

Our thoughts on safety culture

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Those who are very experienced in their field (experts, specialists) have a special status. Several factors contribute to this, including:

- Acknowledgement of their seniority and experience by the company (salaries, positions);
- Recognition of their technical competence by their peers.

Experts represent production and quality assets for a business because, in a circumscribed domain, they know the answers to a lot of questions. For example, maintenance experts are very familiar with the weaknesses of different types of material, the history of equipment, noises and smells that predict a breakdown, the first points to check in the case of failure, etc.

Turning to the experts themselves, there is a belief that as they have mastered technical aspects of their work, they have also mastered the associated risks.

However, experts fallible (1). Sometimes, what they do can even be

The most experienced people can be too sure of themselves

unsafe. This is due to a fixation bias that prevents them from revising their understanding of the task.

Consequently, tasks that are not fully understood become a source of undetected risk. Although such situations are rare, the consequences are serious in a safety-critical operation. In other words, this class of very experienced operators, who are recognized by their peers, are still subject to biases.

The question that arises is whether it is a problem at all. The answer is 'yes', but the problem is not so much the potential mistakes they might make, as the situations that their expertise puts them in.

The following four arguments support this view:

1. As a result of multiple constraints (difficult challenges, time pressure, an unprecedented situations, etc.) experts find themselves in the front line when dealing with situations that cannot be handled by others.
2. Within teams in the field (for example), what mechanism is in place to catch mistakes made by experts and what triggers it? In other words, who notices and will dare to speak out if the acknowledged expert does not perform the correct set of operations?
3. In the field of complex system interfaces (e.g. aviation, the nuclear

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These situations are generally technically difficult, partly unknown, may potentially lead to an accident and the chances of recovery is limited. An example is accidents involving test pilots in the 1950s, when supersonic aircraft were brought into service.

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2. Within teams in the field (for example), what mechanism is in place to catch mistakes made by experts and what triggers it? In other words, who notices and will dare to speak out if the acknowledged expert does not perform the correct set of operations?
3. In the field of complex system interfaces (e.g. aviation, the nuclear

sector), Lisanne Bainbridge (2) identified some ‘ironies of automation’. One of these is that human operators inherit all of the situations that the robot cannot process. Although fallible, these operators are essential and must be experts in their field.

4. Another irony of automation identified by Lisanne Bainbridge concerns the increasing reliability of automated systems and their ability to handle increasingly complex situations. One consequence is that human operators no longer have to deal with the out-of-the-box situations that in earlier times formed the basis for their expertise. The effect of this partial removal of the human from the control loop is a very real issue in the aviation industry, which is facing a situation where the skills of its most competent operators are becoming eroded.

These arguments highlight that the potential for experts to be overconfident

goes far beyond individuals. Being an expert can mean that you are the one who has to deal with situations where everything that anyone knows has already been done, where the stakes are high, where recovery mechanisms are limited and where automation has led to a partial lack of knowledge. If we add to this the value that industry places on specialised skills, the prism becomes increasingly distorted as the potential overconfidence of experts is amplified by their status and visibility.

The final question is about what we should do about this. One answer may be to rethink our ideas about experts:

- All operators must be ready to express their doubts and ask questions, including experts;
- Experts are not limited by the absolute amount of their knowledge, but the situations in which their knowledge is used;
- The technological choices made by a company have an impact on skills levels.

Notes

1. Villena-Lopez, J. (2014). Most accidents not always happen to people with the least experience. Our thoughts on safety culture, issue 8, Icsi, Toulouse, France.
2. Bainbridge, L. (1983). Ironies of automation. *Automatica*, 19, 775-779.