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Perspectives of the new safety

Perspectivas da nova segurança

Cook and Woods¹, in a seminal article, point ways to overcome the notion of 'human error' as an explanation to industrial incidents and their investigations. In the nine steps the authors proposed, analyses should (1) seek 'second stories' to explain events^b, (2) protect themselves from experts' hindsight bias, (3) know operators' work, (4) seek 'systemic vulnerabilities', (5) unveil the production of safety by practice, (6) search for factors distal to the event, (7) examine how macro-determinants produce new vulnerabilities, (8) use technologies to support and favor operators' performance, and (9) control the complexity of systems by new forms of feedback.

These authors' conception of safety is not inherent to the design and operation of production systems, i.e., not only assured by technological choices, equipment maintenance, strict compliance to procedures, and the control of operators' behavior. In the case of complex systems, interrelations between several functions and process variables can lead systems to an operating state with which operators are unfamiliar. Thus, certain circumstances normalize the occurrence of possible incidents which operation teams fail to detect.

In contrast, workers and engineers' activities and interactions generate safety. The former are integrated into the ability of an organization to adjust to the conditions it faces, control the complexity of its production system, and ensure its robust and resilient functioning¹.

Besnard and Hollnagel², in another capital text, show the founding myths of safety management, three of which deserve addressing: the first one deals with human error as the major cause of accidents and incidents, the second one upholds compliance to safety procedures to guarantee safe operations, and the third one asserts that the adopting more safety barriers increases system protection.

After analyzing these myths in detail, the authors show their weaknesses and offer ways to overcome them. In short, they emphasize the need-to-know operators' work and its situations, contradictions, and determinants, the importance of how they adjust to face system variability and complexity, and that rules and procedures serve as references for operators' actions (rather than necessarily guiding all situations), which they apply according to the understanding of the experienced situations.

^b In general, every professional who begins an accident investigation hears similar narratives from company representatives, associating the event with the individual characteristics of the involved workers or their behavior, a story with a similar content which refers to unsafe acts or human error to explain accidents and influence investigations. Hence the importance of looking for second stories.

Finally, they point out that adopting a new protection barrier can lead to unknown, unforeseen situations which increase the risk and complexity of the controlled system.

Contrary to the focus on human error, these authors^{1,2} sustain the relevance of the role of work and workers in producing safety and highlight the fragility of safety specialists' traditional practices, criticizing their concepts, objects of action, and methods/techniques.

Now, for the so-called traditional safety^c (safety 1 for Hollnagel⁴), the absence or minimization of adverse events results from specialists' investigations and/or prospective risk assessment. This view considers workers as a problem or risk factor to be controlled via behavioral management procedures and programs^{4,5}. Thus, safety is approached as an external instance to operators' activity; safety professionals are unaware of operators' work, its determinants, and contradictions. This type of safety operates by restricting the performance of the workers and the system⁴.

If safety rules and procedures are violated, experts ignore the factors that explain and give meaning to operators' actions⁶, externally judging their "deviant behavior" and punish those involved. Woods and Cook speak of the fallacy of safety experts^d.

Although every operator analyzes risk in their operational activities (of which safety services are generally unaware), when they consult workers, they only see them as informants to feed safety management systems⁷. Companies have instituted these systems as part of the safety bureaucratization phenomenon in place since the mid-2000s. If the existence of safety management systems guarantees safe operations for many stakeholders in organizations and inspection agencies, such systems have side effects which can hinder and endanger the achievement of their very *raison d'être*, their safety⁷.

The adoption of indicators based on metrics of incident frequency or its effects (resulting injuries or lost days, for example), associated with rewarding achieved goals, tends to promote underreporting and/or record suppression, i.e., the quantification of safety performance aims at desired results, those that point to what would be the 'good safety' (the zero vision)^e. The British Petroleum catastrophe in Texas (2005), as other accidents, occurred in a facility with excellent occupational safety indicators⁹, which gave a sense of a positive safety climate before the catastrophe. Such metrics, therefore, lack any predictive power over the occurrence of greater or more severe events^{7,9}.

For Dekker, the need to feed the system with information (i.e., results of investigations, audits, procedures, measures, training records, among others tasks, many of which required by labor and environment inspection agencies) tends to keep safety specialists even further away from the point of production and workers' difficulties and contradictions^{7,9,10,11}.

The excessive focus on protocols and bureaucracy, which diverts safety personnel's attention of what is happening in the field, characterizes traditional safety and its management². Any attempt at a new safety requires returning to the world of practice to evaluate the production of safety in the various situations and variabilities which demand responses from teams which are adjusted to their representation of the functioning of systems⁷. For Woods and Cook, incidents occur in situations which would generally have satisfactory results. Hence the importance of understanding incidental events and analyzing situations characterized by diverse demands, difficulties, pressures, and contradictions, in which operators manage to safely reach the expected results. The same factors lie at the origin of both success and failure¹.

This new vision of safety (whether Hollnagel's Safety 2 or Dekker's Safety Differently) deems operators and teams as the solution to safety problems and the increase of operation reliability¹². Understanding the difference between what they are supposed to do (prescribed or imagined work) and what they do in every situation (actual work or work as done) is the key for safety personnel's ability to contribute to production

c 'Safety has been defined as a state in which hazards and conditions leading to physical, psychological or material harm are controlled in order to preserve the health and well-being of individuals and the community.' (p. 237)

d Inspired by William James' Psychologist's Fallacy, the authors assert: 'Updated to today, this fallacy occurs when well-intentioned observers think that their distant view of the workplace captures the actual experience of those who perform technical work in context. Distant views can miss important aspects of the actual work situation and thus can miss critical factors that determine human performance in that field of practice.' (p. 139)

e Beltran and collaborators show and critically discuss the use of indicators based on such metrics in the Brazilian oil industry⁸.

activities and safety guarantee⁷. According to Hollnagel's safety premise²⁴, safety personnel must support operators to face daily situations, based on the understanding of how teams deal with them, especially unusual and problematic ones¹.

As safety is not something inherent to the production system but emerges, therefore, from its operation, Hollnagel claims that an organization which operates safely prioritizes adjusting and articulating its various functions. In short, robust and resilient production systems treat safety alongside operation^f.

Dekker and Hollnagel's recent proposals for new safety contain important developments, such as: a new perspective and participatory methods to develop procedures and rules, an innovative design of worker training, and the proposal of new safety management indicators.

Doing safety differently, as Dekker⁷ suggests, implies rethinking the goal of traditional procedures and rules as well as reorganizing the process making these rules. The core of this kind of safety necessarily relies on operators' participation. In short, the author defends a new order with fewer, more effective (i.e., more adjusted) rules which give operators greater autonomy. To do safety differently implies expanding the perimeter of workers' action⁷.

In this new order, the experience of operators is fundamental to make explicit the difficulties and needs which may lead to the violation of certain procedures⁶. If the existence of a punitive culture prevents speech, the determining factors and contradictions which lead to such violations will neither be known nor can solutions to them be found¹⁴. New safety implies, therefore, engineering social relations¹⁵ to develop discussion spaces between workers and managers, bringing them closer together in the search for solutions to the problems which, for example, lead work teams to disregard certain procedures¹⁴.

Another important aspect is training of workers and managers. In the case of traditional safety, training addresses existing risks, operators' behavior, and procedures to be followed. To change safety, educational processes must provide individual and collective competencies to produce safety in line with the ability of production systems to adapt and react in an integrated and articulated manner ('tuning')¹³.

Dekker and Tooma⁹ suggested a new indicator for safety management, whose design not only regards the undesired effects of the lack of safety (to be avoided and controlled, of course) but also translates the nature and capabilities necessary to produce safety. Their design is based on the following capabilities: (1) 'to acquire and maintain safety knowledge', (2) 'to understand the nature of operations and their risks', (3) to provide resources for safety, (4) to react to risks and adverse events, and (5) to safely control operations.

Thus, new safety, by promoting interest in individual and collective work activities and the participation of workers in the search for solutions, causes a revision of the social relations in companies at the same time that it promotes a new safety culture¹⁶. If a theory of control is the basis of traditional safety practices based on a hierarchy of social relations in companies⁵, these new perspectives depend on social relations based on trust and cooperation between managers and workers¹⁷.

Of course, the literature has criticized such developments both conceptually and practically^{18,19}, causing this new view to break with the patterns and dimensions of current traditional safety practices¹⁰. Instead, some companies have successfully conducted experiments in using and implementing new safety such as, for example, a chain of stores⁷ and a water treatment and distribution company in Australia¹⁷.

Research groups in Brazil are involved in the production of knowledge in several topics about new safety and resilience engineering, among them, the design of discussion spaces and a new safety culture¹⁴, criteria to propose resilient organizations²⁰, public health actions in crisis situations²¹, among others. Moreover, we find an ongoing movement involving professionals and scholars aimed at promoting this new vision of safety in the country²². However, research must question whether the redesign of social relations (on which these new forms of safety depend) is possible in Brazil, considering the negative effects of the latest labor reform on social and legal relations at work²³.

f 'The systems of today are socio-technical systems and complex ones at that, where the interrelation or dependency among system functions is often more important than the reliability of the parts. Improving safety performance must therefore be based on an understanding of what happens in the system, of the nature of its interactions and couplings [31], and of how its overall performance can be managed and improved.' p. 996)

Despite the importance of workers' participation in the production of knowledge²³, the Brazilian experience in occupational safety shows the innumerable instances of resistance to understanding work activities and workers' participation to sustain prevention programs and policies in the companies in our country²⁴. Having democracy as a principle in occupational safety and health is not only a utopian project of its community in Brazil but constitutes a fundamental condition for its effective practice²⁵, as this new vision of safety advises.

Finally, the purpose of this editorial was double; first, to outline the perspectives of this new vision of safety based on the premise that work and workers themselves^{5,25} have the means to solve occupational safety issues and to attract professionals and companies to experiment new paths to promote safety in more robust and resilient work systems.

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