STRATEGIC ANALYSIS

“Skills and competencies for industrial safety”

Research seminar

November 12th and 13th
Château de Montvillargenne, France

FONCSI
Fondation pour une culture de sécurité industrielle

Contents

Welcome

On behalf of Foncsi, the Foundation for an industrial safety culture, welcome to the first strategic analysis on “Skills and competencies for industrial safety”. The five years programme of the foundation (2015-2019) has commissioned the GSAS (Scientific Committee for Strategic Analysis) to conduct four strategic analyses within the 5 years (Skills and Competencies, Safety culture and safety models, Success and failures of HOF in industry, New industrial organizations and safety).

Each analysis runs for 18 months and involves four steps under the responsibility of the same committee made of academics and industrial representatives.

The first step overviews the literature and prepares a plan for analysis, rephrases the problem, including the identification of world experts contributive to the domain. The second step, where we are today, consists in a two days residential seminar with invited international experts. An open access book to be published by Springer is planned to reflect content and debate of this second step. The third step analyses the contribution, and confronts the material with industrial practices (how far the various academic concepts captured in step 1 and 2 have been ‘bought’ and ‘translated’ by industry, how far they have been recognized as relevant, efficient, at what cost, for what continuity of results). The fourth and last step is a one-day seminar with industrial partners internalizing and mainstreaming lessons learned, thinking and practices.

This current seminar is an arena for debate and exchange. Even more important, I want it first and foremost to be a meeting place.

Enjoy the place and this opportunity to meet and share ideas with friends.

René Amalberti, CEO Foncsi

Position statement and expectations of the group

Memorandum by Claude Gilbert, President of the GSAS, November 2015

The industrial companies that support the FonCSI report one clear finding: training programmes in the field of industrial safety no longer seem to be yielding the expected results. This is in spite of the interest shown in them and the funding allocated to them.

The question put to the GSAS (Strategic Analyses Scientific Group) is simple: in light of this finding, what new avenues are likely to be explored in order to increase industrial safety in companies so that it is more "professional"?

The conclusion drawn by the industrial partners deserves to be discussed in more depth, as we are still lacking elements to assess the impact of safety training programmes or, conversely, to determine what effects a reduction in training programmes might produce in this area.

Nonetheless, in response to the question raised by our industrial partners, the GSAS's considerations focused mainly on the following three points:

- Where do professionalisation and safety training meet?
- Should safety training be incorporated into everyday practices and activities or should it be the subject of specific actions within companies?
- Does safety training primarily meet internal requirements dictated by the specific problems companies encounter? Or external requirements dictated by external entities such as regulating authorities, the public, the media, etc.?

Professionalisation and safety

Debates within the GSAS reveal that the link between professionalisation and safety can be understood in two different ways:

- the attention given to safety, a term that is yet to be suitably defined, seems to be closely linked to the skills and know-how that those engaged in industrial activities learn through the occupations or duties for which they were initially trained;
- the attention given to safety results primarily from specific actions and training courses which are distinct from the initial training received.

In the first scenario, no particular actions are required in order for safety to be taken into account, as it forms part of the skill set of the various categories of agents working in industrial companies. In this context, increased safety results primarily from the capacity of these agents to be "good professionals" when carrying out the duties assigned to them (bearing in mind that this applies to operators, middle managers and senior managers alike).

In the second scenario, taking into account safety relies, as a priority, on specific actions undertaken by individuals and departments specialised in the field of so-called "safety". In this context, increased safety is primarily expected to be achieved by increasing the professionalisation of these specialists who influence industrial activities by distinguishing themselves from the agents directly

involved in the flow of operations.

The link between "professionalisation and safety" can thus be understood in very different or even opposing ways. This can largely explain the ambiguity that often exists in the way these issues are approached; even more so because, within companies, greater safety is usually sought on both these levels, albeit with varying degrees of visibility.

Ordinary safety or extraordinary safety

While reflecting on the two approaches possible to the link between "professionalisation and safety", the GSAS considered how to include the issue of safety in company activities. There again, two main conceptions emerged:

- one which considers that safety is an "everyday concern" and thus cannot be dissociated from all of the practices, processes and organisational systems on which a company's activity relies. Moreover, maintaining a long-lasting safe state in a high-risk activity seems difficult to achieve without the existence of "routines" or, in other words, without the integration and implementation, within everyday operations, of a set of rules, procedures, but also experiences and non-formalised know-how (constantly and dynamically correcting mistakes and problem areas) that limit the human cost of actions for agents and organisations. In short, routine, despite being a potential source of deviations and problems, seems to be a necessary evil within organisations.
- and another, which considers on the contrary that safety (just like risks and crises) is a matter of exception and that it can only be achieved through deliberate and repeated actions, located outside of everyday operations, so as to keep attention on it at all levels. In this context, the "routinisation" of practices and procedures is perceived as a danger.

The first approach seems to be the one that most corresponds to the reality of the situation within companies. But, quite paradoxically, it is the least known and the one that is not always the focus of investigations in the academic field. Consequently, despite research in the field of ergonomics, in the sociology of work and the sociology of organisations, only a partial analysis has yet been done of the way safety is ordinarily guaranteed in high-risk companies. Similarly, the issue of safety is broached more from the perspective of its "extraordinary failures" than its "ordinary successes", and this contributes to diminishing interest in the complex processes through which socio-technical systems are usually maintained in a satisfactory, or at least an "adequate", state.

The second approach is more in line with common sense and with the way safety actions are spontaneously considered in companies. Indeed, it seems obvious that safety cannot be achieved without specialised agents and departments constantly calling for vigilance or – and this is the reason for quality assurance measures – without the actual processes being accompanied and backed by administrative procedures. But there again, despite the visibility or even the publicity given to these actions, it isn't always easy to determine what impact they really have on everyday operations.

Although they are very different, these two approaches both ask what the effective drivers of ordinary safety are in high-risk activities (knowing that they vary depending on the sector of activity and the company). More particularly, they lead us to question what really

underpins safety (practices or processes that are part of routines and refer explicitly or implicitly to various safety models? Orders supported by communication campaigns, training courses, certifications aimed at prompting vigilance, at introducing and maintaining a safety culture that is widely shared?). They also lead to questioning ourselves about what could enable us to get to grips with the reality of high-risk activities (problematic in the first approach, given the numerous factors to take into account; seemingly easier in the second approach, but there is no guarantee then that they will enable in-depth action on what constitutes the hidden face of these activities).

Safety for whose benefit? The inside or the outside?

The difficulties encountered in defining safety actions and implementing them in high-risk activities appeared for the most part to be linked to the existence of a double bind which carries a strong contradiction. On the one hand, these actions must solve specific realities and problems that are characteristic of a company or a sector of activity. On the other hand, they must meet a set of external expectations which are increasingly numerous and codified in societies that are conscious of collective risks.

- When it comes to safety in companies, the primary aim is effectiveness, irrespective of the means used (comprehensive actions through professionalisation; ad hoc actions through training). The goal is always to try to ensure that these actions are as compatible as possible with actual situations (with a wide range of methods available to achieve this, which explains the variety of training options available).
- But, at the same time, companies must provide evidence (to regulating authorities, various associations, the media and, more broadly speaking, the public) that they are making safety their number one priority. Moreover, this evidence must meet the criteria that prevail in public debates about collective risks (and more particularly industrial risks). Which means that such evidence can essentially be provided to the public by highlighting efforts made to finance safety measures, ensure standards, rules and procedures are adhered to, develop a safety culture, etc. Thus, even though quality approaches can be considered an "internal" justification method, they are actually largely in place to meet "external" justification requirements (particularly those stemming from supervisory authorities or the evolution of jurisprudence).

Safety actions thus find themselves caught in a contradictory injunction, because they must meet both internal requirements (in terms of effectiveness) and external requirements (in terms of justification). Rather paradoxically, the consequence is that the most in-depth actions — those that are the closest to practices and processes and those that take into account the diversity of the factors that effectively guarantee safety — are those that are least likely to be of use as evidence for "the outside". Conversely, those that are the most aligned with public views regarding risk management (by highlighting formal aspects, respect for values, a sense of responsibility, ethics, etc.) are the most useful for company communication (in the very broad sense of the term). This explains the difficulties people within the company can encounter when they must elaborate a safety training policy, as is the case for HR managers. The training offered is indeed based in large part on what "the outside" expects from companies when it comes to safety.

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The analysis underway within the GSAS therefore meets the demands of industrial companies by considerably shifting the questioning about "professionalisation and safety". Indeed, it asks all involved to note the fact that specific safety training courses are at odds in many ways.

- Firstly, without it being said clearly, they find themselves in competition with the pursuit of safety as it is effectively carried out by the different occupations, the practices, and process activation (in other words, anything that can be qualified as "professional"). Insistence on the professionalisation of safety, or indeed the professionalisation of safety-related occupations, only contributes to masking the discreet, yet broad, implementation of the ordinary safety processes that are part of high-risk activities (but do not necessarily dictate how they are carried out). Thus it is difficult to tackle head-on the link that must be established between initial training, the skills upgrades required by the different occupations, and the training focused on safety. Similarly, the limitations of many professional development courses that aim to train employees in designated "theoretical" situations without sufficiently preparing them for the range of situations they are likely to encounter in real life or teaching them the knowledge they need to develop a pertinent response are overlooked.
- Secondly, and this is linked to the first point, training activities most often lead to thinking about safety from the perspective of the exceptional, the extraordinary, as if they were barely conceivable outside of specific activities, separate from everyday operations and, above all, carried out most deliberately by specialists (whether those recognised as such within the company or external trainers). Once again, the consequence of this is to render the return to reality difficult and make the views introduced from "the outside" seem out of touch or indeed ineffective (irrespective of how close the trainers are to the agents involved in the activities, and despite the middle road taken by proponents of the quality approach).
- Thirdly, when training initiatives are also used to demonstrate the willingness of high-risk companies to make safety an absolute priority, this can in fact shift their core purpose away from the reality of the company's activities. The goal then becomes less about effective management of these activities and more about justifying the efforts made by a company or a sector of activity.

Given these findings, what should be done?

- First, make every effort to "return to reality" by aligning safety training courses *with* safety as it is actually practised in high-risk companies. Indeed, if high-risk situations are to be handled with professionalism, it is important to encourage debate (or even controversy) between different professionals with regards to the situations they encounter, the way they interpret them, the risks they see in them, the solutions that seem pertinent to them, and the feedback received on the implementation of these solutions. Taking stock and discussing the handling (technical, organisational, pedagogical) of categories of high-risk situations must be a permanent part of each occupation's duties. Similarly, the very wide range of practices, of situations and of networks and groups of individuals actually involved in carrying out and managing tasks, often external to the companies themselves, must be taken into account. This seems obvious, but as previously indicated, there are many obstacles to aligning the goals of safety training programmes with safety as it is

handled in the field (ensuring effective practices are “hidden” if they appear to be scarcely or not at all compatible with the image of safety held in the public sphere).

- Next, favour a pragmatic approach by acknowledging the fact that although the current situation in terms of safety training is far from ideal, it corresponds to a “state of the world” and a “state of relations” in our society which it is difficult to change. Hence, however effective safety training programmes are, and however well aligned they are with industrial realities, they participate in the justification work that companies and high-risk activities must engage in. It’s through them in particular that a debate on safety, dangers and risks can develop by involving other types of players than those managing the high-risk activities.
- Lastly, **consider that it is possible, dialectically, to work on these different elements to improve industrial safety.** Going “back to reality” and getting as close as possible to ordinary activities makes it possible to question the pertinence of safety training programmes. Conversely, the elaboration of safety training programmes can be an ideal opportunity to encourage those in charge of ordinary activities to report on their effective practices and the compromises they make between various demands; on how they relate to standards, rules and procedures; on the way they shoulder their responsibilities and conceive their code of ethics. Similarly, taking into account the public’s views on risks, no matter how out of touch they are, is likely to prove a useful lever for making the issue of industrial safety “visible”, to make the situation as it really is a subject of discussion in society. Especially because these views impact the individuals within the companies who, in a variety of ways, must interpret them and position themselves in relation to them.

Programme

Wednesday, November 11, 2015

18:00	Registration at the hotel
20:00	Dinner

Thursday, November 12, 2015

6:30-8:30	Breakfast
8:30	**Opening session** • Welcome address by René Amalberti, Director of Foncsi • Position statement and expectations of the group by Claude Gilbert, Chairman of Foncsi's Strategic Analysis Committee
9:15	**First session** • "Professional competence, governance and technology", Petter Almklov • "Applying the Science of Behaviour Change to Industrial Safety", Paul Chadwick
10:45	Coffee break
11:00	**Second session** • "Towards courses of vocational training guided by real work activities?", Vincent Boccara • "Enhancing Performance: The Hidden Route to Safety?", Rhona Flin
12:30	Lunch break
14:00	**Third session** • "Line managers as professionals of work in the era of health-at-work professionalization", Pascal Ughetto • "Is Professionalisation a safety issue or the other way around — A response", Jan Hayes *(videoconferencing)*
15:30	Coffee break
15:45	**Fourth session** • "A practice-based approach to safety as an emergent competence", Silvia Gherardi • "Doing what is right or doing what is safe — is there a difference?", Linda Bellamy
17:15-17:45	**Wrap-up**

In the evening...

19:00	French « terroir » tasting
20:00	Dinner

Friday, November 13, 2015

6:30-8:45	Breakfast
8:45	Selection/presentation of two themes to be discussed
9:15	**First debate**
10:30	Coffee break
10:45	**Second debate**
12:00	Lunch Break
13:30	**From the field** • "Safety performance improvements in the mining industry", Jonathan Molyneux, ERM • "Shifting the HSE Climate on EPC (Engineering, Procurement and Construction) projects: Technip's Pulse Programme", Pierre-Arnaud Delattre, Technip
14:30	**Third debate** • "Which strategies of professionalisation for a safer industry?"
15:45-16:00	**Conclusion and follow-up**
16:15	Shuttles to airport and station

Participants

Key speakers

Petter G. Almklov, NTNU, Norway

Petter G. Almklov is Research Manager at NTNU Social Research in Trondheim Norway. He has a background from geological engineering before his transition to social sciences and a PhD in organizational anthropology. His research is wide ranging in terms of empirical fields and theoretical interests. He has conducted empirical studies in the petroleum industry, maritime transport, critical infrastructures, control rooms and in the justice and emergency management sector in Norway. Much of his research concerns the tensions between formal organizational models, regulation and representation of work, and how work is actually performed by practitioners.

@: pettera@apertura.ntnu.no

Linda Bellamy, White Queen, Nederlands

Linda Bellamy has a Bachelor of Science and Doctor of Philosophy degree in Psychology. She is a Fellow of the Institute of Ergonomics and Human Factors. Moving to consultancy in the 80's, she built up one of the first Human Factors teams to be involved in major hazard & offshore risk assessment and undertook pioneering research on the underlying causes of process safety accidents in the chemical industry. In 1996, she became a partner in an engineering consultancy in the Netherlands and in 2003 started her own.

@: linda.bellamy@whitequeen.nl

Vincent Boccara, Paris-Sud University, France

Vincent Boccara is an assistant professor in ergonomics at the University of Paris Sud. He conducts his research at the Computer Science Laboratory for Mechanics and Engineering Sciences (LIMSI) of the CNRS. His research program is on both the development of vocational competencies and the training design based on the analysis of human activity at work and in training situation. This research is conducted in academic or industrial partnership in several domains as civil nuclear power plant, crisis management, millitary medecine, aeronautic or driving education.

@: vincent.boccara@u-psud.fr

Paul Chadwick, University College London, United Kingdom

Dr Paul Chadwick is a Senior Teaching Fellow at UCL's Centre for Behaviour Change. His work focuses on promoting cross-disciplinary perspectives on issues related to behaviour change, with particular emphasis on developing methods and frameworks to promote the development and implementation of scalable interventions.

@: paulmchadwick@gmail.com

Pierre-Arnaud Delattre, Technip, Australia

Pierre-Arnaud Delattre works in Australia at Technip's Corporate Services as the Group Pulse Manager to manage the delivery of the Pulse program globally; Technip's global Corporate HSE Climate Change Program. He was previously employed by Technip in Paris as HSE engineer to develop and deploy the Pulse program globally. He currently holds a BA in Science, a BA in Engineering, a MA in Engineering science from Monash University in Melbourne, and a MA in Health and Safety from Paris La Sorbonne.

@: pdelattre@technip.com

Rhona Flin, Aberdeen University, United Kingdom

Rhona Flin (PhD, FBPsS, FRSE) is Emeritus Professor of Applied Psychology at the University of Aberdeen. Her research examines human performance in high risk industries with projects on leadership, culture, team skills and decision making in healthcare, aviation and the energy industries. She now conducts research and consultancy on managers' safety leadership and on non-technical skills in surgery and in the oil and gas sector. She holds the Roger Green Medal (Royal Aeronautical Society) for aviation human factors research and the John Bruce Medal (College of Surgeons Edinburgh) for behavioural science in surgery. She is a member of the Safety Advisory Committee for the Military Aviation Authority at the UK MOD.

@: r.flin@abdn.ac.uk

Silvia Gherardi, University of Trento, Italy

Silvia Gherardi is senior professor of sociology of work and organization at the Faculty of Sociology of the University of Trento, Italy, where she has been Director of the Research Unit on Communication, Organizational Learning, and Aesthetics since 1993. She has a degree in sociology and has been trained in sociology of organization at the Faculty of Sociology of the University of Exeter (UK), where she collaborated with Barry Turner. She is particularly interested in the exploration of different "soft" aspects of learning and performing safety in the workplace.

@: silvia.gherardi@unitn.it

Jan Hayes, RMIT, Australia (*Videoconferencing*)

Dr Hayes has 30 years' experience in safety and risk management. Her current activities cover academia, consulting and regulation. She holds an Associate Professor appointment at RMIT University where she is Program Leader for the social science research activities of the Energy Pipelines Co-operative Research Centre. Dr Hayes is a member of the Advisory Board of the National Offshore Petroleum Safety and Environmental Management Authority.Dr Hayes holds a Bachelor of Engineering (Adelaide), a Master of Business (Swinburne) and a PhD in Sociology from the Australian National University.

@: jan.hayes2@rmit.edu.au

Jonathan Molyneux, Environmental Resources Management — ERM, United Kingdom

Jonathan is a Managing Partner in ERM and has a global role advising mining majors about safety performance improvement. He and his team have advised 50 mines in the last five years. His background is in strategy and business transformation consulting.

@: jonathan.molyneux@erm.com

Pascal Ughetto, Paris-Marne-la-Vallée University, France

Pascal Ughetto is a Professor of Sociology at the université Paris-Est Marne-la-Vallée (France). As a member of the Laboratoire Techniques, Territoires et Sociétés (LATTS), his main research fields deal with the transformations of work since the 1980s, especially in the service activities, and their relations to changes in strategies, management tools and organisation. Museums, the social housing organisations, hospitals, public administrations, are amongst the sectors where he conducts fieldwork. He is the author of Faire face aux exigences du travail contemporain. Conditions du travail et management (Lyon: Editions de l'ANACT, 2007).

@: pascal.ughetto@u-pem.fr

Strategic analysis committee

René Amalberti, Foncsi, France

Doctor of Medicine and Cognitive Psychology, a former Chair and Professor of Medicine at the Val-de-Grâce military hospital, René Amalberti is healthcare safety advisor at the French National Health Authority (Haute autorité de santé) and Risk Prevention manager at a medical insurance company (the MACSF group). He has been Director of Foncsi since June 2012. An international specialist in industrial and medical risk, he has published many books and articles.

@: rene.amalberti@wanadoo.fr

Corinne Bieder, Airbus, France

Corinne Bieder is an engineer and holds a Master's Degree in Risk Management and a Specialised Master's Degree in Ergonomics. After working at EDF and Dédale, she joined the Airbus group in 2005 where she is responsible for safety strategy.

@: corinne.bieder@airbus.com

François Daniellou, Icsi-Foncsi, France

A graduate of the *École Centrale de Paris* and Professor of Ergonomics, from 1993 until spring 2015 François Daniellou taught at the *École nationale supérieure de cognitique* at the INP Bordeaux, where he headed the Department of Complex Systems Ergonomics. His research interests notably include human factors in hazardous industries (nuclear, chemical, etc.) and the prevention of psychosocial risks. He became Scientific Director of Foncsi and Icsi in September 2015.

@: francois.daniellou@foncsi.icsi-eu.org

Claude Gilbert, CNRS, France

Claude Gilbert is Director of Research at the CNRS and a political scientist. He has run several research programmes on collective risks and crises. He chairs the Economic, Ethical and Social Committee of the High Council of Biotechnologies. Claude Gilbert is president of the Foncsi's Strategic Analysis Committee.

@: claude.gilbert@msh-alpes.fr

Franck Guarnieri, Mines-ParisTech, France

Franck Guarnieri is Chair of the Centre for Research into Risks and Crises (CRC) at Mines ParisTech in France and scientific advisor to the French company Preventeo. He leads research on Industrial and Nuclear Safety. He focuses on "engineering thinking" and "on-going emergency". He is also a designated expert at the French National Research Agency (ANR) and in the European Horizon 2020 program. He is currently involved for a two-year research project with the University of California Berkeley (UC Berkeley) on "Nuclear Safety: From accident mitigation to resilient society facing extreme situations".

@: franck.guarnieri@mines-paristech.fr

Philippe Haller, Arkema, France

Philippe Haller graduated from the *École Polytechnique*, France, and is a chemical engineer. At Atofina, he held the position of Assistant Site Director, and headed Arkema's research centres, mainly responsible for process development and improvement.

@: philippe.haller56@gmail.com

Nicolas Herchin, Engie, France

Nicolas Herchin is research engineer and project manager in the Research and Technologies division of ENGIE, in Paris. After graduating from *École Centrale de Paris* (2007) and Cambridge University, UK, he has been leading since 2010 a project in the field of Industrial Safety and Risk Management, particularly considering Human and Organizational Factors of Safety. His key realizations include HOF accident and risk analysis, "collective mindfulness" diagnosis, HOF trainings and sensitization, and work on developing a just culture.

@: nicolas.herchin@engie.com

Pol Hoorelbeke, Total, Belgium

Pol Hoorelbeke is Vice President Management Systems, Control and Safety Culture at TOTAL SA. He is working in the field of industrial safety since 1987. Pol holds a Master Degree in Engineering, a Master Degree in Safety and a Doctor Degree in Engineering. His PhD on mitigation of vapor cloud explosions was recognized by the industry with the EPSC 2012 Award (EPSC: European Process Safety Center). He is professor at the university KUL (Leuven), he has been nominated as Guest professor at the South China University of Technology and Fellow at the university VUB (Brussels).

@: pol.hoorelbeke@total.com

Benoît Journé, Nantes University, France

Benoît Journé is a Professor at the University of Nantes in France, researcher at the LEMNA. He works on high reliability organizations and human factors. He is head of the RESOH research project at the *École des Mines de Nantes*.

@: benoit.journe@univ-nantes.fr

Jean-Paul Labarthe, EDF, France

Jean-Paul Labarthe is head of the HOF team at EDF R&D since January 2015. He is in charge of 20 researchers studying the impact of human and organizational issues within at risk socio-technical systems. He joined EDF R&D in 2001 and since then contributed to the Human Factors Engineering of nuclear new builts. He started his career in 1991 as a Human Factor consultant in the areas of air traffic control, space, transportation and defense industry. He then entered at IRSN, working in the safety assessments of HOF, for the behalf of the French National Nuclear Regulator. He holds a Master's degree in ergonomics and occupational physiology and a post graduate certification in software engineering (Paris-Sud Orsay University).

@: jean-paul.labarthe@edf.fr

Hervé Laroche, ESCP Europe Paris, France

Hervé Laroche is a Professor in the Strategy, Organizational, Behaviour and Human Resources department at ESCP Europe. His research concerns strategic decision processes, strategy formation, decision-making under risk and organizational reliability. He is director of the PhD programme at ESCP Europe and scientific co-director of the Specialized Executive Master in Human and Organizational Factors of the Management of Industrial Safety.

@: laroche@escpeurope.eu

Call for research proposal committee

Germain Sanz, National Academy of Technologies, Paris, France

Graduate of the *École Polytechnique*, Germain Sanz was a researcher in the field of steel, and Head of the French Steel Industry Research Institute (*Institut de recherche de la sidérurgie*). He subsequently managed the R&D department at Sollac, then Usinor, before becoming Head of Innovation at Arcelor. He is a member of the French *Académie des technologies* and a corresponding member of the Spanish *Real Academia de Ingenieria*. He chairs Foncsi's "Call for research proposals" committee.

@: germain.sanz@wanadoo.fr

André Savall, Toulouse University, France

Professor Emeritus at the Chemical Engineering Laboratory of Toulouse, André Savall was President of the Permanent Secretariat for the Prevention of Industrial Problems (SPPPI) at Toulouse and President of a Local Committee for Information and Dialogue (CLIC).

@: savall@chimie.ups-tlse.fr

Scientific coordination & Organisation

Caroline Kamaté, Foncsi, France

Caroline holds a PhD in immunology. She has post-doctoral experience in academy (University Medical Center, Utrecht, Netherlands) and in industry (Sanofi-Aventis, France). Her interest for scientific communication led her to join Foncsi in 2007 where she is involved in the management of research programmes and the dissemination of results. She coordinates the "Skills and competencies for industrial safety" strategic analysis.

@: caroline.kamate@foncsi.org

Eric Marsden, Foncsi, France

Eric Marsden holds a PhD in dependable computing from LAAS-CNRS in Toulouse, France. His work at Foncsi since 2005 concerns the management of research projects concerning risk management and industrial safety. He also participates in the transfer of research results to stakeholders. He coordinates the "Skills and competencies for industrial safety" call for research proposals.

@: eric.marsden@foncsi.org

Sophie Agulhon, Mines ParisTech, France, scientific redactor

PhD student, Centre for research on Risks and Crises, Mines ParisTech. Sophie Agulhon's research areas in philosophy of technique include management devices contribution to safety field in nuclear fuel-cycle industry and methodological aspects regarding social science. Sophie works in AREVA group General Inspectorate, Health, Safety, Quality and Environment Department (DSQE). She also assumes teaching functions and project operational responsibilities in the French National Conservatory for Arts and Crafts (CNAM) since 2012 and in Mines ParisTech since 2014.

@: sophie.agulhon@hotmail.fr

Clotilde Gagey, Foncsi, communication and housing logistics
@: clotilde.gagey@foncsi.org

Stéphanie Méphara, Icsi, travel logistics
@: stephanie.mephara@icsi-eu.org

Abstracts — Position statements

Professional competence, governance and technology

Petter G. Almklov, NTNU, Norway

The relationship between professionalization and safety is a tricky one. It depends both on one's perspective and understanding of safety (e.g. human error or resilience perspectives), and also on the different aspects of professionalization (book knowledge or experience based). A broad understanding of safety and professional competence requires, in my opinion, studies that include both formal and informal aspects of organization.

In this paper I will draw on some empirical examples from my own and my colleagues' research, discussing changes and developments with relevance for professionalization and some of their consequences for safety. I will approach safety from a holistic organizational perspective trying to include the layers of framework conditions within which work is performed.

In most western countries there is an increasing tendency towards a general professionalization in the industries in the sense that the demands for conducting a specific job are specified in more detail. The need for simple manual labor is reduced due to technical development and internationalization (exporting manual tasks to low cost countries). There is also, as I will discuss further, an increasing tendency towards control through regimes based on audit and accountability (see e.g. Power, 2007). This means that the company has to provide a "paper trail", mostly digital in these days, to show that safety is maintained (Hood et al, 1999; Almklov et al 2014; Hohnen and Hasle, 2011). Of course being able to document the professional competence of the workers is an important part of this. Thus the weight on *documentable* professional competence is central.

Cases and examples

In a recent paper (Almklov et al, 2014) my colleagues and I discussed the increasing compartmentalization of safety in the railway sector and in the maritime sector in Norway. In both industries there had been a heightened recognition of the importance of safety, the need for safety management systems and better control of safety. However, the increasing demand for documentation, certification and advanced safety management programs, created a distance between safety professionals and key operative professionals. In small shipping companies, for example, much of the systematic work on safety management was conducted by external consultants. In our railway case competent groups specializing on technical systems (implicitly on their safety) became subordinated to specialists with more generic safety expertise, typically from other industries like petroleum or air transport. The practitioners' perspectives became less influential in the organization. This paper shows how professionalization and safety training may lead to a compartmentalization of safety-related knowledge. As stated in the problem statement for this paper: "safety is often considered a specific domain demanding specific actions conducted by specific actors." On a ship, the captain is responsible for safety. The increased professionalization of safety, as an isolated phenomenon, and the increased bureaucracy involved in controlling safety from afar, may, however reduce the captain's leverage to work with safety or at least transform his role. The practitioners' (e.g. captain's) knowledge is a key to safety and resilience, but seemed to be less included in the safety work because of this compartmentalization. The changing role of ship captains and pilots due to changes in technology and the governance of work is the main topic for ongoing research in our ongoing PROCOM-project. (Røyrvik et al, 2015)

In a similar vein Stian Antonsen and I (Almklov and Antonsen, 2010; 2014) noted how deregulation, implying outsourcing of operational work, of critical infrastructures implied a separation of system knowledge (engineers and control room operators) and the practical knowledge of fitters. Both informal networks between professionals with different skills as well as the existence of multi-skilled professionals were resources for resilience that was challenged by these developments.

A related topic to this is that of accountability, audit systems, and their relationship to safety and resilience. Throughout the industries I have studied, there is an ever-present trend of increasingly detailed control trough procedures, documentation and reporting. Already Wildavsky (1988) in his book *Searching for safety* argued that controlling safety through accountability will focus on anticipation, of preventing known and easily described threats, and that it will reduce the search for safety that a more resilience oriented philosophy will do. In my research we have seen this best in the public sector (though there is clear support for this in the private sector as well). For example, the strict chains of accountability between infrastructure-regulators have given them quite a few problems when analyzing and (in particular) *taking responsibility* for risks related to the couplings between the infrastructures (e.g. the water supply's dependency on telecom). Each regulator, and the companies they regulate, has clearly described and mandated responsibilities *within* their sector, and the inter-sectorial issues fall outside the systems of accountability.

More generally, accountability systems are part of a bureaucratic approach to safety. My colleague Jens Røyrvik and I (Røyrvik and Almklov, 2013) have discussed how risk analysis exercises may be misleading as one identifies a number of risks, and then "closes" them. When doing this, one divides hazards and risk into manageable chunks, items on a list, in a way that may be deceiving. It goes hand in hand with structures of accountability, as it is a way to prove that all identified risk is handled, and that the operation may proceed. This is all well and fine as long as one realizes and keeps in mind that the search for safety is also a creative endeavor that is never over.

Summarized: Formal and informal aspects of safety and work

The problem statement must be seen in relation to formal and informal aspects of organization and work.

The first column in the table below outlines, in a highly simplified manner, Hollnagel's (2014) distinction between the traditional approach to safety (Safety 1), and "Safety 2", a concept more oriented towards resilience than avoiding error. The other column separates formal competence from an understanding of knowledge including experience and social networks.

Safety 1: Avoidance of adverse outcomes (accidents). Focus on risk, barriers, compliance etc	Professional competence 1: Book knowledge, theoretical training, standardized/measurable.
Safety 2: Positive outcomes. Handling situational variability. Resilience.	Professional competence 2: Experience, personal knowledge, social networks.

An interesting topic to discuss is whether a focus on safety 1 and on professionalization in the sense of theoretical knowledge are possible to integrate with training and support for safety 2 and professionalization 2 (in the sense of supporting the development of experience, social networks, communities of practice etc.). Striking the balance, or even better, being able to integrate these would be ideal.

The questions

3 a) Yes, it does. But only for certain kinds of accidents and only to a certain level. Many of the biggest accidents depend on professional competence more generally, not primarily your safety training. Training for resilience is harder to decouple from normal practice, as it is a matter of doing your normal work in a robust manner.

3b) It should be extended to better handle the integration between normal work and safety/resilience. I think a

key here is to understand the role of experience and of personal networks. In particular I think addressing the role of the "informal, situational coordination of tasks, resources, and information" (Almklov and Antonsen, 2014) is important for many safety critical work situations.

3c) The second column distinguishes between a formal view of competence and the aspects of competence that are more unique, personal and social. This has some relations to the type of safety one discusses. Human errors, slips and lapses, the use of protective gear etc. are to some degree possible to address by training of individuals. However, as suggested above, many of the keys to resilience and safety, particularly with regards to larger accidents, lie in the interaction between people, parts of the organization and even external organizations.

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Applying the Science of Behaviour Change to Industrial Safety

Paul Chadwick, University College London, United Kingdom

Many aspects of industrial safety depend on behavioural change. This paper will explore the potential contributions of behavioural science to the improvement of industrial safety using the Behaviour Change Wheel (Michie et al., 2014) as an organising framework. Research into patient safety will be used to illustrate how a consensus-derived, evidence-based systemic model of behaviour can lead to substantial reduction in the number of never-events in health settings. The opportunities and challenges involved in using this framework will be presented for discussion.

Towards courses of vocational training guided by real work activities?

Vincent Boccara, Paris-Sud University, France

We share the three observations made in the call for papers about industrial safety: safety is generally: 1) addressed in isolation from other work dimensions; 2) disembodied from actual working situations; and 3) defined by actors driven by accountability issues and exogenous norms. It is obvious that professionalization in safety inherits elements from those three features: safety training is generally made up of sequences or modules focusing on given technical/regulatory contents, that are isolated from other dimensions of work, and exposed following the standard.

From our point of view, vocational training should aim to make individuals capable of managing the complexity of work situations that they have to cope with on a daily basis. It should therefore be guided by knowledge concerning real work. We thus distance ourselves from a widespread approach according to which the contents of training result from standards (regulatory, occupational, technical, skill-related, etc.). Training usually addresses prescribed work – which is a necessary, but not a sufficient condition to addressing the stakes of vocational development mentioned above. The point is rather this: how can one build the potential of training situations (Mayen, 1999) or work situations (Falzon, 2014) for development, in order to enable individuals to develop their skills as required by the organization, whilst integrating within the safety stakes that are inherent to their work activity? The approach described above aims to define a possible way to tackle this issue.

This paper proposes a holistic approach to the design and assessment of courses of vocational training, stemming from the contribution of ergonomics (Falzon, 2014) and vocational didactics (Pastré, 2011), both of which refer to the concept of work activity (Daniellou & Rabardel, 2005). It is a result of an ongoing research programme concerning the development of vocational skills and the design of training systems, tools and situations based on work analysis. This programme hinges on several research programmes in domains that involve risks, such as automobile driving (Boccara, 2011, Boccara et al., 2015), aeronautics (Boccara & Delgoulet, 2013, under revision), nuclear operations (Fucks & Boccara, 2014 ; Couix, Boccara & Fucks, 2015) or war medicine (ANR project VICTEAMS).

This approach is based on the use of guiding principles about human activity (Daniellou & Rabardel, 2005) in the design of situations fostering learning and the development of vocational skills: 1) activity is situated, in two senses. Individuals act depending on the situations they have to cope with, which are variable, evolve in time, and require changes in the activity; and activity is also marked by the period and culture in which it takes place; 2) Activity is finalized, oriented by goals which are partly specific to the individual who realizes it. His/her goals may be different from the goals that have been prescribed. 3) Activity is integrative, it emerges at the intersection of the individual's own features (his/her aims, personal history, knowledge, skills, etc.) and the features of situations in which he/she acts (the goals that must be met, the material means provided, the work environment, etc.). 4) The activity developed by a specific individual in a given situation is unique: it inherits elements from his/her past. It is constantly revised and renewed.

Learning and the development of vocational skills are both a process and a product/result of activity. More specifically, they are a result of the constructive dimension of activity, which is the dimension oriented towards the elaboration of resources for oneself in future situations (Rabardel, 1995/2011). Seen in this way, the stake of vocational training systems would be to foster the production, the development of vocational skills that can be ef-

fective in work situations - that is, skills that integrate the stakes of production, safety and quality, as well as health. With this as a goal, it would be irrelevant to try and influence directly external determinants of activity such as knowledge or skills independently of situations, since activity is both determined in situations and develops within situations. In contrast, we can act through the mediation of situations. The notion of "situation" becomes a key element of the design of courses of vocational training, which implies a shift in focus with respect to classical approaches of pedagogical engineering in adult training (Carré & Caspar, 2011). The design of situations that entail a potential for development (Mayen, 1999) leads us to question two dialectic processes: didactical transposition (Samurçay et Rogalski, 1998) and transfer. How can one transfer work situations to training situations, in order to support the development of skills, whilst ensuring that they also favour the transfer of these skills in future work situations? These dialectics invite us to think in terms of courses of vocational training rather than in terms of mere sequences of training sessions that are decoupled from an inscription in people's vocational history. In the same way, it suggests a need to think about the continuity and breakthroughs between the developmental potential of work situations and training situations, with the goal of promoting the articulation between these.

This approach therefore requires project management practices that integrate methods for analysing "works" (in training situations and production situations) (e.g. Boccara & Delgoulet, op.cit.), and design methods to build training situations that are to be integrated to tailored courses of vocational training (Couix, Boccara & Fucks, 2015). Project management should also question the strategic orientations of professionalization, notably those orientations that are linked to safety: do organizations want to make their stakeholders able to manage hazardous situations? Or do they limit themselves to enforcing the application of rules? Before designing and assessing courses of vocational training, it is necessary to document the safety stakes in a variety of situations, from the points of view of both the organization and its stakeholders. Finally, analysing the policy of vocational training as well as stakeholder involvement (notably managers and trainers) are two necessary components in defining a training programme's orientation and contents.

Enhancing Performance: The Hidden Route to Safety

Rhona Flin, Aberdeen University, United Kingdom

This contribution is primarily directed at reflection axis: 3b 'What part could professionalism in the job play in safety? The reason for choosing this topic is that much of my research has been founded, perhaps implicitly at times, on the assumption that enhancing job performance so that it is of better quality, efficiency and accuracy, will concomitantly enhance safety due to improved risk perception and risk management behaviours.

Crew Resource Management and Non-Technical Skills

One of the most obvious demonstrations of this approach is Crew Resource Management, as introduced by the aviation industry (Kanki et al 2010). In European aviation, this focussed on an individual pilot's non-technical skills, essentially cognitive and social skills that complemented technical skills and enhanced efficiency and safety (Flin et al, 2008). Task analyses were employed to identify these skills, which were essentially protective for safety, by reducing the incidence of error or by 'catching' or mitigating errors that occurred. Errors jeopardise efficiency, as well as safety. Improved communication also enables smoother interaction between crew members and supporting personnel. Awareness of human performance limiting factors, such as stress and fatigue results in better self-monitoring and corrective action.

The teaching and assessment of non-technical skills is obligatory for airline pilots in most countries and this approach has now extended into many other occupations (e.g. Flin et al, 2014, 2015). The main objective of this training and assessment has always been is to improve safety/ reduce accidents, hence the behavioural rating scales tools to measure performance on non-technical skills are phrased in the language of safety. For example, in the NOTECHS system for pilots (van Avaermaete & Kruijsen, 1998; O'Connor et al, 2002), the scale descriptors use explanatory terms such as 'behaviour directly endangered flight safety' or 'behaviour enhances flight safety' for very poor and good performance respectively. But the specific behavioural examples (markers) in such systems relate not to specific safety-related activities but to normal task operations. Thus the underlying premise is that better demonstration of skills such as leadership, teamwork, decision making during task execution will benefit safety.

The evaluation literature on CRM and safety outcomes is somewhat limited in aviation (low accident rates offer insufficient outcome data) although there have been meta-analyses (e.g. O'Connor et al, 2008). The more recent introduction of non-technical skills / CRM to the world of healthcare means that as a technique it is being scrutinised by a new level of rigour, given medical professionals concern with treatment efficacy and willing to measure error rates and outcomes. Thus there is an emerging database of studies examining the relationships between technical skills, non-technical skills, error and safety or other performance metrics. These generally indicate positive, if patchy, relationships, (Hull et al, 2012) but there is an emerging message that focussing on improving the execution and reliability of normal task activities can improve safety.

Leadership

One of the non-technical skills that has been of long standing interest to safety researchers is leadership; at the team level, this is sometimes called operational leadership. The aim is to identify the leader behaviours normally used on a given task (e.g. Parker et al, 2013) and then to try and relate these to outcome measures. There is a proliferation of research on so-called safety leadership, from the supervisor to the senior manager. Some generic leadership scales (e.g. the Multifactor Leadership Questionnaire, MLQ, Avolio et al, 1999) are customised by researchers by rewording items in a safety-specific fashion (e.g. Kelloway et al, 2006). I have long thought that this is not the best tactic to employ – as what we are striving to understand is less about what leaders do when

they are concentrating on safety-related activities but what do leaders do when they are simply trying to get a task completed under normal operational conditions (which may involve time pressure, a degree of risk and variable information). I appreciate that attention to safety also has to be visible, discussed in an obvious manner and promoted at the workplace to gain attention to the risks that are present and how they should be managed. I do not disagree with that approach but I think that safety information may need to be more effectively integrated into routine technical and operational training and delivery: Rather than being taught in some kind of 'safety bubble' - isolated and distinct from normal operations.

The motivational power of 'safety'

It is also worth considering whether separate safety initiatives do not always produce the required level of traction is because they have not been sufficiently well designed to take account of prevailing human motivations on the worksite. What really interests and motivates managers and their workforce, it is not usually safety per se. While they do not wish to be injured or cause injury at work, they may believe, often correctly depending on their occupation, that the probability of this adverse outcome happening is relatively low. Of course, the consequences of low probability events may be severe. People may be aware that they engage in risky activities out of work, such as smoking, driving, sports, home improvements, which have much higher probability of personal injury and that knowledge may provide an anchoring effect for judging risks at work. Moreover, as Weick (1991) pointed out, safety is a dynamic non-event, i.e. get it right and nothing adverse or notable happens. Nothing happening is not usually a reinforcing consequence for humans. In contrast, effective production or service delivery normally produce tangible and desirable results, often followed by tangible rewards. My experience of conducting research and consulting in industry or in health care, it is beneficial to point out when discussing cultural or behavioural interventions designed to enhance safety, that any resulting performance improvements in task execution would also be likely to improve operational performance through efficiency gains, reduced down-time, less rework and other loss factors.

Moreover, the safe state of 'nothing happening' can mean, in the word of James Reason (1998) that people 'forget to be afraid' (p.294). Recent interest in applying the concept of 'chronic unease' to managerial thinking on safety matters is an attempt to address this problem (Fruhen et al, 2014).

The salience of production

Given the salience of productivity targets for managers and the associated economic benefits, I would suggest that there is insufficient attention to productivity outcomes in safety research. Moreover, very few studies calculate an economic outcomes or measure return on safety investment. And yet if one wants to persuade organisations of the need for change, these are the very levers that attract managerial attention.

Situations which appear to constitute production/ safety trade-offs in decision making may provide an opportunity to explore managerial and worker assessments of relative costs and benefits of competing options and an indication of the time scale employed for their judgements.

Professionalization and safety

Whether enhancing professionalization by focussing on productivity, general job efficiency or overall performance can result in concomitant benefits for safety, is a provocative topic for debate at this Fonsci workshop.

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Is Professionalisation a safety issue or the other way around — A response

Jan Hayes, RMIT, Australia (*Videoconferencing*)

I would be pleased to contribute to FONCSI's work on professionalism and safety. This subject has been of interest to me for some years. I have written about it in several contexts and this project would provide an opportunity to reflect on this topic more thoroughly. The following sets out my research work, conclusions in this area to date and ideas for further research.

In my study of decision making by senior operational staff and their efforts to balance conflicting goals (Hayes, 2013a), I found that operational experts were influenced by two different occupational identities – firstly their identity as an employee but critically also their identity as a professional in their particular field. These dual identities mirror to some extent a contrast between bureaucratic organizing and professional organizing. This contrast has a long history in social science (particularly sociology) but has been little explored in the context of modern industrial safety practices. Professionalism invokes such concepts as vocation, public trust and authority deriving from knowledge, rather than organizational position (Middlehurst and Kennie, 1997). The key issue for safety performance is the reliance unwittingly placed by organizations on professional qualities of their operational managers. Such individuals provide an additional valuable perspective on what makes the system safe, rather than simply acting in line with management priorities at all times, irrespective of the specific circumstances. A key facet in this arrangement is a sense of identity linked to their profession which encourages decision makers to think independently.

My interest in professionalism has continued with investigation into social aspects of safety in design offices and the conflict that exists between different professional groups, specifically discipline engineers and project managers. In this case, the main findings relate to different concepts of time, with the discipline engineers taking a much longer term view of what a successful project entails than their project management colleagues (Hayes, 2015b). This difference generates conflict and so power relationships have an impact on safety outcomes (Hayes, 2015a). This work is ongoing with more fieldwork focused on the professional values of project managers planned for 2016.

In many technology-based industries, a 'career of achievement' (i.e. moving to a more senior position based on professional skills and knowledge) is seen as less desirable than a 'career of advancement' (i.e. progressing up the hierarchy of the organization chart) (Zabusky and Barley, 1996). Despite this, to date our research has found strong professional groups in both operations and design functions linked to hazardous industry.

We have also considered issues of professionalism in conducting organisational analysis of two major incidents. The first is the Montara blowout that occurred off the northwest coast of Australia in 2010. My analysis of this accident (Hayes, 2013b) demonstrates that a critical causal factor was the merging of key technical and managerial roles with the result that cost and schedule implications of key decisions were given priority over well integrity.
Most recently, our analysis of the organisational causes of two major US pipeline failures (San Bruno and Marshall) (Hayes and Hopkins, 2014) also highlights the role of professionalism on the part of engineers in accident causation and prevention. As with many modern organisations, the two companies involved are highly bureaucratised i.e. management is the dominant profession and the most senior managers (those at the top of the organisational hierarchy), set the goals of the organisation and the methods by which those goals will be achieved. Our analysis reveals a strong identification with organisational goals on the part of professional staff in these organisations, meaning that safety decision making was significantly diluted by management priorities based on cost and schedule.

Based on these four pieces of work and informed by our broader research program, I see some key questions regarding professionalism and safety as:

What factors increase the organisational influence of professionals on safety matters?

This is being addressed by a PhD student we have in our program. A key aspect is organisational structure but several other factors are emerging from the data.

What is the role of safety professionals in relation to process safety issues? Is this area always best left to the content specialists?

Consistent with general societal trends towards professionalisation, workers who have traditionally held roles labelled as 'safety' are becoming professionalised themselves. The Safety Institute of Australia has published a widely used Body of Knowledge and instituted formal accreditation of tertiary courses in safety. These efforts are being extended globally via the International Network of Safety and Health Practitioner Organizations (INSHPO). The role of safety generalises in process safety remains an area of contention.

What is the impact of outsourcing on these issues?

In the past two decades, it has become increasingly common for organizations to outsource specialist functions, essentially leaving a core of staff to manage the work of external professionals. This decreases the formal authority of professionals and leaves them with the power to provide advice at best.

Are there sufficient technical professional skills present in company Boards?

Analysis of the organisational causes of several major accidents has highlighted the extent to which Board of companies managing hazardous technologies are dominated by corporate functions such as law, accounting and finance, rather than those who understand the potential harm that their technologies can cause. Anecdotally, technical professions seem to be under represented and so technical knowledge at Board level limited.

To what extent have professional societies become industry lobby groups? Can the two functions be successfully combined? Who is really in control of the content of key safety standards?

Historically one of the key functions of professional societies has been the setting of professional standards. In some cases, this function has been taken over by industry associations which may have different motivations and interests.

As indicated by the above summary, attitudes to safety that stem from professional ethics by those who work with hazardous technologies is a key research interest of mine. I would therefore be pleased to contribute to research discussions in this area and ultimately a new publication.

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Line managers as professionals of work in the era of health-at-work professionalization

Pascal Ughetto, Paris-Marne-la-Vallée University, France

When not ignored, line management staff are the targets of accusations that do not justice to the role they may actually play in occupational safety and health policies. In the process of inventing policies of work, and whatever the issue addressed (combatting stress at work and "psychosocial risks", reducing musculoskeletal disorders and work accidents, promoting safety policies…), top management and human-resource management departments think of middle managers as one of their favorite levers of action. These are also one of the first protagonists or factors mentioned when an accident occurs and needs interpretation. Middle managers are supposed to have been faulted for not having monitored their team's behaviour or not having delivered safety messages with sufficient conviction, or not having really paid attention to enforce procedures. Training sessions are thought of as solutions to enforce in line managers' consciousness and behaviour exact recognition of the company's safety policy and good practices, and therefore to make them reliable agents of the shaping of work as ensuring both safety and economic performance. Ways companies currently define policies regarding work, its organization, its safety and its performance rest thus on implicit theories of work, but not only of the employees' work but also of managers' activity and role. This activity is conceived as a cornerstone of the collective activity of organizing which consists in giving to the employees' activity frameworks that delineate as much as possible a pre-defined room of action and standards to be respected. Line managers are interpreted as front-line constituents of the organizing arrangement, whose role is to settle these frameworks in situ, check the proper functioning and improvise ultimate adjustments to ensure that things work. They are expected to act throughout team meetings where they deliver messages and enforce procedures. In such a representation, line managers are not identified as specialists of their employees' work. Expertise on work is a central expertise they are simply relays of. Training sessions are precisely seminars where they can assimilate this expertise.

In my paper, I will contend that the way line managers are enrolled into policies of work is crucially based on a distribution of legitimate fields of professionalization on work as an object of knowledge and action. While they daily assume decisions about their teams' working activity and, doing so, are familiar with what this activity is and what employees need in order to achieve their tasks, line managers are denied of having legitimate expertise on work. Their knowledge on work and what they can report about how people work is often disqualified as being inspired by a too closed relationship with teams and their propensity to give themselves their own rules or even to resist change. To what extent central departments and their functional leadership tolerate that line managers organize (and not merely deploy organization plans in situ) and know much about work is at the centre of the social construction of policies of work. What corporate top management make of the fact that line managers know many things about work – how work addresses the daily challenges of production – because they manage and organize, this is dictating what sort of place is devoted to line managers in the competing professionalization processes in the safety and occupational health policies.

The contention of the paper is that the scope of action and expertise on work issues that is conceded to line managers is the end result of competing dynamics. The line-managers' role is taking place at the crossroads of several dynamics that decide on what the line-managers work should be:

- Dynamics of professionalization of groups, within support functions (functional divisions), that formulate those norms that will give their objectives and constraints to individuals and teams and those that define the professional role of middle managers; amongst them human-resource management dynamics of professionalization is crucial as far as, from the origin of the group onwards, a key problem has always been to define HR managers' field of competence vis-à-vis the foremen and (today) line-managers' prerogatives. This has always been a conflictual relation where HR managers define themselves as experts of work and mastering academic

knowledge on it and denounce line managers' behaviour;

- More specific dynamics of professionalization of specialists of health at work and of risks prevention; the strengthening of policies of work during the past decade is a new field of professionalization for specialists rapidly expanding their field, particularly those who, within companies or in a contracting relation, are experts of psychosocial risks, stress reduction, and so on;
- Dynamics of organization and technologies as they impact which frameworks are given to the employees' activity. Ultimately, representations of the employees' work embodied in the organizational and technological design delimit the field where line managers are supposed to take their place between the organizers and the realities of work, or in other words between the prescribed aspects of work and the way workers manage to solve problems in real situations.

However, fully instituting line managers as professionals of work is a key dimension of the definition of policies of work, at the company level or at a more macro-level, as these managers are crucially decisive on how objectives and constraints actually weigh on activity and make it sustainable or not. It does not mean that they are naturally experts of interpreting activity in the process and of managing work. Accompanying them may be needed: in mastering the analysis of the activity – observing real work and interpreting situations where individuals or teams seem to find it necessary not to respect prescription – and in designing the local organization rules that enhance the employees' capability to tackle complicated situations.

A practice-based approach to safety as an emergent competence

Silvia Gherardi, University of Trento, Italy

The Foncsi invitation to reflect on professionalization and safety beyond traditional approaches requires a preliminary explication on how the two terms are understood, before addressing the three questions that form the reflection axes.

The meaning of safety may be constructed in different ways according to the disciplinary background of the researcher and the approach s/he develops. Therefore safety may be thought of and represented as a multifaceted phenomenon that enables a pluralistic way of inquiry. Moreover the understanding of the field of study of safety should be considered in historical terms, since it is in itself a socio-cultural product of specific societies. For this reason we have seen that from the study of risk (in objectivist terms), the field moved on to the culture of safety as an organizational dimension, to reliability and resilience as situated practices. In fact, we may say that the study of safety is part of a reflexive science, since the knowledge produced is going to change the object of study and the changed object calls for a renewed way of studying it.

For approaching safety through the lens of a cultural, organizational and practice-based definition, I offer the following formulation:

'Safety is an emergent competence which is realized in practice, which is socially constructed, innovated and transmitted to new members of the community of practices, and which is embedded in values, norms and social institutions. It is the final outcome of a collective construction process, a 'doing' which involves people, technologies and textual and symbolic forms assembled within a system of social relations. In other words, a 'safe' workplace - a 'safe' organization - results from the constant engineering of diverse elements (for example, skills, materials, relations, communications) which are integral to the working practices of the members of an organization. Safety, then, is knowledge objectified and codified in an expertise and circulating within a web of practices. In order to exist it must be performed in, by and through safety practices, i.e. through discursive and material social accomplishments' (Gherardi, 2006:71).

When we look at safety through the practice lens we see that i) safety is emergent from the working practices of a community; ii) it is a collective knowledgeable doing; iii) it is embedded in the practices that perform it. This 'lens' has implications for research since it requires that the researchers study safety in studying situated working practices and how practitioners achieve or fail to achieve safe working practices. In other words safety has to be understood and explained in context and not as a de-contextualized knowledge that may be transferred from one site to another. At the same time this kind of ethnographic, fine-grained understanding of how safety is achieved in situated working practices constitutes a challenge to theorizing safety across different settings. I shall not address this tension here, since it will imply a longer argumentation. Rather I limit myself to acknowledge this tension in developing the studies on safety and at the same time I wish to stress that in implementing safety projects we need a local, contextual and fine-grained knowledge of how a community of practitioners perform more or less safe working practices.

In proposing a practice lens for looking at safety, I am enlarging the traditional way of looking at safety mainly in relation to prevention and control of processes (or products) related to risk in hazardous activities. When we consider safety as 'knowing-in-practice', we are looking at a kind of knowledge that is pervasive and it refers to reliability instead of being limited to risk-related contexts. Any activity should in principle be reliable in its outputs and social effects, especially in consideration that risks are pervasive and prone to happen as a consequence of the growing interdependencies of our 'risk society'.

The FONCSI invitation proposes a large definition of the term 'professionalization' to encompass all kinds of learning and training situations, not limited to traditional classroom training or specific safety-related training. I recognize that a common ground behind FONCSI invitation is constituted by the dissatisfaction with the delivery of traditional safety knowledge and therefore an implicit issue that needs to be addressed (in the two days seminar) is

how it may be imagined and delivered differently. Nevertheless I propose to look at professionalization distinguishing three lines of inquiry:
Strictu sensu professionalization has to do with the institutionalization of a relatively new professional figure – the safety manager-. Therefore the institutionalization of a new 'body of knowledge' in the form of a profession prompt questions about the learning curriculum of the aspiring safety professional, about the institutions best suited to provide and certify this knowledge, about the modalities for inducting the new professional in the organizational culture of the employer and moreover about the role and the activities that a safety manager is supposed to perform within a well-defined context.
Another understanding of professionalization may refer to a distributed professionalization in which each community of practitioners has the mastery of the safety knowledge relative to their own working practices and in relationships with other working practices. When we think in terms of distributed professionalization, we have to face the issue of how to design the training for it in a situated and 'customized' way of engaging the practitioners in developing always new knowledge.
Finally if we consider professionalization as an umbrella term or if we wish to contemplate the actual pedagogy and the de-contextualized contents about safety which can be transmitted in a routinized way, we have to inquire in safety education plans and their productivity.

The outlined three levels of inquiry into professionalization are intertwined and ideally could be brought to work together but need to be addressed separately.
With these introductory notes I can better address the three questions and the reflection axes supporting them:

3a- Does professionalization in/of safety make any sense?

The profession of 'safety manager' may be regarded as a specialization in management education and the role and expectations from a safety manager may be regarded as a body of knowledge that is under definition and is subjected to negotiations and refinement. The dominant rhetoric about the role of the safety manager is that s/he symbolizes the process of making safety a priority within the organization that employs such a figure. Obviously it is not enough to hire a safety manager if the organization does not give him/her the resources and the power to integrate safety into organizational practices. Therefore the question is double: on one side it is a question of management education, on the other side is a question of integration of a safety manager into the management team where accountability is expected from each field of managerial expertise and from the whole management.

3b. What part could professionalization in the job play in safety?

In doing research on safety I learnt that at the level of the workplace safety is not a 'standing alone' issue. A novice entering in a community of practitioners is not thought about safety as a school issue nor does s/he learn safety as a specific content. Rather a novice (and generally all the practitioners) learns safe working practices, knows about safe working conditions, knows when the requirements for doing the job and those about safety regulation clashes and how to behave in such situations. A community of practitioners constitutes the site for developing and keeping the knowledge about safety in their everyday practices. The culture of 'doing the job well' is at the same time a culture of safety in practice and the site where the occupational identity of the practitioner develop. The professionalization of this kind of knowledge requires specific methodologies (participative, action-learning, experiential, etc.).

3c. Safety at the organizational level: beyond the individualistic viewpoint of professionalization?

We may say that safety has to become an 'object of concern' that warrants study in social science and at the same time is inscribed in social (not only organizational) practices. The difference between a matter of fact and a matter of concern (Latour, 2004) is that instead of 'being there', whether one likes it or not, matters of concern

have to be liked, appreciated, tasted, put to the test. Matters of concern are disputable, they move, they carry one away, they *matter*. When safety is a matter of fact, it is simply 'there', inscribed in rules, artifacts and activities; when safety becomes a matter of concern, it has to do with our relation to the world in which we live.
Therefore if an organization is committed to safety within its boundaries and in the environment where it lives, all the organizational practices should become an issue of reliability and an often neglected area of inquiry – resilience- should be brought to be in conversation with the more classic areas of prevention, accidents, safety, reliability and organizational sustainability.

References:

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Doing what is right or doing what is safe? What is the relationship between professionalization and safety?

Linda Bellamy, White Queen, Nederlands

The Foncsi question of whether professionalization is a safety issue or the other way around has been elaborated in the title of this presentation. “Professional” is taken to mean *doing what is right*. No one would say that not doing it right is being professional. People must be able to trust the professional, that he/she is indeed “doing it right”. Formally this is assessed according to accepted knowledge and competence standards and codes of practice and recognised through membership of professional bodies. Professionalism can also be a personal characteristic involving not only scholarship but also commitment to quality, pride in ones work, dedication, service etc. What does *doing what is safe* mean? Safety is effectively a non-event. Nothing harmful happens because one does things in a safe way. This is usually associated with a projection into the future (the risk) that if this or that is done in removing or controlling the hazard there will be no harmful outcome (or an acceptably small chance of one).Safety performance is usually measured in hindsight - an accident occurred so it must have been unsafe.
Making sure there are six secure bolts on a flange is doing what is right while keeping a flange closed with 3 bolts while there are no hazardous materials inside is safe, although a safety professional (projecting into the future) may prefer the 6 bolt configuration. Not delaying to save people from harm when it is a race against time is doing what is right but delaying that activity so that the responders can be protected from harm is doing what is safe. Doing what is right and doing what is safe does not always overlap.
So what is a good operator? Is doing what is right and doing what is safe differentiated or can they be integrated?
“A good operator does not get any alarms: he notices everything. The panel operator should be the most experienced man. He knows the system inside out, he notices every little signal and plans the activities that should take place in the coming shifts.” *Emergency response and security manager, chemical industry*.
If everything were done right, would there be any need for safety? Many incidents happen because necessary knowledge or competence is not available at the right time in the right place. How and where does the issue of (safety) knowledge or (safety) competence arise in the occurrence of incidents? E.g. a trainee was left unsupervised to manage a chemical batch process with a recipe that happened to contain an error. This initiator, compounded by poor technical design and procedural practice, resulted in an explosion that destroyed the plant and people died. Incompetence does not always result in an incident however e.g. cleaners were regularly asked by the operators of a Seveso top tier major hazard installation to take over the control room while the operators went for lunch. The regulatory inspector thought this was an easy case but the judge ruled that according to the law an immediate danger could not be demonstrated and the plant could not be shut down.
This presentation will focus on challenging the perspectives of professionalisation and safety, looking at professionals successfully dealing with high risks and at knowledge and competence failures in relation to accidents.

Questions being asked are:

Are accidents being analysed in the best way to help learning? Are there lessons to be learned here in terms of professional training? Are there actually any available links between professional training and safety performance? Because safety is a non-event do we need failures to learn how to do things safely?

The Foundation for an industrial safety culture (Foncsi) is a french public-interest research foundation created in 2005 and located in Toulouse, France.

The Foncsi funds research projects concerning potentially hazardous industrial activities and their interaction with society, and aims to encourage open dialogue with all stakeholders (associations and NGOs, industrial firms, local government, regulators, researchers, trade unions, etc.).

Our originality is the interdisciplinary nature of our activities, in France and internationally, as well as a strong commitment to innovation and to anticipating tomorrow's issues.

Our mission:

- identify and highlight new ideas and innovative practices;
- develop and fund research into industrial safety and the management of technological risks;
- contribute to the development of a research community in this area;
- transfer research results to all interested parties.

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