

## Professionals, experts, and super experts: an insight into rule-based safety and managed-based safety

In this *Industrial Safety Opinion Piece*, FonCSI's Director, René Amalberti revisits two well-known, but often misunderstood concepts: rule-based safety and managed-based safety. He begins by highlighting the dangers of oversimplification. Then, he proposes several levels of managed-based safety, ranging from 'professionalism' to 'super expertise', and ends by suggesting some ways to integrate these profiles into the organization.

Safety experts like to cite a study of avalanche victims in the USA between 1972 and 2002. The circumstances were often totally predictable (a risky corridor, unstable weather conditions), the victims more competent than the average visitor (guides, experienced mountaineers), typically a group of climbers, rather than an isolated hiker, often under pressure to get back to base before nightfall. Many of these 'expert' victims were acknowledged for their wide experience, their understanding of the mountain environment, their ability to face danger, their prowess in rescuing people in difficult situations, and for sharing their knowledge. If we pick up a newspaper, we can see that such events continue to occur.

This example serves as a metaphor for the industrial world, and work in general. We could say that there are two sides to these experts: on the one hand, they are respected icons, recognized as life-savers, and role models for the youngest; on the other hand, they take more risks and have more accidents than the average person. At this point, it is important to note that we are not talking about theoretical skills or academic knowledge, but about know-how that is acquired in the field, and about using these skills in practice.

### Rule-based safety and managed-based safety: an inherent opposition?

The question of expertise feeds directly into the notion of rule-based safety and managed-based safety. The notion first emerged in 2008, in the context of industrial fishing, one of the riskiest professions in the world. Popular science often likes to characterize these two forms of safety as opposites.

Rule-based safety is the expected outcome of a system that is 100% procedural, under both normal and abnormal conditions. Operators follow the rules, with no exceptions. To a great extent, the effectiveness of the safety system is based on the implementation of breakpoints, or equivalent mechanisms, which trigger as soon as a risk of going off course can be detected. This approach makes it possible to calculate and demonstrate the safety of the system (required for certification, for example), and is the best illustration of safety results for an industry - at least on paper. Paradoxically, in the rule-based system, human expertise relies more on those who draw up and disseminate the rules than on front-line operators - who are seen rather as agents who have been trained to apply the rules.

Managed-based safety, on the other hand, is the result of 'intelligent' actions that are undertaken by operators who cannot follow procedures because none exist for the situation they are faced with. The expertise of the operator (or a group of operators) is encapsulated in their know-how: they know how to adapt and manage risks in unforeseen situations. This approach makes it far more difficult to demonstrate (calculate, certify) a gain in terms of safety. In practice, the demonstration relies on a myriad of specific cases that have been observed in the

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field; moreover, these examples also serve as counterexamples to rule-based safety. To put it simply: a high level of expertise, professional and social recognition of this intelligence, and a good level of resilience are almost considered as synonymous.

In reality, the situation is more nuanced, and not only because reality is a continuity between these two approaches to safety, a judicious balance between rules and initiative.

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#### How can we characterize the two approaches?

To better understand the rule-initiative continuum, we first need to characterize the nature of both expertise and rules. We do not attempt to establish a typology of rules here - it is a subject that could easily be the topic of its own Opinion Piece, perhaps even a follow-up to this one.

It is clear that rules are associated with an entire universe of requirements, with varying degrees of abstraction and detail. Some are very action-oriented (*if you see this, do that*), others are very abstract, while a third set focus on an unfamiliar situation (*if you don't see that, try this, or stop and take a step back*). Some are aimed at the frontline operator, while others are reserved for the executive committee. A whole set of different skills are required to draw them up. First, the ability to write well - not easy; second, a vision that is consistent with other rules - also not obvious; and third, the ability to talk to people at their own level - another challenge. Together, the ability to master these three aspects make the difference between a system that is effective in practice, and a system that only works well on paper. Of course, it is clear that the need for good management runs in parallel to the initial quality of the rules.

#### Levels of expertise in managed-based safety

In this Opinion Piece, we only address the dimension of expertise; more specifically, we examine the continuum that runs from professionalism to a rarely-seen level of accomplishment.

**Professionalism is level 1 of managed-based safety.** No rule-based system can work without intelligence. It is required to know how to use which rule when, in what context, how quickly, and in what sequence. What we call ‘know-how’ also extends to the meta-idea of knowing when to stop, because following the rule would lead to an unexpected or unsafe outcome. Professionalism also includes social and ethical intelligence regarding the team’s skills, trust, delegation and accountability. Operators increase their level of know-how throughout their careers; it is constantly improved through repetition. Every operator should have it, although it is acquired more-or-less quickly depending on the person and their career path. At level 1, the vast majority of operators continue to follow the rules.

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**Super professionalism is level 2 of managed-based safety.** These operators are often referred to as experts. Already professionals, their know-how goes beyond a good knowledge of the rules, and they have encountered a wide variety of difficult situations. They usually follow official instructions, but have added some of their own, unofficial rules. They still follow the rules, sometimes more strictly than their younger colleagues, as experience has taught them that this is a sensible strategy, but their rules extend beyond the ones thought up by the staff in the office. It is interesting to note that ergonomists like to identify these intelligent and effective individual (or shared among a small group) rules in their analyses. In a similar vein, in 1992, Véronique de Keyser observed that the ability of experienced professionals to develop intelligent rules distinguished them from novices and other professionals. In her eponymous text, she noted that intensive



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efforts to automate work, which began in the 1990s, resulted in ergonomists being hired to record this know-how and incorporate it into automated systems that would eliminate the need for the super professionals who provided it. Not all professionals become super professionals; the latter are both valuable and sought-after as they add value to the company. Moreover, they can be a little unpredictable if they do not share their super expertise.

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**Acknowledged, outstanding expertise is level 3 of managed-based safety.** No system, not even the most highly tuned, is sheltered from infrequent, peripheral, unforeseen and serious situations where even professionals (in the previous sense) do not know what to do. In this case, a super expert is called in to help. A rare species, these people are expected to analyze the situation, and apply a non-standard solution. It should be noted that although their solution may be unconventional, they are far-better prepared than the standard operator; they know, and rigorously apply a whole range of safety rules to the operation in hand. This is level 3 of managed-based safety.

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Finally, we have ‘self-declared super experts’. These professionals allow themselves to take independent action because they believe that they know more than their colleagues, and must compensate for a poorly-designed system. Except that they are the only ones to acknowledge their expertise. They are sometimes called ‘cowboys’. We cannot really call this a category of expertise, rather it is a typology of psychological profiles that cuts across the three levels of expertise. These people are the first to intervene in poorly-understood areas of the system, as they seek to demonstrate their know-how and ability to find solutions to unusual problems (which they may have provoked). Pleasure and a desire for peer approval of their successes are important drivers of their behavior. They like to show off. In rare cases they may become the outstanding experts of the future, but most will perpetrate incidents and accidents that shatter their dreams. Each industry has them, to a greater or lesser degree. While few in number and a dangerous addition to safe systems, they may be considered normal in less regulated environments.

### To sum up: rules-managed...

No system can only be rule-based. The idea is meaningless, as rules cannot tell us how to use them wisely (initiative is required for this) but, more importantly, because no system can claim to have considered all possible cases and crises.

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Managed-based safety is not improvisation. Professionalism is the mildest, but most frequent expression of it. Not only do operators stay within the rules, but it also is expected of all operators, in all industries, even the safest ones.

On the other hand, super experts correspond to a much greater level of autonomy, and noncompliance with rules. In the most difficult situations, we cannot do without them, even in the safest industries. However, their position is delicate (level 3 of managed-based safety). These self-proclaimed experts can be a danger to their colleagues, especially when they decide to go it alone.

### How do super experts fit into the safe company?

While any team welcomes seasoned professionals, who gained their experience while adhering to the rules, the position of super experts in the field is much more questionable. Why? Because they often find it difficult to find a role in the huge number of situations where their super expertise is not required. Moreover, they are not necessarily excellent professionals, in the sense that they are able to



apply the rule that is most applicable to a situation; the hierarchy worries about their excessive independence, team members see them as dangerous because no-one understands what they are doing, or feels able to criticize them, and it is difficult to discipline people who are highly regarded.

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In short, they are difficult to manage, especially in a regulated, safe or ultra-safe industry. Although they may be needed in exceptional circumstances, it is less feasible to find a role for them on a day-to-day basis. Above all, they should not become trainers; experience shows that they are more interested in passing on their ‘insider tricks’ than teaching standard procedure (which they are not very familiar with). A situation to be avoided for most operators. They definitely should not become managers; in fact, they are rarely good managers, as super experts are free spirits; they see themselves as superior, are unwilling to comply with regulations, and lack social skills.

So, where are they most useful? The best solution is undoubtedly to deploy them to a specialized subsidiary or test center. This is what happens in the aeronautics and, to a large extent, other ultra-safe industries. However, there is a price to be paid. These individuals have their own, idiosyncratic career path, and cannot be transferred to other departments.

#### Super experts in other industries

Here, the situation is very different. For example, in the healthcare sector, all doctors are trained in the hope that they will become super experts (unlike safe industries where training is only intended to encourage professionalism). Of course, only a minority of physicians will achieve this level. The others, trained in adaptive and autonomous behaviors, remain at the top end of level 3, contrary to patient safety recommendations and evidence-based medicine. This is a recurring source of risk in medical practice. We must not forget that, on average, one patient in a thousand who is hospitalized will experience a serious event that is unrelated to his or her pathology, but is related to his or her care.

Another example comes from the fishing industry. Fishing boat captains are highly sought-after mentors for sailors, but they are also most expert (not only most professional). The economic model tells us that end-of-month profit is highest for those who are willing to take risks that break the rules and, especially, those super experts who can manage their overexposure to risk in the long term.

Why is this situation acceptable? Because the reality is that the system is highly unstable (an entire nation, 24 hours a day, 7 days a week in medicine; life-threatening conditions at sea) and it is unrealistic to think that the system can only be regulated by rules. What are the consequences? The risk is huge, nevertheless, it is clear that expert know-how is more common among operators in these activities than among their colleagues working in industry.

What advice can we give these industries? Probably the opposite of the advice given to ultra-safe systems: use these experts as trainers; use their wisdom, you are more likely to heal, perform well, earn money, and even survive, if you follow their example.

#### Conclusion

This Opinion Piece goes beyond the stereotypical opposition of rule-based safety and initiative-based safety. It underlines that, in the end, safety is the sum of both rules and initiative, and that the two concepts cannot be separated in real life. We must find the best marriage between them, taking into account the industry, its size, its risks, and its safety objectives.



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This Opinion Piece also teaches us that there is a tipping point, a step into managed-based safety, that marks the transition of a ‘mass’ manager who is sought after and associated with professionalism, into a ‘niche’ manager, who is, ideally, a super expert. However, even under optimal conditions, this is a difficult, dangerous step, especially in safe and ultra-safe industrial systems. In the latter case, we must think particularly hard about their role and, above all, prevent them being tempted - or even encouraged - to declare themselves as above all others. The outcome is often the opposite, as super expertise is exceptional and, by definition, very few people have it.

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