Resilience Safety Culture in Aviation Organisations

R. Akselsson, F. Koornneef, S. Stewart, M. Ward

EARLY DRAFT of HILAS Book Chapter
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1 INTRODUCTION

The aviation sector is under extreme pressure. The competition is intense and leaner production is a must for most aviation service providers. Furthermore the negative effects from aviation on the environment, foremost carbon emission but also noise, have to be diminished. At the same time the International Civil Aviation Organisation (ICAO) requires that safety has to be improved (ICAO, 2008) although civil aviation sector already is ultra-safe (experiencing less than one catastrophic safety breakdown every one million production cycles) and very safe compared to most other sectors. Also safety, as perceived by potential customers, is important for an airline. One accident and even a few incidents may cause a threat for the affected company’s possibilities to continue its business. Aviation service providers are also very sensitive to aviation accidents and incidents within other aviation companies. Thus there should be a strong incentive for co-operation on safety within the aviation sector.

In order to improve safety in the aviation sector ICAO has introduced requirements (to be operationalised by national civil aviation authorities) on aviation service providers to develop and implement a Safety Management System (SMS). To guide the service providers and the national civil aviation authorities ICAO has published a Safety Management Manual (SMM) (ICAO, 2008). The SMM promotes

an organisational culture that fosters safe practices and encourages the process of active and effective safety reporting. (ICAO, 2008)

In this chapter this culture is referred to as the safety culture, seeing it as the oil keeping the SMS working including the continuous improvement of the SMS itself.

In order to comply with the very high requirements on safety (improve safety in a sector where safety already is very high) current concepts for safety management, including safety culture, have to be used more efficiently. Also new concepts for safety management may be needed. Resilience Engineering (see below), a concept under development stressing feed forward control as a complement to feedback control, may be such a concept. A safety culture with resilience, learning, continuous improvements and cost-effectiveness as its focus is referred to here as a “Resilience safety culture”. The concept is further developed below. In theory resilience safety culture is not different from safety culture as normally defined (see below) – the difference is on how it is used in practice.

The HILAS project focused on using Ergonomic/Human Factor knowledge and methodology in addressing key issues for performance including performance for safety in the aviation sector, mainly in flight operations and maintenance.

A HILAS taskforce mainly focusing on developing processes and procedures for the successful implementation of an SMS also explored the issue of developing tools and techniques for fostering a good safety culture in practice. Weaknesses in the current conceptualisation of safety culture and utilisation of it as a concept in practice were identified. Supported by current knowledge from the scientific literature on safety culture and resilience ideas on improvements were developed and implementation processes have started.
Intermediate results have been presented in a conference report (Akselsson et al., 2009). They are repeated or further developed here. The objective of this chapter is to present the status of the concept “resilience safety culture” in a way that might guide aviation providers to improve their work on safety culture for safer production.

2 RESILIENCE SAFETY CULTURE – A DEFINITION AND A FIRST OPERATIONALISATION

As mentioned above resilience engineering (see below) might be a concept helpful in a) improving safety in an already ultra-safe sector as civil aviation, and b) doing it in a cost-effective way. One expression of resilience safety culture is thus use of results from and participation in the development of resilience engineering.

From these two premises, improve safety in ultra-safe organisations and in a sector under hard economic stress, resilience safety culture is defined as follows

Resilience safety culture is an organisational culture that fosters safe practices for improved safety in an ultra-safe organisation striving for cost-effective safety management by stressing resilience engineering, organisational learning and continuous improvements.

How resilience safety culture is practiced depends on the maturity of the culture – on how long and efficient resilience safety culture processes, such as organisational learning, have worked. Experiences from HILAS-workshops and many task force meetings at a service provider, both with intense interplay between theory and practice, together with literature studies lead to the following operationalisation of resilience safety culture:

An organisation having a resilience safety culture
1. has a safety culture, as defined below, stressing a learning culture with a truly just culture
2. strives for resilience developing and using feed forward control for safety (see resilience engineering below) to keep processes within safe limits considering possible adding effects between different processes and circumstances
3. strives for efficiency in safety management and for integration of safety and core business performance for efficiency
4. is mindful (Weick and Sutcliffe, 2007)
5. is observant on and mitigate holes in the culture (see below)
6. has a systems view identifying and controlling system weaknesses
7. has a functioning organisation for organisational learning – both single and double-loop learning – within the organisation, but it is also active in learning between organisations in the sector
8. stresses efficient change management
9. designs for safety
10. applies a continuous improvement philosophy
11. stress commitment, cognisance and competence from top management to operators
Some of these points are further elaborated below.

3 SAFETY CULTURE

3.1 About the definition

There are several review articles on safety culture (e.g. Cooper, 2000; Flin et al., 2000; Gadd & Collins, 2002; Guldenmund, 2000; Sun et al, 2009, nd). Many of these cite safety culture as the most important factor in the ability of an organisation to implement a safety management system (e.g. Reason, 1997). Also a special issue of Safety Science (Volume 34, No1) was fully devoted to safety culture with an editorial by Hale (2000). These articles include several different definitions of safety culture. Mainly based on works by Cooper (2000) and Health & Safety Laboratory (HSE, 2005) we define safety culture in this chapter as

values about safety shared by all in an organisation expressing itself in three groups of aspects: psychological aspects (the safety climate including attitudes; how people feel), behavioural aspects (what people do), and situational aspects (artefacts such as the SMS; what the organisation has).

Here we also make use of Bandura’s model of reciprocal determinism stating that these three groups of aspects influence each other bi-directionally (Bandura 1977 a, b; 1986). This is done by stressing continuous improvements on all three groups of aspects. As improvements of one group of aspect indirectly improve the other groups, continuous improvements on all three groups should take place. In cultures where the concept safety culture is not used an equivalent alternative is to work on continuous improvement of safe behaviour, behaviour for safety, safe artefacts, artefacts for safety and management’s perceived devotion to safety as outlined below.

The safety climate of an organisation (peoples’ perception of their company’s commitment to safety) is usually measured with questionnaires. In this case the questions, the items, are often grouped into aspects. The number of aspects varies between different authors. Sun et al (2009, nd) has in, what is interesting for a resilience safety culture, companion chapter introduced the Integrated Safety Culture Model (ISCM) with 20 indices. Using the Delphi method they also allocated weights to each index. In this section we shortly discuss Reason’s four subcultures (aspects) (Reason, 1997).

For several reasons ICAO, in its second version of its Safety Management Manual, avoid using the constructs ‘safety culture’ and ‘just culture’. Instead ICAO stresses the importance of an organisational culture that fosters safe practices and encourages the process of active and effective safety reporting, through whichever means or building blocks it might be achieved (ICAO, 2008, 2.8.37)

The definition of safety culture we have and how we define and work with resilience safety culture (and also just culture) is by no means in opposition with the organisational culture that ICAO is advocating.
Those who don’t want to use the concept “safety culture” may use the longer expression used in the ICAO safety management manual, 2nd ed. and cited above. Also, as indicated above, we think that those who want to avoid using the word culture can use the basic ideas of this chapter since the focus here is very much on the expressions of the culture in the form of behaviours at different levels of the organisation and on the artefacts in form of for instance the safety management manual, the man-machine system.

3.2 Reason’s approach

Reason (1997) stresses four aspects (or subcultures) of a safety culture. They are:

1. a learning culture,
2. a reporting culture,
3. a just culture, and
4. a flexible culture

Together they create an informed culture.

Figure 1 illustrates how these aspects are related to each other within a safety culture, leaving place also for other aspects of safety culture.

Reason’s approach is important in practice since it stresses continuous learning for safety. That means that behaviour (safe acts and acts for safety) and artefacts (safe artefacts and artefacts for safety) all the time is developing and adapting to changed circumstances towards a safer organization. Thus other aspects important for safety, e.g. the different indices introduced by Sun et al (2009), are targets for continuous improvements and thus implicitly included in Reason’s approach.

Figure 1. Safety culture and Reason’s subcultures.

Here follow descriptions of Reason’s subcultures with some elaborations on their use in resilience safety culture.
A learning culture. Concerning learning we stress organisational learning and organisational memory (Koornneef, 2000; Koornneef & Hale, 2004a, 2004b; Koornneef et al., 2008; Koornneef et al, 2009, nd) and learning from all relevant sources, such as accidents, incidents, other disturbances, observations of unsafe acts and unsafe conditions, flight data monitoring, internal and external safety audits, investigations, risk analyses and research. Also the importance of learning between flight operations and maintenance and shared learning between operators is stressed (Koornneef 2008; Ward, 2009, nd; Koornneef et al, 2009, nd). The last step in learning is implementation and use of improvements, a step that obviously closes the learning loop. This step should be stressed as an expression of the safety culture in any safety culture investigation and in improvement efforts.

What is learnt is of course important as well (Koornneef, 2004a). Thus the investigation processes for learning from incidents and accidents are important. Proactivity and a systems perspective in learning is at focus, meaning an emphasis on an active search for system weaknesses, i.e. latent conditions and insufficient barriers including gaps between espoused theories and theories-in-use (Argyris & Schön, 1974, Koornneef 2004a). For a more thorough description of organisational learning, see the chapter on organisational learning in this book series by Koornneef et al (2009, nd).

For analysis good reporting is needed. Thus a good reporting culture is needed and in Figure 1 we have described the reporting culture as a subculture to a learning culture since learning from e.g. incidents can’t be good without good reporting.

A reporting culture. A reporting culture includes a just culture – see below – and expresses itself mainly as creating good reporting of incidents and near incidents regarding both quantity and quality of reports. It is also expressed as willingness to report by all employees and as ability of the organisation to bring about

1. a just culture
2. motivation for reporting
3. user-friendly forms for reporting (templates)
4. good training and instructions for reporting with usable content
5. feedback to those reporting, showing
   a. that reports are used for improvement and how they are used
   b. appreciation to groups with good reporting
6. a regular follow-up by management that reporting is functioning

In aircraft maintenance in particular voluntary reporting on errors or mistakes made has always been problematic. At a recent meeting labelled Europe’s First Annual Error Management Best Practice Symposium held in London Gatwick, November 4-5, 2008, a number of organisations were of the opinion that a successful error management system will generate one or two internal reports per person per annum and this includes near misses and issues that overlap into the Health and Safety arena. Maintenance tends to suffer from a much lower voluntary error reporting culture than flight operations (Nisula & Ward, 2008). Part of this issue can be explained in terms of a continued reliance on error theories in maintenance to
explain accidents and a slow movement towards a just culture. For flight operators problems are more on how to efficiently manage the large amount of incident reports.

A just culture. Many large accidents, e.g. Three Mile Island, have been preceded by incidents with identical causes so accidents could have been avoided if the lessons had been learnt. Often learning from incidents is blocked because a person, who made a mistake being the immediate ‘cause’ of the incident, doesn’t report because he or she doesn’t want to take the risk of being blamed or mistreated in any way. Since it is much more important to prevent accidents than to punish somebody – often unfairly considering that people most often want to do a good job, and that it is human to err – for an incident that may contain key information for prevention, a ‘no-blame’ culture has been argued for to improve reporting. In a survey of 53 European aviation organisations most organisations admitted to still having to work on the ‘no-blame’ aspects of a just culture in relation to mistakes made (Ward, 2008).

A just culture in an organisation is a culture where nobody in the organisation is punished or mistreated in any way for actions, omissions or decisions taken by him/her that are commensurate with his/her experience and training taking the context of the action into consideration. However, gross negligence, wilful violations and destructive acts are not tolerated.

This definition leaves, however, a grey zone between what is culpable and not. In order to enhance the willingness to report the procedure for drawing the line between what is culpable and not is important. Trust is crucial. Thus it should be explicit to each person who exactly is drawing the line (Dekker, 2007, p 84). Furthermore special actions should be taken in order to protect the reporter’s identity and to keep sensitive information to a small group. It may be wise to exclude managers from this small group in order to avoid unconscious mistreatment. In any instance where sensitive information reaches managers they must be committed not to misuse it, and be explicit so the operators perceive they can trust management in this matter. When applicable an agreement between the organisation and relevant Union(s) should be signed clarifying procedures and actors.

For a just culture it is important that everybody understands that ‘to err is human’. We need to move beyond this being only our ‘espoused theory’ (what we say and write) to also being our ‘theory in use’ (what we do).

A flexible culture. Reason has also included ‘a flexible culture’ as an important subculture. Flexibility here involves shifting from the bureaucratic mode to a mode where skills, knowledge and abilities determine who takes the lead or performs a task in difficult situations such as emergencies and shifting back again when the problems are resolved.

3.3 A framework for development and maturation of safety culture

Parker, Lawrie & Hudson (2006) have developed a framework for development and maturation of organisational safety culture. The framework is based on Westrum’s classification of culture based on how safety-related information is handled (Westrum, 1992). Westrum’s levels of culture are: pathological, bureaucratic and generative, each shortly described. Parker et al. (2006) build on this, but use five levels: pathological, reactive, calculative, proactive and generative. They also extended the number of aspects to eighteen
(e.g. Incident and accident reporting, Investigation and analysis; Hazard and unsafe act reports; Contractor management; What are the rewards of good safety performance; Commitment level of workforce; and Level of care for colleagues). An organisation with a resilience safety culture can use it as a guideline for development of their safety culture and for following that development.

3.4 The role of management

There are many studies stressing the importance of safety-related attitudes and behaviour among management (e.g. Clarke, 1998; 1999; Flin, 2003; Griffits, 1985; Zohar, 1980). Particularly the perception by staff of management’s attitudes and behaviour is important (Clarke, 1998; 1999). An understanding, however, of the processes relating to management behaviours, their perception by the work-force and any resulting impact on work-force behaviours is rather less well established (Corrigan, 2002). What is obvious, however, is that management should be central to any efforts to improve the safety culture and to any efforts to maintain a good safety culture. A challenge for each organisation, especially its management, is to develop efficient practice for management so they are doing the right things right in safety matters considering their scarcity of time – a key issue for resilience safety culture.

3.5 Gaps between espoused theory and theory-in-use

A good safety culture should also express itself in an active search for gaps between what the managers and management system say or write (espoused theory) and what happens in practice (theory-in-use) and in decreasing these gaps.

4 RESILIENCE ENGINEERING

The concept ‘resilience engineering’ is in a phase of development as evident from recent conferences and books (Hollnagel et al., 2006, 2008). There is no single agreed upon definition of resilience used in the system safety context, but there are several variants. Here we cite a definition suggested by Wreathall (2006): “Resilience is the ability of an organisation (system) to keep, or recover quickly to, a stable state, allowing it to continue operations during and after a major mishap or in the presence of continuous significant stresses”. Resilience engineering then attempts to control processes in terms of safety, not only risks, and to keep the system within safety limits. If this fails then the objective is to control the system back to normal safe functions. In control theory terms this means to focus on feed forward control in addition to feedback control (e.g. learning from accidents and incidents).

An organisation having a resilience safety culture strives for resilience by adopting and developing resilience engineering tools.

For feed forward control of complex socio-technical systems, it is important to have a model of the key processes showing the expected behaviour of the total process when disturbed by internal and external variations. Within the HILAS project research on such
models has taken place. Key processes in maintenance and flight operations have been modelled using a tool developed in the TATEM and HILAS projects called the ‘Operational Process Model’ (Bunderath, McDonald, Grommes & Morrison, 2008; see also the chapter on process modelling in this book series). Other interesting models of complex socio-technical systems to learn from are STAMP (Systems-Theoretic Accident Model and Processes) by Leveson (2004) and FRAM (Functional Resonance Accident Model) by Hollnagel (2004) and further developed by Woltjer (2009).

Due to the current lack of a complete and functioning process model we focus on methods to anticipate, or to support the early detection of, stress on the system from external and internal variations. These methods could increase the level of safety significantly by supporting organisations in developing readiness to mitigate. In a following section examples are given on different kinds of stress that should be anticipated. Processes and units in the organisation should be implemented to catch information, analyse it and proactively counteract anticipated risks using models for how different stresses contribute to risks.

Ek and Arvidsson (2009) have a similar approach when developing a tool for proactive identification of factors that can affect safety in air traffic control, i.e. leading safety performance factors to be used for feed forward control.

An essential aspect of a system’s resilience is its enhanced sensitivity to detect weak surprise signals from operational performance data and trigger organisational learning (Weick & Sutcliffe, 2007).

5 SOME IDENTIFIED COMMON WEAKNESSES IN WORKING WITH RESILIENCE SAFETY CULTURE AND PROPOSED MITIGATION

In Table 1 some weaknesses in working with safety culture identified by the taskforce group as common and crucial for safety are listed. Some of them are further described below.

5.1 Focus on one aspect or subculture

In aviation often just culture is stressed very much. And justness is crucial for good reporting and therefore for learning from incidents. Also ‘just culture’ is often the weakest link in the ‘just culture - reporting culture - learning culture’ chain. Therefore ‘just culture’ should be of special concern. However, even if the safety experts in the organisation are fully aware of that justness only is a link there is a risk that so much focus is put on getting a just culture that reporting and learning is forgotten.

Another example on where an area of safety can be more or less forgotten is that work environment hazards are thrown into the shade of hazards for major accidents or vice versa. An example is the ESSO gas plant explosion, Longford, Australia, 1998, where a systematic
lack of attention to major hazards was found as a contributing cause (Hopkins, 2001). In the aviation sector there may be a risk that attention to work environment hazards is insufficient, which indirect also may be a risk for major accidents.

Table 1. Weaknesses in working with safety culture.

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<th>Common weaknesses</th>
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<td>Sometimes focus is only on one aspect, often just culture</td>
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<td>Low-score groups</td>
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<td>Low-score aspects or items</td>
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<td>Time-windows when forces towards the design envelope exceed the counter-forces</td>
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<td>Questionnaire results may be very much influenced by temporary stress on the</td>
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<td>organisation, e.g. ongoing conflict</td>
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<td>Long questionnaires, especially when competing with other questionnaires, may</td>
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<td>give low response rate and hasty answers</td>
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<td>The construct dilemmas</td>
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<tr>
<td>- Constructs may not be feasible with short questionnaires</td>
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<td>- Dimensions (constructs) may not correspond to characteristics suitable for</td>
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<tr>
<td>mitigation</td>
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<tr>
<td>- Items (questions), judged as important for safety may fit in more than one</td>
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<td>constructs or in none, are discarded</td>
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<td>Resilience aspects are not considered</td>
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<td>All management members are not recognising their key role for safety and safety</td>
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<td>culture. There could be lacks in commitment, competence and cognisance.</td>
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<tr>
<td>Gaps between what is said and written and what is practice</td>
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5.2 Hole in the culture 1 – low-score groups

Culture is the attitudes and values shared by everybody in the organisation (see definition of safety culture above). Many of the major accidents reported in literature have evolved from a poor safety culture embracing the whole or most of the organisation concerned, e.g. the Chernobyl disaster (IAEA, 1991), the Columbia accident (NASA, 2003), the Clapham Junction railway disaster (Hidden, 1989) and the Herald of Free Enterprise disaster (e.g. Kletz, 2001). However accidents could also have their origin in small subgroups not sharing the attitudes and values of the majority of employees in an organisation with an otherwise good safety culture. Such subgroups may not be detected from mean values from analysis of questionnaires. Not even standard deviations may reveal small subgroups. Outliers may be dangerous.

By analysing safety climate questionnaires to explicitly look for low-score subgroups, by explicitly looking for them in interviews and observations the probability of detecting low-score subgroups is increased. An adequate programme for fostering an improvement in the safety culture in such groups then has to be developed and applied. Also more proactive activities should be applied to prevent low-score subgroups manifesting itself in the first
instance such as stressing the requirement on safe behaviour in recruitment and selection, in job introduction training, in Ergonomic/Human Factor introduction training, in promotion, in annual performance appraisals and by clear signals from management. In a study in one HILAS organisation exploring ‘Risk in the Process’ the place where people felt ‘Ergonomics/Human Factors’ could best be addressed in their role was through their individual performance appraisal process (Lautier, 2009; cited in Ward, 2009, nd).

5.2 Hole in the culture 2 – low-score items and characteristics

Weaknesses in safety culture could express themselves in different ways. A safety culture questionnaire includes questions (items) often belonging to different aspects or dimensions (e.g. perceptions of management’s attitudes and behaviours in relation to safety, safety arrangements, procedures, training and work pressure). By looking for low-score items or low-score aspects in subgroups weaknesses could be identified. After a careful investigation of the reasons behind the low scores decisions about risk mitigation could be taken. Good questions and sense-making aspects may make risk mitigation easier and less expensive as they can be focused.

5.3 Hole in the culture 3 – time windows when forces towards the safety border may exceed the counter forces. Some resilience aspects.

Using Rasmussen’s design envelope metaphor (Rasmussen, 1997) safety culture can be seen as a counterforce against migration towards and beyond the limit for safe operation (see Figure 2).

![Figure 2. The design envelope. Forces changing work procedures or artefacts to make work more comfortable or more efficient mean that the working point of the system ‘S’ migrates towards the design envelope – the margin for safety. Counterforces, for example the safety culture, can counteract this migration. After Rasmussen (1997).](image-url)
Examples of centrifugal forces for migration could be targets for a higher efficiency or for making the job more comfortable. Therefore a company should have a good safety culture avoiding the system to migrate beyond the envelope – the margin for safety. However during extreme environmental stress on the organisation and its members the centrifugal forces could be very strong instantaneously. Also the motivation for safe work and work for safety could decrease drastically. Some proposals against this kind of threats are:

- Develop and sign agreements with employees and where applicable with unions stating that safety should not be compromised under any circumstances including e.g. strikes, lockouts and conflicting requests from either managers or employees. For example often maintenance staff can be ‘pushed’ to perform tasks without the proper safety equipment in place when the aircraft is due for immediate release to service.
- In line with the basic ideas behind resilience engineering develop skills for anticipation or early detection of internal or external stressors with the potential to compromise safety; for example using threat and error management techniques to anticipate potential threats (Helmreich, Klinect, & Wilhelm, 2001).
- Also in line with resilience engineering ideas develop routines for fast response counteracting the stress and its potential effects on safety.

For early anticipation of potential stress on the organisation the board, the management group and safety groups should as a regular action point in their meeting agendas discuss possible temporal threats. Depending on the fora they could for instance discuss the possibilities of and the necessary control of

- risks for conflicts between employer and employees, e.g. on salaries or on working conditions,
- foreseeable generation shifts on important posts,
- downsizing
- fast expansion, with the possibilities that key personnel would not have time for their ordinary safety critical tasks
- implementation of new technology or a new organisation

Also safety culture investigations could be performed several times per year in form of work-arounds, observations and interviews. Also short questionnaires could be used, e.g. once a year if given to the whole organisation. The investigations should include a focus on early detection of conflicts or other kinds of discontent in the organisation. Then questionnaire investigations given once a year are not sufficient. An alternative maybe to divide the employee in a number of groups (e.g. six) and give the questionnaires to the different groups evenly spread over the year.

It is essential that results are analysed promptly and that necessary precautions are taken in appropriate organisational units.
5.4 Traditional safety culture questionnaires may constitute a problem due to the number of questions

Traditional safety culture investigations often include questionnaires containing many questions, e.g. around 100 or more. Employees often do not like long questionnaires including complex questions. That may result in a low response rate and hasty answers making the investigation not so useful. Furthermore many person-hours are consumed by the employees making employers, but also employees, wonder if not time for safety could be spent more efficiently. Therefore shorter questionnaires complemented by interviews (around 25 easy to answer questions) and observations of behaviour and studies of artefacts are being trialled. Together these methods should reflect the safety culture as it is expressed in items and aspects judged as important for safety. A drawback from a scientific point of view is that the low number of questions does not allow the formation of several constructs. Instead focus needs to be on individual items sometimes pooled into aspects making sense in practice and for risk mitigation.

A problem noticed in questionnaire investigations on safety culture is that the result is very sensitive to ongoing or recent stress on the employees. It is therefore important to discuss the interpretation of the results in different groups, e.g. when giving feedback to employees.

6 MANAGEMENT’S ROLE – PARAMOUNT FOR SAFETY

In their review on safety culture Gadd and Collins (2002) conclude that management is the key influence of an organisation’s safety culture. They found that management’s attitudes and behaviour influence many aspects of safety behaviour including

1. The success of safety initiatives.
2. The reporting of near-miss occurrences, incidents and accidents.
3. Employees working safety
4. Employees taking work related risks.
5. Influencing production pressures.
6. The effectiveness and credibility of safety officers.
7. The effectiveness and credibility of safety committees.

In a resilience safety culture all these aspects are important. Thus for such a culture everybody in the management should recognise their role for safety. Commitment, competence and cognizance (called the cultural drivers by Reason (2008, p. 276)) should characterise top management’s efforts for safety.

Recognising the important role that management have, a course for management is under development. A first version is ready and under test within another sector. It is a four hour course and includes a self-test for managers to find out where they are on the scale pathologic to generative safety culture. Another self-test about the learning cycle from incidents works to stimulate thinking and discussions among managers and the lecturer.
content discussed with the managers includes background for a number of ‘commandments’ or ‘rule-of thumbs’ for managers such as:

- Show your devotion to safety in words and in your acts. Be proactive.
- Have a systems view
- Stress good communication – vertical and horizontal
- Involve employees in cost-benefit thinking. Give everybody a role in the work for safety.
- Make sure that everybody understands that it is human to err
- Beware of hindsight when investigating incidents and accidents and judging the human role
- Look for system weaknesses. Manage them.
- Create trust and keep it. One mistake may destroy it for a long time.
- Close gaps between prescribed routines and practice
- Beware of migration too close to and over the ‘safe-enough’-border of the design envelope
- Maintain learning loops
- Stress change management. Participation and feed-back is important
- Find and close ‘holes’ in the culture. Be mindful and anticipative.
- Consider safety, health and environment when contracting or co-operation with other organisations
- Consider safety, health and environment in recruiting and promoting

7 CONCLUSIONS

In this chapter we have pointed at some areas identified as important for safety and in particular for conceptualising and fostering resilience safety culture in organisations. Continuous improvement is an important concept in resilience safety culture and also for resilience safety culture itself. Thus also outlined in this chapter is a starting point for the continuous improvement of safety.

These areas have been identified and developed out of extensive literature reviews in the area and out of workshops held within a European airline and further out of ‘validation’ workshops held with a cross section of European aviation companies representing airlines, maintenance organisations, original equipment manufacturers and Ergonomic/Human Factors research institutes. These concepts included in resilience safety culture are still in development and for some of them tools are now in a trial phase for validation and further development (Stewart et al., 2009, nd).

The hope is that aviation service providers interested in improving their ‘organisational culture that fosters safe practices’ could pick up some of the ideas in this chapter and adapt them for their needs and visions.
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