Call topics

**2013 SAF€RA joint call on
Human and organizational factors
including the value of industrial safety**

September 2013

SAF€RA's 2013 joint call on *Human and organizational factors including the value of industrial safety* addresses two topics:

- T1: The value of safety and safety values
- T2: Resilience: improving management of safety

The subtopics identified for these two topics are described below. Please note that the research questions listed for each subtopic are not intended to be exhaustive. Research proposals may address other related research questions, if they are included within the scope of the topic and subtopic. The funding available for each topic is not related to the length of its description in this document.

The questions addressed by this call are relatively broad, and will often benefit from inputs from several scientific disciplines. Multidisciplinary or inter-disciplinary proposals are welcomed. It is anticipated that the following disciplines can provide useful contributions to the call: management science, economics, law, organization studies, political science, psychology, engineering, history, geography, anthropology, philosophy. Proposals including other disciplines are welcomed.

Research proposals which adopt a **comparative approach** (analyzing similarities and differences between different European countries, between different industry sectors, between large and small organizations, *etc.*) are encouraged.

T1: The value of safety and safety values

Human and organizational factors are recognized as having a significant impact on safety, and are increasingly being targeted by management interventions which aim to improve safety performance. However, these factors are more ambiguous than traditional technical approaches to safety intervention, and the subject of more debate. The notion of safety itself depends on a society's attitudes and value systems in ways which are poorly understood. New challenges arise from new ways of working, and novel forms of safety regulation. There is therefore an interest in better understanding the value of different safety intervention approaches: both the underlying societal values which impact their effectiveness, and the value of different methodologies, in terms of business benefits and social and societal benefits.

The "value of safety and safety values" topic comprises three subtopics:

- T1.1: The value of human and organizational aspects of safety
- T1.2: Assessing performance of regulation frameworks in the light of value systems
- T1.3: The value of the safety culture concept

T1.1: The value of human and organizational aspects of safety

The "value" of industrial safety may be interpreted in two ways:

- In terms of **utilitarian ethics** ("the greatest good for the greatest number"), as the *worth* or *instrumental value* of safety. Under this approach, firms analyze the **business case** for preventive measures, to judge whether they are profitable; regulators use techniques such as benefit-cost analysis to assess the net value (difference between social benefits and costs) of proposed projects.

- In terms of **duty ethics** (adherence to rules that bind you to your duty), as the *intrinsic value* of safety, or the moral imperative not to cause harm.

Both of these viewpoints are used in society's management of hazardous industrial activities. The utilitarian ethics viewpoint on the value of safety is adopted by firms and regulators in deciding whether a given level of spending on safety leads to a level of risk which is "as low as reasonably practicable". The duty ethics viewpoint is widely adopted in occupational safety legislation, and to a certain extent in firms' social ethics commitments (corporate social responsibility programmes, in particular).

A number of research questions arise from the balance which has been constructed over time between these two competing justifications for risk prevention:

- What are the practical implications of the interactions between the utilitarian ethics and duty ethics viewpoints on safety (influence on regulation of risk in different sectors, on societal acceptance of hazardous industrial activity, on risk management activities and corporate social responsibility commitments within firms and their insurers)? How have these interactions evolved over time?

- How do individuals value various safety-related attributes of products and services (willingness to pay), and how do safety considerations impact their choices? How can firms market the value added by safety (labels such as those developed for "green" or "eco", other approaches to be developed), both in business-to-consumer and business-to-business relations?

- What empirical evidence is available concerning the benefits of investment in different forms of risk-reduction interventions (in particular, interventions targeting human and organizational aspects of safety)? A broad understanding of the term "benefits" should be adopted, including benefits in business terms (financial impact on profitability of operations, impact on license to operate and insurance costs), other indirect benefits for the firm (reputational benefits, attractiveness to future desirable employees, *etc.*) and social or societal benefits to employees and other stakeholders (including local communities).

- What are the potential consequences for firms of underestimating the impact of non-financial benefits of interventions targeting human and organizational aspects of safety, and how can these be integrated into a risk-management strategy?

- What factors contribute to a positive development of business cases for safety interventions?

T1.2: Assessing performance of regulation frameworks in the light of value systems

A variety of legislative and regulatory mechanisms are used by society to control the risks generated by hazardous activities:

- classical "**command-and-control" regulation**, which requires firms to implement specific technological measures to reduce risk;

- **"goal-oriented" regulation**, which specifies a safety goal or target and allows operators to choose the best methods to attain it;

- **"management-based" regulation**, which requires firms to adopt organizational controls, such as a formal safety management system;

- **liability regimes**, potentially combined with obligatory insurance, which attempt to ensure that firms have appropriate incentives to avoid accidents by requiring them to compensate victims;

- **soft law and self-regulation approaches**, which aim to establish voluntary standards of behavior or codes of conduct, associated with social sanctions for firms which do not engage in the process.

A number of moral and cultural values underlie these regulatory mechanisms, including:

- **equitable treatment** of firms and ensuring that workers and the general population are not subjected to significant differences in risk exposure from different hazard categories;

- **predictability** of regulatory requirements (in particular an issue for SMEs);

- **risk reduction** thanks to innovation in safety management;

- **reduced cost** of enforcement;

- **transparency** in risk governance;

- **public confidence** in the safety of hazardous industrial activity.

The performance of different regulatory mechanisms, with respect to these values, is variable: for instance command-and-control regulation tends to lead to equitable treatment of firms and predictable regulatory requirements, but hinders innovation in safety management and is generally expensive to enforce; self-regulation is generally less expensive but leads to lower transparency of risk governance and lower predictability of regulatory requirements. The comparative performance with respect to the aforementioned values may be dependent on the nature of the industrial activity: for example, it is generally accepted that liability regimes and soft law approaches are better suited than classical regulation to highly innovative activities (where there is uncertainty concerning future hazards and on the most appropriate risk prevention measures).

Research is invited in particular on the following questions:

- What are the societal and cultural values which underlie the choice of an appropriate regulation regime?

- What are the relative strengths and weaknesses of different regulation regimes, and their optimal combination (including the analysis of interaction effects), with respect to these values?

- Can accompanying measures be proposed for some of these regulation regimes which improve their overall performance (for example concerning soft law regimes, measures which might allow stakeholder involvement in risk governance, ensuring public access to information on safety management methods implemented by firms and on residual levels of risk)?

T1.3: The value of the safety culture concept

Following its identification in INSAG report 4 on the Chernobyl disaster, the concept of safety culture has been increasingly used in safety research, and is today often the subject of management-driven safety interventions in high-hazard industries. Whilst the academic literature provides a variety of definitions for the term, a commonly used definition for the safety culture of an organization is "the product of individual and group values, attitudes, competencies and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organisation's safety programmes. Organisations with a positive safety culture are characterised by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventive measures" (ACSNI, 1993). Further research is required into a number of dimensions of the safety culture concept, and its interaction with safety values and beliefs.

Fundamentals of the concept:

- What is the effect of ingredients such as societal value systems, principles and basic assumptions made by individuals on an organization's safety culture?

Safety culture assessment methodology:

Several methods have been developed to characterize an organization's safety culture, with different combinations of questionnaire surveys for groups of workers, focus groups and interviews, but there is little evidence of their **comparative performance**. What is the validity of these different methods and the measures they generate? To what extent do they reveal information concerning the underlying beliefs and value systems shared by the group?

- How can organizational components of culture be isolated from national/regional influences (in particular the underlying values)?

- Safety culture assessment measures may depend on certain national or regional characteristics, which should be isolated from organizational safety values. How can **calibration procedures** be developed for safety culture assessments, ensuring a common understanding of measures (dimensions and scales) made by different teams, in particular if such measures are used for regulatory purposes or for inter-country comparison?

Applications:

- Safety culture assessments are often undertaken by external consultants, for methodological (avoiding bias) and competency-related reasons. To what extent can **self-assessment methods** be developed which overcome these two factors?

- In the context of a move from prescriptive regulation (imposing specific technical requirements) to more goal-oriented or management-oriented regulation (requiring firms to implement a safety management system, for example), how can the safety culture concept, and various assessment methods, be used by **regulators**? To what extent can the biases in people's responses to regulatory-driven assessments be controlled? Could such methods be used as input to **risk-based targeting** of firms and facilities for **inspection**?

- Which aspects of **safety leadership** and management ownership of safety initiatives are important in developing and sustaining a positive safety culture, which goes beyond slogans?

Specific contexts:

- How can safety culture be assessed on sites with multiple subcontractors, complex allocations of responsibilities and multicultural workforces?

- What is the impact of certain new types of work organization (decentralization with increased distance between workers, increasing use of ICT) on an organization's safety culture? What specific forms of HOF interventions (such as new uses of social media) are suited to such environments?

- How does an organization's espoused values and safety culture determine its reaction to new external risks and domino effects (such as natural-hazard triggered technological accidents)?

- Is it possible to assess the impact of safety culture on **design activities** for new products and facilities (in particular, good planning for safety in life-cycle phases which are often neglected, such as **dismantling** and recycling)? What is the impact of an organization's

safety culture on its sensemaking capabilities and its ability to identify and understand emerging risks?

T2: Resilience: improving management of safety

Many high-hazard industries today are characterized by complex socio-technical systems in which anticipation and control are difficult. Traditional risk-assessment approaches, focused on hazard identification and the development of prevention and mitigation strategies, reach their limits when system complexity does not allow analysts to identify all hazards and quantify risks. Resilience approaches aim to address the limits of this static approach to safety management by moving the focus towards **organizational adaptability** and the **management of uncertainty**. The objective in the present joint call is to use the concepts and models developed by the resilience community over the past 20 years to develop **new or improved practices for safety management**, concerning multiple system levels (legal and policy framework, regulation, management, engineering and operations).

A number of research questions concerning specific systems levels are listed below.

Concerning regulation and the policy framework:

- Several methods have been developed to assess the resilience of an organization, based on different kinds of models, but little evidence is available concerning their comparative performance. Does the increasing complexity of industrial organization justify new models and approaches to assess resilience? Which new models can be proposed, building on previous research in the area?

- Resilience assessment measures may depend on organizational characteristics (centralized vs non centralized, stable vs dynamic…). What calibration approaches can help ensure a common understanding of measures (dimensions and scales)?

- Resilience and confidence: how can a firm develop a **justified confidence** that its actions in favor of resilience will allow it to handle unexpected circumstances or events in a satisfactory manner? How can a regulator assess a firm's ability to handle unexpected events? On which basis can other stakeholders (employees, local communities and territories, …) place confidence?

- If *risk* is defined as the effect of uncertainty on the achievement of one's objectives, how should one define *acceptability* and *safety*? What are the implications in terms of regulations, principles and policies of these new definitions and new approaches to safety management?

Concerning the management of safety:

- What are the **trade-offs** (conflicts, complementarities) between the conventional approach to safety (anticipation and planning) and the resilient approaches (adaptation to new circumstances)?

- How can safety be improved in practice by adopting the resilience approach? What success stories can be shared illustrating situations where resilience engineering approaches have improved safety performance?

- Can resilience concepts be integrated into classical bow-tie approaches to risk assessment, in particular to improve the characterization of the management system's performance and the impact of human and organization factors of safety on loss of control?

- Which **leading indicators** can be used to monitor current performance and level of preparedness? In particular, can the resilience of an organization be assessed before the event? Is the notion of maturity level applicable?

Concerning engineering and operations:

- What kind of operational activities help to improve resilience? In particular, what implications for training, formal and informal activities for transfer and sharing of knowledge, and experience feedback and learning from incidents (both negative and positive)? What new contributions can be made by initiatives which build bridges between formal and informal components of the organization and of its safety management? What contributions of social networking?

- "Errors" seen as performance variability: in complex systems, operating procedures cannot provide an exhaustive and definitive description of the system's states and the actions to be undertaken by operators. Operators adapt their practices to manage operational fluctuations and local constraints, even when they were not all anticipated in procedures and standards. These adaptations, which could be interpreted as violations, often remain hidden; the underlying expertise which enables adaptability without (most often) compromising system safety is ignored. What methods can be proposed to understand and document this variability and adaptations, using procedures as guidance rather than as rigid straitjackets?

- What are the specific impacts of a resilience approach to safety management for SMEs?

Research proposals which address resilience issues that are transverse to these system levels are also encouraged.

Research types

The following types of research expected in this call:

- **case studies** which can help increase confidence in the methods used and their real impact on safety**;**

- **empirical evaluation** of interventions (econometric approaches, surveys, *etc.*);

- development and evaluation of **practical methodologies/tools;**

- exploratory studies (appreciative inquiries).

Given the nature of research questions concerning safety, multi-disciplinary projects are particularly encouraged.