

Can Simplicity Improve Safety Management Systems?

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About the author:

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Introduction

What would you say if someone replaced the traditional speed limit sign with complex law text as shown below? You would probably say that the complex sign is not good for safety. This presentation is about being clearer like the simple 80 sign.



I will share lessons learned from 20 projects run by shipping, oil and gas companies to simplify and improve their Safety Management Systems (SMS). Many reduced their procedures by more than 50% without losing anything of value. They had two goals: (1) Be more like the clear 80 sign; and (2) present required background information efficiently without putting all of it on the 80 sign.

Use experience – not checklists, was an unwritten rule I quickly learned many years ago when I was a young airline pilot. Older colleagues had experienced having to choose between good airmanship and checklists. Since voice recorders monitored us, we always read the checklists, but fast and superficially. Today pilots do not read the

checklist fast because they have to, but carefully because they want to. What has changed? This question takes us back to 1988.

Are Complex Checklists Safe?

I woke up early in the morning when Delta Airlines crashed close to my home in Texas. The pilots forgot the flaps and the warning system failed. The voice recorder showed superficial checklist reading. They answered what they expected to see and not the actual indication.

Every pilot knows they need flaps, so lack of knowledge was not the problem. Typical airline checklists had many non-critical items; pilots perceived them as a nuisance and often read them too fast. The accident investigators did not just blame the pilot's checklist discipline, they also found system deficiencies.

Ten years later, Swissair had a fire in the video entertainment system. Despite thick smoke and high heat, the pilots still circled and read the complex lists. This took too long; they crashed and lost all onboard.

What did we learn? Too complex checklists compete with common sense and experience. We therefore made these lists shorter. If unable to control the smoke or fire, the pilots are quicker instructed to land as soon as possible. This might have saved Swissair's passengers and crew.

Even the Best Make Mistakes

Our new vision was a tight focus through concise simplicity. We believed there is a clear link between how user-friendly something is and how

much we will use it. In other words, user-friendly procedures improve performance and compliance.

Checklists should not compensate for lack of experience or basic knowledge, but for the fact that even the best can make mistakes. We only permitted “killer items” in the checklists based on (1) not interfering with tasks and (2) risk assessment.

Best Since Doctors Began Washing Hands

Other industries learned from aviation. As an example, Haukeland University Hospital in Norway reduced complications and mortality rates up to 42% by using aviation-inspired checklists. Norwegian TV2 called it the biggest breakthrough since doctors began washing their hands.

Shipping, oil and gas are also using these concepts. Since 2009, we have worked in the field to understand the problems. First, we asked many seafarers for their feedback about their SMS. The most common answers were:

- Complex language and long sentences
- Needing to read something multiple times
- Difficulty finding what you need
- Explanations not following the work flow

This made it difficult to read and understand the SMS text by yourself. Resulting in knowledge being passed down verbally, including good and bad habits. When we asked why this was, we got these answers:

- It started with the introduction of ISM, ISO and other standards
- Authorities and customers require complexity
- Information is added but never removed
- Too much information was forced upon our SMS

After a while, a new theory developed. We began to question if the problem really was too much information. Could the problem be how the information is presented? First, we looked at the writing style.



Windbag Text

Procedures can be like people, some talk a lot but say very little. We call them windbags, and this is not a compliment. We do not want inflated windbag text in our management systems.

Text is like math – we can present the same things in a complicated or a simple way. Why write $\frac{12}{18}$ when we can write $\frac{2}{3}$? Why write commence when we can write start? Is it not better to write stop than discontinue? We made a new simple word dictionary published at www.lovoy.info

We called this text washing, which can reduce the word count by more than 50%. Text washing can cut down on the number of words, but this is not the end goal. Our goal is to be concise. This means saying what we need clearly with as few words as possible. We also developed easy to measure Key Performance Indicators (KPIs) for proactive user-friendly text.

Spaghetti Structure

We found an even bigger problem than long, complicated text.

We called it spaghetti SMS structure. This happens when we revise an SMS without time chunking rules (we will explain time chunking rules later in this paper). This results in a tangled complex structure branching through our documents. Spaghetti structure is abstract; it is not operational and user-centered. We fail to present steps in the order that the work needs to

be done in, which is extremely inefficient. Sometimes the old SMS presents the first thing we should do at the end of the procedure.

Disconnect Between Checklists and Procedures

The biggest structure problem we found was a lack of connection between checklists and procedures. An SMS is like a large iceberg with around half a million words. The checklists are the tip of the iceberg and they cannot hold the entire SMS. We need to prioritize and only permit the most critical items in the checklist. Just like the 80 sign, it is inefficient to put too much information in the checklists.



To find more information about a checklist item we must dive down below the surface into the procedures. Procedures have more details for training and standardization. This is where you go for deeper explanations about something you are uncertain about. Our biggest finding was that there was little to no link between the checklists and procedures. This had a large potential for improvement since we knew we needed to have workflow-based procedures in the same order as the checklists. This is what allows for quick and efficient referencing between the two in the work place.

Cut the Spaghetti into Convenient Chunks

Chunking, it is a pedagogical concept that says we need to put similar things together. For operational procedures, this means putting together things that we do at the same time. The old procedures were chunked by academic topics without thinking about when the tasks

needed to be done. We therefore made new rules to help writers organize actions based on when we do them. We called them time chunking rules.

Most procedures were in prose text even though they described operative steps. It is better to write most procedures in proactive imperative steps. Most procedures also need an introduction using prose text. We must find the right balance between prose and step procedures. Today we have too much prose text.

Layout

The last element we looked at was layout. Pages cramped with text makes it hard to find what you need. The shipping companies needed a clear visual layout that they could easily update themselves. I therefore made a Microsoft word template with notes, cautions, warnings and other styles. Later known as the Lovoy template, it had a rich graphic layout for proactive procedures and checklists. The shipping companies are using this for paper and electronic documents.

Some made the mistake to believe that all they needed was the new template but the template has little value unless you restructure and wash the text.

Results

All of these concepts combined is what allowed Teekay to reduce their navigation procedures and checklist from 48,939 to 17,235 words. A 65 percent reduction, but the goal was not to reduce the word count. The goal was to have text that is easy to understand for both new and experienced workers, and with the information required during inspections.

We got similar results with companies such as Eidesvik, KGJS, Bernhard Schulte, V.Ships and more. These have been in use for several years now, and have passed all forms of inspection.

Seafarer Feedback

Feedback from Eidesvik showed that their new manuals were:

- Easy to read
- Easy to find what was needed
- Shorter and more concise
- Easier to learn

- Easier to use
- Safer
- More efficient

Seafarer's surveys typically showed around 70% increased perceived usability.

Conclusions

Our first conclusion from these projects was that the main problem was not too much information in the SMS. It was how the information was presented.

Some thought the solution was to switch to a new computer system. This may be a good idea, but it will not solve the writing problem. If you put inefficient text in, the same will come out. Those that washed and re-structured the text before they switched their systems had the best results.

If possible, we wanted to use internal writers. Could we train internal staff without an inborn gift as a writer to solve the problems we found? Good tools were half of the job. We made clear language writing rules and methods for how to untangle spaghetti structure. After some training and practice, the shipping company's existing staff became very proficient.

The Way Forward

What is the biggest simplification challenge? Most support simplification but few have specific methods. Simplicity does not happen by itself – you must design it and this requires resources. Simplicity is abstract; it is easier to get funding for technical projects. To succeed we must put a value on simplicity.



You must invest in the training of your own people. With support from management, SMS improvement projects are low risk. They are low tech and do not require new software or hardware, but have huge potential.

References

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- Simplicity Improves Diving Safety, IMCA Making Waves, Terje Lovoy, London 2016.

Resources

- [New Teekay Nav Procedures](#) (Video)
- [User-Friendly Procedures are Used More](#) (Video)
- [BSM Navigation Procedures](#) (Video)
- [Simple Word Dictionary](#)