

# Forum: social network for the surveillance and prevention of workplace accidents

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**Abstract.** In 2008, academic researchers and public service officials created a university extension studies platform based on online and on-site meetings denominated “Work-Related Accidents Forum: Analysis, Prevention, and Other Relevant Aspects. Its aim was to help public agents and social partners to propagate a systemic approach that would be helpful in the surveillance and prevention of work-related accidents. This article describes and analyses such a platform. Online access is free and structured to: support dissemination of updated concepts; support on-site meetings and capacity to build educational activities; and keep a permanent space for debate among the registered participants. The desired result is the propagation of a social-technical-systemic view of work-related accidents that replaces the current traditional view that emphasizes human error and results in blaming the victims. The Forum uses an educational approach known as permanent health education, which is based on the experience and needs of workers and encourages debate among participants. The forum adopts a problematizing pedagogy that starts from the requirements and experiences of the social actors and stimulates support and discussions among them in line with an ongoing health educational approach. The current challenge is to turn the platform into a social networking website in order to broaden its links with society.

Keywords: Education; University Extension; Web page, Work-related accident prevention.

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## 1. Introduction

Work-related accidents represent the most severe health problem among Brazilian workers, with high social and economic costs that may reach 10% of Brazil's GDP [1].

The predominant professional and technical approach views work-related accidents as simple events caused by inappropriate victim behavior. This vision serves to support the legal defense of employers and hampers surveillance interventions [2].

Despite being a thoroughly studied subject in the area of workers' health, the reductionist and distorted view that individualizes such a complex social-technical phenomenon still prevails in the country by blaming the involved victim or operator for the system failure. Expressions such as "uncertain act", "non-standard behavior", "carelessness", "lack of attention", "negligence", etc. are generally utilized to create the scenario for human-error theory [2].

Current thoughts about the phenomenon, however, demonstrate that certain factors immediate or proximal to the event, called Reason of Active Failures, for instance, a machine operator mistake, occur due to latent conditions, such as project miscarriage or managerial decisions, etc., that may remain dormant in the organization until an unpredictable combination of factors triggers an adverse breach of regular operation [3].

Persisting in the traditional approach may be explained by, among other reasons, the legal interest in defending the companies from civil lawsuits and criminal prosecutions. [2,4]

This involvement with employers' interests renders the explanation based on human error, an ideological bias, off the conceptual theoretical field, which makes the deconstruction task even more difficult and complex, requiring systematic initiatives that are able simultaneously: to know the subjects: a) to criticize the traditional approach by showing its trends and limits; b) to offer a new approach – herein called the organizational approach – of a social, technical and systemic nature as an alternative to be adopted by the area professionals as a daily practice.

Thus, we are facing a situation in which a conceptual theoretical criticism is not sufficient, in our field. This work deals with the installation of a

new culture that needs to gain acceptance by means of a continuous process of criticism associated with the implementation of new guidelines and practices as prescribed in Permanent health education [5].

The concept of permanent education has become public policy due to the propagation of this proposal by the Pan-American Health Organization which has called for a significant learning strategy capable of achieving the compliance of workers as to changes in daily practices at complex organizations. [5].

Ongoing education is inspired by Paulo Freire's teachings on problem-solving in education, which starts from the student's knowledge and reality, from his personal life issues, to move ahead and make reflections in order to reach the proposed goals. Therefore, it explores the subject's experiences and introduces issues related to concrete cases and examples extracted from analysis and interventions developed from the participant's reality and experiences.

*[...] problem-solving includes questioning the questions instead of imposing answers. It is to make a reflection part of ones' thought and to exert practical analysis as a singular mutation device either reflected or volunteer. [6]*

Such pedagogical assumptions are consonant with permanent education in the National Capacity-Building Policies for workers from SUS (Brazilian Public Health and Surveillance System) which values work as a source of knowledge (significant learning) and articulates educational activity with attention, management and social control.

In this context, the professional practices are defined by multiple factors such as work organization, technical and scientific knowledge, skills and power relations [7].

The term significant learning is understood as the learning process that originates from the previous knowledge and cognitive learning structure of the learner; that is, characterized by a cognitive interaction between the new and previous knowledge. In this process, the new knowledge becomes meaningful to the learner and the previous understanding is enriched, it becomes more differentiated, more elaborate in terms of meanings, and acquires more stability. Under this view, the subject's previous knowledge is the variable that affects the learning process the most, that is, one can only learn from what one already knows [8].

In the context of organizations and complex situations, the capacity building does not show

efficacy in enabling the incorporation of new concepts and principles into already established practices because they worked in a decontextualized manner and are based primarily on the transmission of knowledge [5].

Instead of prescribing or transmitting a new manner for understanding and analyzing accidents, it would be necessary to have a permanent articulated and interinstitutional process that arises from the workers' daily realities to help them acquire the organizational approach for achieving the surveillance and prevention of such events.

### *1.1 History and initiative context*

The USP School of Public Health and the Botucatu School of Medicine, UNESP have been working on education, research and extension studies associated with the field of workers' health, for (X?) years, especially through initiatives from the teachers and their respective departments of Environmental Health and Public Health.

In recent years, working in collaboration with Reference Centers on Workers' Health from Piracicaba, Botucatu and other places in the state of São Paulo, professionals from these academic and research institutions have participated in the development of a local system of information on work-related harms, on the evaluation of the impact of traditional surveillance practices focused on the compliance with safety rules and the development of interventional alternatives directed to the improvement of these practices. The first product developed and tested by these initiatives was the System of Work - Related Accidents Surveillance – SIVAT Piracicaba implemented as a result of research in public policies supported by the São Paulo State Foundation for Assistance in Research – FAPESP [9].

After notifying all the emergency services units of the totality of WAs, SIVAT identified the companies that, even under constant surveillance from public agencies and labor unions, persisted with high annual incident rates of work-related accidents. This fact motivated the team in the quest to improve the Surveillance System which was carried out from 2006-2009 by means of a second project called "Interinstitutional Actions for the Diagnosis and Prevention of Work-Related Accidents: improvement of a proposal for the Piracicaba region" – FAPESP, which was concluded in November, 2009.

During this second project, a Model of Analysis and Accident Prevention (MAPA) was developed and tested [10] with the aim of stimulating deep analyses of such events promoted in systemic or organizational approaches in tune with the surveillance perspective in workers' Health.

In February 2008, the team triggered a public discussion on the issue of work-related accidents including on-site meetings and the development of a web page – a forum, initially for sharing selected articles for discussions at on-site meetings about topics such as information systems, analysis and prevention of work-related accidents and accident-analysis reports developed by the team members, to be presented and discussed during on-site meetings.

Therefore, a university extension Forum was created to provide an information exchange between the Academia, Industry, Trade Unions and Services Units, a space for exchanges and development of knowledge in interactions among the actors and professionals from several different institutions.

Our hypotheses is that the Forum has been searching for a process that is aligned with the concept of ongoing health education, a guiding process for professional development and strategies aiming at transforming practices.

This article proposes to report and systematize the experience of building a web page as a space for permanent education in workers' health, to present the main achievements, challenges and future perspectives in this area.

## **2. Method**

The present work is a descriptive qualitative study linked to a case study since the object of its analysis deals with social events and phenomena [11]. The analysed documents were available on the webpage together with the evaluation of the main initiatives from the period in which the webpage was developed - February 2008 up to August 2011 including 25 on-site meetings.

The content of the on-site meetings was evaluated from the chosen topics and the guest speakers. It was possible to characterize the profile and the origin of the on-site meeting participants from the attendance lists. Data profiles were obtained by the registration page itself.

### 3. Results

#### 3.1 The Platform

The platform Moodle, free software utilized in FMB-UNESP, was chosen to host the page <http://www.moodle.fmb.unesp.br/course/view.php?id=52>.

Participating in the network are Public Professionals in the area of workers' health like CEREST and auditors from the Ministry of Labor. Students, researchers, corporate health and safety professionals and labor union representatives also participate.

+	<b>Explanations about the project</b>
+	<b>Agenda of on-site meetings</b>
+	<b>Materials generated from on-site meetings</b>
+	<b>Accident Analysis Reports</b>
+	<b>Materials and Reference Links</b>
+	<b>Educational Courses and Materials to give support to Accident Analysis</b>
+	<b>Labor Union Representation</b>
+	<b>Board with Events and News</b>
+	<b>Case Database</b>
+	<b>Web Page Debate Forums</b>

Figure 1 - The web page structure.

In the first year the page attracted thousands of visits. The counter initiated in April 2010 has recorded slightly more than 15,000 page views, mostly by visitors. Currently there are about 230 registered users who received additional materials and participated in debates within the platform. All materials produced are freely available on the page.

From April 2010 to July 2011 the page has received about 12,000 visits. The download of files or research materials is free. The most visited module is "page forums", with over 18,000 viewers since the beginning of the counting period.

Besides the fact that web participants may integrate the initiative that stimulates ongoing education, the web page enables following-up the activities. For instance, the recordings of the on-site meetings may be downloaded at any time via a page link. Another advantage is the easy access to several virtual products, text files and films, readily available for those who are interested in the subject. For instance, the number of accesses to support

material on capacity building for accident analysis has already surpassed 5,700, with emphasis on the access to contents related to the Tree of Causes methodology – ADC [12].

The virtual platform has been used as support for developing short duration extension courses as well as post-graduation subjects that use didactic material such as texts, power point presentations, cases and exercises given to students.

#### 3.2 On-site Meetings

The process includes on-site meetings in the format of panels, case discussions and courses, and initiatives of material sharing and virtual discussions that are spontaneous.

In Figure 2 the issues approached during on-site meetings are presented.

Table 2.  
On-site Meetings

Meeting	Contents and concepts debated in the meetings
1	Accidents with machines equipped with all the necessary protection – concept: Predictable bypass due to task requirements
2	Surveillance and Accident Notification System. <b>Cases:</b> SIVAT Piracicaba Experience and Aircraft Accidents – SIPAER
3	Nine steps to go beyond human error. <b>Case:</b> Accident with wood rolling machine (FTA method)
4	Safety professional activities: an unknown problem. <b>Case:</b> accident with mechanical power press with protection (MAPA)
5	Investigation of accidents in power presses after implementation of the Risk Prevention program in power presses and similar equipment. <b>Case:</b> WA with hydraulic Power Press (MAPA)
6	Use of systematic information in accident prevention (Denmark experience). <b>Case:</b> burial in a ditch from a sewage system ( FTA method )
7	Behavioral safety myths. <b>Case:</b> accident with ceiling collapse at an industrial building ( FTA method )
8	Conclusions of analysis from a GOL collision (flight n° 1907). <b>Case:</b> accident with amputation in a textile rolling mill (ergonomic analysis and MAPA)
9	Hollnagel model of functional accident resonance. <b>Case:</b> Fall from high place in a sugarcane plant (use of MAPA)
10	NIOSH Public health approach for work-related accident: from surveillance to prevention <b>Case:</b> Accident with drop of bearing from a wheel barrow (ergonomic analysis and MAPA)
11	Risks + Barriers = Safety?. Study of a Hollnagell article. <b>Case:</b> work and accidents in a swine and bovine slaughter house (Ergonomic Analysis and MAPA)
12	WA in power press and similar equipment. <b>Case:</b> Fatal WA while moving plates in a glass plant
13	Public consultation and debate about the new format of Machine Safety – Legislation
14	<b>Case:</b> WA with a pneumatic stapler in a furniture plant (Ergonomic Analysis and MAPA)
(*) 16	Bases for a new safety approach: organizational safety according to M. Llory. <b>Case:</b> work organization analysis in a hospital with accidents with sharp cutting tools (Ergonomic Analysis and MAPA).
17	Social production of work-related accident. The case of the marble and granite workers from Espirito Santo – Brazil. <b>Case:</b> The consequences of WA: a Civil Construction case
18	Exploring the right side of the bow tie model (consequences of Severe Accident in civil construction) <b>Cases:</b> WAs with plastic injection machine and meat mixer machine
19	Rules and human activity: dynamic models of prescription and historicity of work situations – the activity ergonomics approach.
20	Presentation and debate on the model of Accident Analysis and Prevention – MAPA. <b>Case:</b> WA in a paper mill
21	Risk prevention program in gas stations. <b>Case:</b> Accident in gas station
22	The use of epidemiology in the WA analysis and prevention. <b>Workshops</b> on information systems
23	The clinical contribution to accident analysis. <b>Workshop</b> on the clinical method activity
24	Current aspects of responsibility in work-related accidents
25	Fatal Work Accident Surveillance in the state of São Paulo. <b>Case:</b> WA involving a bus and 2 trains at a Level Crossing in Americana – SP. (MAPA)

(\*) The 15<sup>th</sup> Meeting was dedicated to planning the activities

As demonstrated in Figure 2, there were 25 on-site meetings within a period of 42 months. The forum took place at an average of 7 meetings a year. From 2010 on, the meetings were broadcasted on a University TV network, IPTV.USP, which monitors the audience during the events and the number of accesses after their occurrence. Some meetings had their audience doubled via remote access and others were accessed by more than 900 people after they had finished.

The meetings have had a mean attendance of 100-120 participants with the latest ones showing a trend toward increasing. In 2011 the average participation in on-site meetings has increased. The first one had 163 participants and was broadcasted live by IPTV-USP in 166 points distributed throughout the country. The participation from the second to third meeting rose from about 130 to more than 220 participants with the latter being seen live by IPTV USP from over 100 distribution points. The recent cooperation established between The Reference Center for Workers' Health - State CEREST from SP – and the National Coordination Council of Workers' Health- GGSAT from the Health Ministry may multiply these figures.

As to the content, theoretical conceptual issues were dealt with in combination with case studies. Information Systems and Surveillance policies were addressed in all 07 meetings.

The on-site meetings have prioritized debates about concepts of analysis and elaboration of recommendations for accident preventions. Emphasis has been placed on comprehending the accident by using a bow-tie model [13], contributions from ergonomics and cognitive and work psychology, thus highlighting the origins of accidents in the organizational and strategic choices of the company as well as their health, economics, law, environmental and other consequences, both immediate and long-term ones were taken into consideration.

Seventeen 17 cases of accidents including, mild, moderate and fatal ones were presented and discussed in 14 meetings. The analyzed accidents encompassed a great variety of sources and professional fields such as machines, electricity, manual tools, airplanes, construction industries, needles in hospital units, as well as railway and road accidents.

#### 4. Discussion

The University must attend to life. University extension presupposes participation in multi-, inter- and trans-disciplinary experiences of construction and dissemination of knowledge, articulation of theories, practices and interventions in social realities [14].

The need of a permanent education in health as a strategy adopted by the forum to deconstruct the traditional work-related accident analysis and prevention, is clearly identified by the following aspects:

a) The forum tries to value the subjects' knowledge in the practice of work-related analysis and prevention as a starting point to criticize the traditional approach to bringing cases from the Brazilian reality into debate. This practice is seen, for instance, in the presentation of 17 accident cases which were analyzed and presented by the subjects taking part in on-site meetings;

b) The Forum enables, from this perspective and by knowing the subjects, the offering of a new accident analysis methodology, MAPA, which was validated and discussed in 10 cases, with the goal of both propagating the methodology as well as identifying and overcoming difficulties felt by the subjects when using it;

c) The continuous follow-up of difficulties is made feasible also in capacity-building courses and debate web page, where this cooperation is done in a broader and more open form of networking among participants.

Despite several positive aspects, further studies are necessary to evaluate whether the initiative is contributing to the transformation of accident analysis practices in daily work routines.

The growing numbers of site accesses and audience size in meetings suggest the initiative is becoming known and is meeting the national demand for information on the subject. The Forum contributes to placing the theme on the country's agenda for worker health; it reinforces criticism of practices that attribute blame to victims, explains socio-technical aspects involved in the origin of workplace accidents, and favors preventive practices.

The use of concepts from ergonomics, especially in the stage of comprehending the habitual activity of the operator before the accident, contributes to understanding the strategies and regulations adopted by workers faced with the difficulties and variability

of socio-technical systems [15, 16]. These concepts are present in MAPA [10], which has been adopted as a script for the analysis and training of accident analysis teams.

## 5. Conclusions

The forum has constituted a permanent education network centered in worker health surveillance activities devoted to addressing work-related accidents. The strategy of matching a conceptual discussion with cases brought about from the participants, provided by on-site meetings and the debate channel as well as by the members assistance, has proven to be coherent with an ongoing education in health which values the reality and experiences of the subjects, enriches reflection and favors transforming practices.

This initiative has opened the doors of academic institutions to those interested in the analysis and prevention of accidents by providing an ongoing space for support, debates and knowledge dissemination.

The current challenge is to transform this movement into a social network to increase its links with persons, professionals and institutions involved in surveillance and prevention.

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