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Beyond Compliance

Guiding principles for making ultra safe systems even safer

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Summary

When judging existing or developing safety management systems it is helpful to have some kind of reference to judge them by. In aviation operations safety management systems are maturing and people in aviation tend to have a fairly comprehensive idea about what they should look like and how they should operate. When talking with people outside that community, yet involved in making public policy regarding or touching aviation operations, we found that these ideas were sometimes not fully understood.

This is not to blame policy makers. In our developed democratic society policy making appears to be an independent profession, detached from content. This is reflected in the fact that policymakers, be it politicians or civil servants, rotate from one domain to a completely different one rather frequently[1]. Without operational expertise, and not given the time to acquire it, the tendency to focus on process, procedures and numbers makes sense.

Yet when we look at the problems facing not just aviation, but also other domains that rely on first-line professionals for their proper functioning, it appears to be hard to separate content from process and still get satisfactory policy[2]. This paper is an effort to mitigate this by providing a short overview of the development of aviation safety systems, leading towards a simple set of guidelines that can help focus debate and decisions. It does not pretend to be scientific, just practicable. The literature on the subjects touched is extensive, so those who want to broaden their knowledge base will have no problem finding far wider and deeper ranging material to satisfy that need.

[1] And when spokespersons on aviation in Parliament survive an election, after the unavoidable reshuffling they may well end up doing another subject. Consequently it is very rare for a spokesperson to last beyond four years at most. More or less the same holds true for civil servants at the higher levels. The Director General responsible for aviation was rotated four times over the past ten years.

[2] In 2004 Parliament became worried about the increasing number of occurrences of train drivers missing a stop sign. The new railroad law made it a crime (Spoorwegwet 2005, art. 87 lid 2). As the increase was from 159 cases per year in 1996 to 315 in 2003 (Inspectie Verkeer en Waterstaat, 2008, p. 17), almost 100%, this could well be the result of an increase in traffic, a change in reporting systems or detection capabilities, or a combination of these. Whether the problem is addressed by making it a crime is the subject of later footnotes.

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1 Introduction

In large parts of the world commercial aviation has reached a very high level of safety. This is not because people in the aviation business as a whole are smarter than the average person, but rather because aviation has three distinguishing features. For starters the first-line operators are fully responsible for the delivered product. Not only in fact, but also before the law. Secondly if the product is faulty, in other words if a flight ends in an accident, the odds are that the first-line operators will share the fate of their customers. The third feature is instantaneous feedback. Aviation is like playing golf. It is immediately obvious if and when things go wrong. And, given the necessary skills and knowledge, it is also quite often possible to recover. But not always. (Reason, 2008)

Largely due to these three features aviation Safety Management Systems (SMS) developed bottom up over the past decades, driven by lessons learned through fundamental analysis of accidents and incidents. The resulting systems of balanced rules, procedures and responsibilities can best be described as: solidified experience.

Three challenges remain. The first is to spread the system to parts of the aviation world that lag behind. In large parts of Africa for instance the accident rate is up to thirty times higher than the rate in the Western World. Efforts to address this issue are in place. This paper will therefore not discuss this challenge.

The second challenge is to improve aviation safety even further. The existing systems have reached or are very close to their maximum effectiveness. New insights and new approaches are needed. Not in place of the existing ones, but in addition to these. Over the past few years the scientific community has developed a number of promising insights that need to be tested in real life.

The third challenge is the exact opposite of the second. Existing systems face a two-pronged threat of forced regression into less effective modes. The first part of the threat is that policy tends to be made top down, not bottom up. In the virtual world of process management a well thought out process might seem to be airtight, but almost always the real world turns out to be even messier and more unpredictable than anticipated. Managers and politicians with limited firsthand experience of the wide range of pitfalls in the real world of operations and with views shaped by their everyday experience of the virtual world of rules and regulations tend to try to stop unexpected breakdowns and/or gaps with additional rules and regulations. This may lead to procedures that either try to turn first-line operators into human robots, or are to complicated for real life or, even worse, have not as their main focus to improve the

system but to avoid blame or culpability. In all three cases, what we get instead of solidified experience is solidified distrust.

The second part of the threat is even worse. It is the worldwide tendency to bring criminal charges to front-line operators that have made honest mistakes. Criminal procedures have been started not only when a mistake resulted in an accident[3], but also when a mistake might have lead to damages, injury or loss of life[4]. This tendency to prosecute has serious negative effects on the incident reporting systems that are at the core of safety management systems. This is a source of rising concern with aviation professionals worldwide.

The issue is not whether public prosecutors have the right to start a criminal investigation when they feel the need to do so. They have. The issue is what delivers the greatest benefit to society: unlimited criminal prosecution or advancement of safety management systems. These approaches are not, as is sometimes stated, complementary. They are mutually exclusive.[5] It is very difficult to resolve this issue, because it is based on strong public perception on the one hand and on fundamental ethical en philosophical questions on the other hand. These issues are addressed in a separate DEGAS advisory paper (DEGAS, 2009) and are therefore just touched upon in this paper.

The good news is that the two prongs of the regression threat probably have common drivers. Such as the pressure of public perception, unwillingness to accept the fundamental unpredictability of the world and lack of understanding of the very basics of aviation safety systems. Sharing of information and insights between the aviation community and the rest of society might therefore counter the debilitating effect of both parts of the regression threat and at the same time find ways to further improve the existing high levels of safety.

[3] In 2009 the pilots of the Tuninter ATR-72 that ditched off the coast of Sicily on August 6, 2005, have been sentenced to 10 years in prison for manslaughter. Five other people, including mechanics and executives of Tuninter, have been sentenced from 8 to 9 years.(newsitem) The accident was caused by an ATR-42 fuel gauge mistakenly fitted to the 72 model, hence giving incorrect fuel readings. (Agenzia Nazionale per la Sicurezza del Volo, 2008)

[4] During a Cat II ILS approach on runway 27R at London Heathrow on November 21, 1989, the pilot had difficulty getting the autopilot to lock on to the ILS. At that time the aircraft had deviated to the right off the runway 27R centerline. A go-around was carried out and the aircraft cleared a hotel alongside a major road by just about 12 feet. In May 1991 the captain was convicted for negligently endangering his aircraft and passengers. He had resigned from British Airways after losing his captain's qualification on type. He was fined £ 2000,-. He committed suicide on November 30, 1992.

[5] See e.g. (Houtman, 2009) A slightly earlier study confirms this as well, as quoted from Flight magazine, issue March 19, 2009: *"A new doctoral study of the criminal prosecution of pilots or air traffic controllers following aircraft accidents and incidents has concluded that they have a definite detrimental effect on flight safety, but fail to have the intended effect of deterring individuals from making mistakes. In fact, the study found, controllers are particularly aware that successful prosecution could follow an unintentional error, and the resulting stress may even make mistakes more likely."*

2 Premises and Consequences

The guidelines are based on three premises that are considered to be axioms, plus their consequences. The three premises are:

1. Safety is not the result of rules but is created or destroyed by people acting
2. Safety can never be the number one priority
3. The real world is fundamentally unpredictable

Ad 1) Safety is not the result of rules but is created or destroyed by people acting

Thinking, policy making and rule making all take place in a virtual world. They have no direct effect on the real world. The only way to have an effect on the real world is by performing a physical act. Like baking bread, laying brick, or flying an aircraft. Or playing golf[6].

Consequences

The acts of first-line professionals in safety critical systems are all important. Of course policy, rules and procedures are also very important. But only because these set the stage for the actors. The stage restricts and guides the actions of the actors and provides them with the necessary tools for their trade. But without the acts of actors the stage is meaningless. Safety management systems should therefore focus on the actors and help them to achieve the best performance. Of course first-line professionals cannot hide behind an SMS. They remain accountable for their acts. An SMS is a tool, it does not replace responsibility, skills or common sense.

Because the acts of people create or destroy safety, it cannot be added to a product, like putting icing on a cake. Safety is not a separate but an integral part of a process. It is one of the ingredients of the recipe of the cake itself and should be treated as such. Safety related issues should be a fully integrated part of the tasks, skills and knowledge of first-line operators. Safety is one of the elements of a process. Which brings us to premise number two.

Ad 2) Safety can never be the number one priority

Although organizations as well as politicians tend to declare that safety is their number one priority[7], some even declaring it their number one, two and three, in the real world this can never be true. Every organization exists for a purpose, to provide a service or a product. Of course, whatever that service or product is, it needs to be provided as safely as possible. But

[6] No more is intended here that an obvious factual statement. Deeper philosophical analysis is also possible. For good common sense discussions see (Arendt, 1958), (Arendt, 1971) and also (Searle, 1998)

[7] A Google search for the exact phrase "Safety is our number one priority" yields over 160.000 results from almost as many organizations.

probably also comfortably and environmentally friendly, and certainly economically. Or, in other words, at affordable cost. Both for an individual customer as well as for society as a whole.

Thus in the real world getting things done will always be a balancing act. The challenge is to get the mixture of competing goals just right. A business or organization that really treated safety exclusively as the number one priority would very soon be out of business. On the other hand, a business or organization that neglected safety would also eventually be out of business. Although that could take a little bit longer.

Stating that safety always has priority equates denial of the balancing process. This precludes the management of the balancing that will take place anyway. Acknowledgment of the balancing makes it possible to look at that process. This provides the opportunity to make sure that acceptable balances are indeed found. The decisions that were made become part of the after-the-fact analysis process that is a normal part of operational management. At least it is in aviation safety management systems.

Consequences

The safety level of an organization will never be a static state. Safety is a dynamic process and the actual state at a specific time is the result of the particular balancing of the competing goals. It will also be different for different organizations, even when they supply the same product and operate in the same regulatory environment. Furthermore most of the times there will be a range of acceptable states. What some call the safety space (Reason, 2008). The limits of the safety space are on one side the point where an organization folds because it devoted too many resources to safety and on the other side the point where it goes belly-up because its products are not safe enough to be desirable.

Especially when for a long time nothing seems to go wrong the main pressure will be directed to move the process from the overly safe end towards the unsafe end. The resulting movement through the safety space needs to be countered dynamically and proportionally. Disproportionate pressure, quite common in policy making after an accident or major incident, may well push an organization out of the safety space on the overly safe end. This may be less noticeable than an accident and will sometimes be justified with better safe than sorry, but can on the long run, for economic reasons and because of missed opportunities, be very harmful to society as a whole.[8]

[8] There is quite a bit of literature on this aspect, see e.g. (Wildavsky, 1988), (Breyer, 1993), (Margolis, 1996)

The setting of goals, including the desirable outcome of the balancing, will be done top down in an organization. The actual balancing however will be the result of acts from first-line operators. So this too confirms that rules and procedures may need to be set top down, but that what actually happens in the real world determines whether the rules and procedures indeed accomplish what was intended. So the initial set of rules and procedures needs to be fine-tuned bottom-up by what actually works in the real world. It may start as a somewhat abstract scientific logical process, but acquires real value by trial and error. The validation of a procedure is not that it looks good on paper or is airtight in the virtual world, but that it works in the real world. This brings us to the third and final premise.

Ad 3) The real world is fundamentally unpredictable

The real world is more Darwinian than Platonian. More contingent than causal. Of course lots of minor, everyday events develop in a logical and thus predictable way. We came to more or less understand these and learned to cope. However the much rarer high impact events tend to be more contingent and thus elusive.[9]

The problem is that in hindsight it is often possible to indentify the bifurcation points in a sequence of events and to determine how each decision or event brought the system to the next state or, in the case of an accident, closer to disaster. The resulting explanatory narrative can be very convincing, which can lead to the delusion that predictability and thus prevention are attainable.

This is probably the driving factor behind some efforts to reduce uncertainty by building mathematical models that try to capture the real world. The issue of the applications and limitations of causal model building in aviation safety matters is addressed in a separate DEGAS advisory paper (DEGAS, 2008), so we will not go into further detail here. After the financial crises the limits of modeling as a way of making the world predictable have caught the attention of a wider audience, but it has been the subject of many studies for many years.[10]

Consequences

Everyday normal events tend to be largely causal and can be analyzed. In these cases rules, procedures, skills and knowledge will prevent most accidents from happening. A constant effort is needed to promote compliance to sensible rules and procedures, to adjust these rules when feedback loops indicate the need to do so and to prevent drift into failure or movement

[9] The weather forecast for tomorrow will for instance on average be fairly accurate, while a weather alarm for tomorrow is quite often wildly off the mark.

[10] See e.g. the chapter *Limitations of Bayesian Networks* in (Niedermayer, 1998)

too far to the wrong end of the safety space. But in a well developed safety management system the causal end of things is basically covered.

What remains are the contingent failures, the events hidden in the future that have become notorious as the unknown unknowns[11]. These cannot be prevented with more rules and procedures or more training. Adding more rules and procedures may even make the system less safe by making it unworkable or by promoting a false sense of having the bases covered, leading to complacency. This is even more dangerous because the only line of defense available for unpredictable events is resilience. And for being resilient awareness of the fact that the unexpected can happen anytime is essential (Hollnagel, Nemeth, & Dekker, 2008).

[11] As quoted from a press conference by then US Defense Secretary Donald Rumsfeld (on February 12, 2002): "There are known knowns. These are things we know that we know. There are known unknowns. That is to say, there are things that we now know we don't know. But there are also unknown unknowns. These are things we do not know we don't know."

3 Present state of aviation safety systems and recent developments

For the three reasons stated in the introduction aviation safety systems developed bottom-up over the decades. They now typically combine sensible and internationally standardized rules and regulations with advanced training systems and feedback and learning loops at the organizational level, driven by incident reporting systems. Compliance with rules and regulations is at a very high level and when deviations are deemed necessary these deviations are generally reported. When circumstances permit they are even discussed beforehand, at a minimum among the first-line operators involved.

Historically the top-down involvement of Government and/or Administration was limited to rule and policy making and checking for compliance. The tendency now is to also formalize the very successful feedback and learning systems by mandating Safety Management Systems at the organizational level, by Mandatory Occurrence Reporting Systems at national and international levels, and by State Safety Programs in the Government/Administration domain.
In itself this is a worthwhile development. There is however a real danger that these efforts to consolidate will mutate to produce top-down driven bureaucratic systems. Furthermore frequent rotations of policy makers, be it politicians or civil servants, can lead to loss of operational knowledge, shifting the focus from, historically, output management and content to input management and process. The result could well be virtual processes that are deemed satisfactory when all boxes are ticked, taking away responsibility from first-line operators and replacing that with systems that are essentially mechanisms to shift blame.[12]

Another problem associated specifically with formalizing occurrence reporting systems is that the relationship with the Justice department, especially the public prosecutor, also needs to be formalized. As said above, this is addressed in a separate DEGAS paper (DEGAS, 2009).

Formalization of reporting systems is probably necessary (and if not it is by now unavoidable), but may produce undesirable results.

Returning to desirable results: the existing aviation safety management systems have reached or are close to their maximum effectiveness. Several studies therefore explore additional ways to make the ultra-safe organizations produced by present systems even safer. Below we

[12] . In the case of the train drivers missing stop signs it is hard to understand the basic reasoning behind the decision to make it a crime. On the road running a red light is unfortunately a quite common occurrence and it will in most cases be done on purpose. It can thus be influenced by a deterrent. A train driver however will almost never cross a stop sign on purpose. So to make it a criminal act amounts to blame shifting instead of problem solving.

mention some of the subjects that are being explored. These are just examples, the list is not limitative.

How do we counter hindsight bias, to reach a deeper analysis of the decision making that happened prior to accidents or incidents. With the hindsight of an accident it is easy to see that a specific decision was part of the accident sequence. It also relatively easy to then label it as lack of skills or knowledge, loss of situational awareness, loss of crew resource management or whatever other labels are available (Dekker, 2006). This however delivers no useful insight. The actors did not know about the outcome, or else they would have acted differently. The real question is why, given what they knew at the time, did their action made sense to them at the time. It is difficult to pursue these questions in a top-down oriented environment, because instead of presumably finding a below standard actor, a bad apple, you may find a systemic problem. Bad apples are easy to remove, systemic problems often not.[13]

How do we tackle drift into failure, or a slowly shifting of standards. Not the obvious drift, but the one that goes unnoticed because no violations are involved, the one everybody agrees is acceptable, including the regulatory authorities. All seems to go well. There are no incidents, so the feedback and reporting systems have nothing to report and thus there is nothing to learn from. Until an accident happens.

How do we establish what the position of an organization actually is within the safety space. There is no single measure for it. If you know the position, how do you improve it when necessary? Or how do you keep the organization there when its position is satisfactory?
How do we make actors and organizations resilient, the only way to absorb or limit the damage that unknown unknowns can cause?

How do we prevent organizations from becoming box-ticking bureaucracies disconnected from real events in the real world? Flexibility and creativity are probably necessary to be resilient, but are not the very first features one would associate with bureaucracies.
Lots of very stimulating work is going on and all this goes way beyond the relatively simple business of compliance and of blaming the person who made the most proximate mistake in

[13] A quick scan of the train drivers and the missed stop signs case yields the following. With about 3000 train drivers, 300 missed signs per year and about 600 sign crossings per working day, on average a driver will miss one sign in ten years, which is less than one per million signs. That is almost superhuman and it is hard to see how criminalization would improve that. It would probably be more useful to analyze features of the stop signs involved, which is what safety management systems would tend to do. Furthermore to prevent accidents as a result of running a stop sign an automatic safety feature will stop the train when that happens. However that feature only works above a speed of 40km per hour. It is possible to extend that to any speed, but the cost involved is about 40 million euro and there are no plans to do that. This may be well be a proper balancing decision, as the number of casualties over the last ten years is zero. However the consequences, even casualties, should then be accepted by the organization (and society) and not be transferred just in case to the individual front-line operator by criminalization

an accident or incident sequence. Some of the work is related to airline operations, others to other sectors of society, but all can share and learn. And airline operations, because of its advanced development, offers a great proving ground for new insights.

Note that the first-line operator need not be burdened with developing or even speculative insights. The safe operation of an aircraft is like almost everything in the real world a quick and dirty job. It is not about academic insights, exact definitions, fully coherent logical systems and rigorous analysis. It is pure and simple about what works and what does not work and about instant decision making based on unavoidably limited knowledge. What the first-line operator needs is the knowledge, skills, tools and environment to be confident that the flight can almost always be completed safely. A rough understanding why the things work that work is helpful, but that is all that is needed.

4 Guiding principles

The guiding principles are just a simple set of things that seem to work. In line with the premises the focus is on the actor, the first-line operator. The organization and beyond that the authorities have the task to optimize the environment or, as we called it earlier, the stage the actors have to work on and with. Nevertheless it will be tempting to try to regulate and/or inspect safety into an operation. This however is not possible when the premises stated in the beginning of this paper are accepted to be true. And even if it were possible in theory, it would not be possible in the real world because of issues with limits of controllability.[14]

Again, this is not an scientific endeavor. Most of it is empirical knowledge. Those who really want to get to the heart of matters and haven't been there yet should delve into the ample literature. The bibliography would be a good starting point.

1) **First-line operators should be properly trained.**
   This might seem obvious, and will probably always be the case at the service entry of an operator, but it goes beyond that. Recurrent training should be provided on a regular basis, together with additional training when new procedures and/or new equipment will be implemented. Training should not just cover normal procedures, but especially abnormal situations. Even more so when these hardly ever occur in the normal operational environment. Finally training should also cover abnormal abnormals. An engine failure or another single system failure in airline operations, although rare, is nevertheless a normal abnormal, well within the capabilities of any properly trained crew. The interesting failures are the multiple interacting systems failures, especially when compounded with external circumstances like weather and/or terrain and time pressure. No training will be able to cover every thinkable combination, let alone the ones nobody thought of yet. So it is down to the resilience of the system and the crew. Effective prioritizing, basic knowledge, handling skills, creative thinking and communicating skills will help save the day, as has been shown at numerous incidents (Reason, 2008). This can be trained and is trained at many airlines.

2) **First-line operators should have proper tools.**
   Again obvious, but this includes proper maintenance of the tools, proper documentation and proper information. That does not mean documentation and other information you can get if you know where to look for it, but reliable documentation

[14] For controllability issues see e.g. (Hoebeke, 1994) and, for an introduction to the Viable Systems Model of Stafford Beer, basically a management model for resilient systems, see (Espejo & Harnden, 1989)

and information readily available when you need it and out of the way when you don't.

3) **First-line-operators should be given appropriate and realistic procedures.**
Instead of first-line operators using their personal preferred way of proceeding, collective best practice procedures should be established. A procedure is a tool as it helps to structure actions and workflow. But it is also a benchmark. It gives first-line crewmembers an opportunity to challenge a deviating action by another member when the deviation is not announced or to discuss the merit of an intended deviation when it is. Realistic means that procedures should enhance the work, they should not complicate it beyond necessity, let alone be almost impossible to use in the course of normal work.

4) **Rules and procedures should be developed bottom-up, based on what does and what does not work.**
An initial set probably needs to be installed top-down, but should be fine-tuned bottom-up as soon as possible. Fine tuning is necessary to make procedures really effective and to make sure they indeed represent the best practice at a given time. Only then will they be recognized by the first-line operators as such and will they be used. The monitoring and feedback loops that are an essential part of an SMS must be used to establish if procedures are adhered to and if not, why not. Noncompliance can be the result of improper balancing of competing priorities, an information issue, but also of inappropriate design of the procedure, a management issue.

5) **Compliance to rules and procedures should be very close to 100%.**
When procedures do indeed represent the best practices they should be followed in almost all cases. However they should still be applied with the intended effect in mind, and only after a quick check whether they will indeed work in the actual situation. Deviation can therefore appear to be necessary (and should then be reported). Non-compliance for no reason on the other hand is not acceptable.

6) **Feedback and reporting should be encouraged through a pervasive Just Culture.**
The only way to improve a system and to find out what is actually going on instead of what is supposed to go on is by a functioning reporting system. A system will only be functional when it is embedded in a Just Culture. Only in cases of gross negligence or criminal behavior will there be repercussions. In all other case reporting will be blame free and strictly for the purpose of improving the system.

7) **The Department of Justice should be convinced of the quality of the Safety Management System and should be confident that the Public Prosecutor will be involved in cases of criminal behavior.**
Just Culture and Criminal Prosecution are not compatible and it is probably impossible to make them compatible. The only solution may be to link them. If the Department of Justice would be convinced that an SMS is working properly and that, if a criminal act or other culpable behavior is encountered, this will then be reported to the Public Prosecutor, only then may it be possible for the Ministry of Justice to leave the initial fact finding and judging to those who are knowledgeable on the subject. Thus to a body within the SMS.

8) **Responsibilities should be assigned as close to the actions as possible.**
So for the actual operation the actor, the first-line operator, needs to be responsible. The organization is responsible for an SMS, thus amongst others for the provision of adequate training, tools and information. The state has the responsibility to set appropriate rules and meta-procedures, to make sure an SMS will be in place and to set licensing and certification standards. Of course, where people have responsibility they need to be given the requisite authority to live up to that responsibility. [15] In airline operations this is indeed the case. The captain of the flight crew traditionally carries both full responsibility for and full authority over a flight.

9) **Classification and analysis of incidents should be done by the first-line organization.**
It will be very difficult to assure that the skills and intimate knowledge of a specific organization, necessary for proper classification and in-depth analysis of incidents, are reliably and readily available at the level of the authorities[16]. On top of that the first beneficiary of lessons learned from an analysis is the organization itself. Furthermore the lesson learned may quite often be organization-specific. Analysis should therefore be done by the organization, but be accessible for inspection to check the functioning. The results of an analysis should be made available to an Inspectorate, as well as summaries, to enable a higher-level type of analysis by the relevant authorities.

10) **Analysis of trends between organizations and between different geographic regions should be done by the relevant national or international authorities.**
An organization will be motivated to exchange safety data and lessons learned with their peers, even if they are competitors, but other than that cannot easily devote

[15] (Dekker, 2006, p. 197)

[16] See the report (Evaluatiecommissie Meldingplicht Voorvallen Burgerluchtvaart, 2009) to get a feel for the difficulties.

resources to look beyond itself. An organization also has also no authority to do so. It is up to the State to compare organizations and up to international bodies to compare geographical regions. To make this possible the reporting at organizational level should be standardized, which is a problem far from solved but also way beyond the scope of this paper.

11) **Authorities should establish that within organizations compliance is at the required level, that appropriate Safety Management Systems are in place, and that these are functioning as desired.**
The task of an Inspectorate should not be to inspect safety into a system, because this is impossible. Their brief should be to make sure that at a given organization an SMS is in place and functional. Part of this is also compliance with rules, regulations and procedures, but always with the intention to reach the highest reasonably reachable safety level[17] as the ultimate objective. Rules are Tools, not entities with a life of their own. In this respect Inspectors too are first line actors who will have to make their own informed judgment calls, just as first-line operators in the operational environment have to make these every day.

12) **Inspectors should have a working knowledge of the industry as a whole, the type of organization they inspect, the specific organization they are looking at and the insights behind and the objectives of Safety Management Systems.**
Without this, inspections might be reduced to bureaucratic box-ticking on compliance lists[18], which is not very helpful and might even be counterproductive. Different organizations also need different knowledge at the inspectorate level. Inspecting a car is not the same as inspecting an aircraft. Inspecting a shipping company is not the same as inspecting an airline.

13) **Look at what a system does, don't listen to what it says it does**.[19]
In the real world it are acts and events that matter. Not academic (and sometimes ideological) constructions that only exist in a virtual world, however ingenious and theoretically sound they may be.

[17] What could be called the AHARA level: As High As Reasonably Achievable

[18] An interesting case may be the audit process run by ICAO (the International Civil Aviation Authority, part of the Unites Nations). Over a hundred countries have been audited so far, which in itself is a valuable contribution to enhancing flight safety. However, when looking at the ranking, there are a number of countries in the top ten that the average observer would not expect to be there. This either indicates faulty prejudices on the part of the average observer, or highlights that this is predominantly a bureaucratic virtual world process: necessary in itself but far from sufficient.

[19] (Hoebeke, 1994, p. 118)

14) Never change a system based on hindsight bias.

A final but essential guideline if we want to move a safety level beyond what can be reached by compliance alone. In hindsight, especially after an accident, it often might seem quite clear what went wrong. This may lead to superficial responses, often in the form of additional rules or procedures. Efforts to understand what went wrong from the position of the first-line operator working in the system at the time are more helpful. Why did the decisions made sense to the operator when they were made, based on only the information readily available to the operator at that time.[20]

[20] (Dekker, 2006, pp. 29-38)

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