

Incident

What can we learn from the grounding of the Astute submarine?

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Summary

On 22 October 2010 the nuclear powered submarine HMS Astute ran aground near the Isle of Skye whilst preparing to go alongside a service vessel to carry out a crew transfer. The submarine was undergoing sea trials at the time prior to entering service. The immediate cause of the incident was fairly straightforward – the submarine entered water that was too shallow. However, the underlying causes of the incident included a number of human and organisational factors – including examples of poor communication and supervisory failure – that are common to all industries.

Keywords: Communication failure; supervisory failure.

Introduction

On 22 October 2010 the nuclear powered submarine HMS Astute ran aground near the Isle of Skye whilst preparing to go alongside a service vessel to carry out a crew transfer. The submarine was undergoing sea trials at the time prior to entering service. The official report has recently been declassified and made publically available. This incident made the headlines at the time because the submarine was brand new and very expensive. The images of it being towed free with the rugged Scottish coastline in background added drama to the TV and newspaper reports.

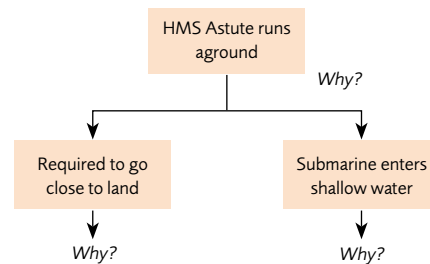
The immediate cause of the incident was fairly straightforward. The submarine entered water that was too shallow. At this level the incident is of little interest to people who do not work with submarines or ships. However, delving a little deeper shows that the underlying causes of the incident included a number of human and organisational factors that have featured in major accidents across all industries.

This paper is based on information contained in the official report. It has required a certain amount of interpretation and it is possible that some of the technicalities have been 'lost in translation.' The aim has been to use the incident as another example how human and organisational failures contribute to accidents, rather than to explain how submarines are operated or why this one ran aground.

Accident overview

One way of learning from incidents is to define the incident at a high level and then drill down in the areas of most

interest. Causal trees are an effective method of doing this. The diagram below gives a simple representation of the HMS Astute incident.



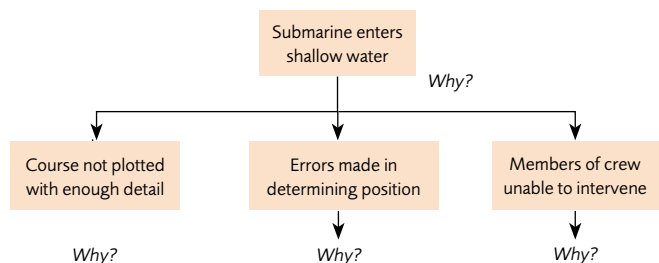
In this case, understanding why the submarine went close to land is of little interest because it was planned and should have been safe. There is no suggestion that there was anything wrong with carrying out the crew transfer close to land.

However, the second question leads to a very interesting line of inquiry.

Why did the submarine enter shallow water?

The investigation confirmed that the water depth was marked correctly on the charts being used to navigate and the draught of the submarine (i.e. the depth of water needed) was known at the time of the incident. Therefore, it is reasonable to conclude that the course taken by the submarine was not as intended and occurred because of errors made by the crew.

This causal tree shows how this may have occurred:



Why was the course not plotted with sufficient detail?

This was the seventh crew transfer that had taken place in the same area during the submarine's sea trials. There had been no issues with the previous ones. A general plan was in place and being followed at the time of the grounding. However,

this assumed the transfer would take place during day light when visual navigation would be possible. This transfer was taking place in the dark, which was far more complicated. The implications of this were either not recognised or not given adequate consideration.

It appears that a degree of complacency had set in on board the submarine. Whilst it is easy to view this as a failure of individuals involved and blaming them for being careless it is important to recognise that complacency is actually a natural human reaction to familiarity. If people carry out tasks or situations on a regular basis their perception of risks diminish, no matter how hazardous or complex they are.

Avoiding complacency is difficult. It affects competent people the most and can appear on the surface as efficient working. Signs of complacency include taking short cuts and multi-tasking, which means people pay less attention to what they are doing. In this incident people accepted the task as routine and got on with it. They failed to consider the conditions they were working under and so did not recognise to change the methods they were using.

Why did the crew make errors in determining position?

The crew made errors because the information they needed to determine their position was not readily available. The route to be followed had been marked on paper charts. Although the person taking the lead in the navigation had a copy of some of these charts, there was a delay in him obtaining the one showing the area where the crew transfer was going to take place.

As well as the paper charts, the submarine was fitted with various items of equipment to assist with navigation. These should have been accessed from the 'bridge.' This is a platform on the 'fin,' which is the tower like structure on the topside of the submarine. The bridge is not watertight, so only accessible once the submarine has surfaced. It takes some time to set up all the equipment, and this was still happening in the minutes leading up to the incident. This had taken longer than usual because a fault had been reported with the main radar system and a backup system was being set up.

Another factor in this case was time pressure because the submarine was behind schedule. A deviation from the original planned route was taken as a short cut and it is likely that the crew may have been reluctant to do anything else that would have caused delay.

Lack of information and time pressure are often factors in accident in all sectors. People will carry on with a task even though the procedure they are following is incorrect, equipment fails or other conditions on the day means that the standard method is not appropriate.



Wikipedia

Sailors aboard the Royal Navy submarine HMS Astute, November 2011. Commissioned on 27 August, 2010, the 323-foot, 7,400 t submarine carried a crew of 98 officers and enlisted personnel, and could travel at speeds of 29-plus knots while submerged.

Lack of information and time pressure are often factors in accident in all sectors. People will carry on with a task even though the procedure they are following is incorrect, equipment fails or other conditions on the day means that the standard method is not appropriate. Management can apply time pressure by emphasising the need to meet a deadline or improve efficiency. Often pressure is self-generated by operators and technicians who feel disappointed with their performance if they do not achieve what they set out to do. The problem is that people do not adjust their expectations about what can be achieved to take account of unusual or difficult circumstances.

Why did other members of the crew not intervene?

People were positioned in several locations on the submarine. The official report suggests that it was an error to have a less experienced person on the bridge. Although the more experienced personnel in other parts of the submarine should have been able to monitor what was happening a number of factors affected their ability to intervene in a timely manner.

For example, it had been decided that one of the more experienced members of the crew would occupy the secondary navigation position to coordinate the crew transfer.

They should have been able to monitor the movement of the submarine from there quite easily. However, when they arrived at the position they found it had been left in a secure condition, and it took some time to first gain access and then for them to develop some night vision.

Problems with the submarine's internal communication systems resulted in delays in relaying critical information and orders to the people who had control of the submarine. Also, the 'watch' handover had occurred less than half an hour before the incident. The official report states that this was not conducted in accordance with standard operating procedures, possibly because of time pressures and the fact that this operation was being viewed as quite routine. The result was that people who may have been able to recognise problems and intervene before the incident did not have a sufficiently detailed and up to date picture of what was going on.

These factors often contribute to accidents. Some form of communication failure is almost a certainty in any demanding situation, and so it is important to be very aware of the risks and have robust controls in place.

Inadequate supervision is sometimes overlooked as a factor in accident causation, but this incident highlights how assumptions about how people will monitor the activities of others and intervene when required can be overly optimistic. And, shift handover has been highlighted in a number of major accidents over recent years but is probably one area

where there is still a lot more to be done to improve processes and practices.

Conclusion

The aim of this paper was to use the HMS Astute incident as another illustration of the human and organisation factors that have been associated with major accidents across industries. In this case the fact that a critical activity had become routine allowed the natural human reaction of complacency to set in. As a result, the task was not properly planned to account for the circumstances being encountered at the time. When problems were experienced resulting in critical information not being readily available people carried on instead of taking the time to check that they had an accurate picture of what was going on. This was partly influenced by a perceived time pressure. When individuals did make errors, other people were not able to intervene because they did not have awareness of what was going on. Breakdowns in communication, including those during handover meant intervention either did not result in corrections of those errors or occurred too late.

Reference

Report of the service enquiry into the grounding of the HMS Astute on 22 October 2010 http://www.mod.uk/NR/rdonlyres/7A650FA3-9FFC-40F4-872E-6CB6D898DBE6/0/astute_grounding_si_report.pdf