operates within a large framework, involving approximately 40,000 individuals, including both government and private contractors. Its scope encompasses diverse submarine classes and spans worldwide naval operations.

### Historical Context of Submarines:

The design of submarines traces back to the 19th century, finding widespread use during World War I and subsequently serving various military and civilian purposes. Submarines today operate in capacities ranging from military missions to marine science, exploration, and maintenance.

### The Thresher Incident:

The turning point for SubSAFE was the tragic loss of the USS Thresher on April 10, 1963. This newly designed nuclear-powered submarine encountered fatal issues, resulting in the demise of 129 individuals. The aftermath of this incident prompted Admiral Hyman Rickover, the head of the US nuclear navy, to initiate a program ensuring such losses would not recur.

### Establishment of SubSAFE:

In response to the Thresher loss, SubSAFE was swiftly designed and became operational on December 20, 1963, a mere 54 days after the incident. The program aimed at ensuring high-quality submarine components and intensified structural inspections.

### Thresher Loss Analysis:

The Thresher incident was attributed to a failure in a silver-braze joint in the saltwater piping system. This led to flooding in the engine room, electrical failures, reactor shutdown, and loss of propulsion. The subsequent accident report highlighted deficient maintenance practices and design issues.

### Deficient Maintenance Practices:

Thresher had around 3,000 silver-brazed piping joints, and inspection revealed that 14% of tested joints exhibited sub-standard integrity. Despite this, the submarine was allowed to go to sea, emphasizing a failure in maintenance practices.

### Accident Report Conclusion:

The accident report concluded that Navy risk management practices had not kept pace with submarine capabilities, exposing critical deficiencies in specifications, shipbuilding practices, and maintenance procedures.

**SubSAFE Goals and Requirements:**

SubSAFE's focus is on the essentials, ensuring watertight integrity, and the operability of critical systems to control and recover from flooding hazards. The program does not delve into mission assurance, fire safety, weapons safety, occupational health safety, or nuclear reactor safety.

**Requirements for the Submarine Community:**

The SubSAFE program imposes comprehensive requirements across administrative, organizational, technical, and design aspects, ensuring adherence through design contracts, construction contracts, overhaul contracts, fleet maintenance manuals, and spare parts procurement specifications.

**SubSAFE Risk Management Fundamentals:**

The success of SubSAFE is grounded in fundamental risk management principles, including work discipline, material control, documentation, compliance verification, and continuous learning from inspections, audits, and nonconformances.

**Cultural Principles:**

SubSAFE has instilled cultural principles within the submarine community, fostering a questioning attitude, critical self-evaluation, continuous learning, continual training, and a foundation of personal integrity and responsibility.

**Likes:**

I have gained valuable insights from the success story of the US Submarine Safety Program, SubSAFE. The program's impressive 60-year record of no losses since its inception in 1963 showcases its robust risk management principles and unwavering commitment to safety. Learning about the Thresher incident emphasized the crucial role of addressing deficiencies in design and maintenance practices to ensure the integrity of submarine operations. SubSAFE's clear focus on essentials, rigorous requirements for the submarine community, and the establishment of cultural principles such as continuous learning and personal integrity have contributed to its remarkable achievements. The program serves as a commendable example of how a combination of diligence, strict compliance, and a proactive approach can elevate safety standards in complex military and government initiatives.