

# 17.0 ORGANIZATIONAL CULTURE AND ITS AFFECT ON SAFETY

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## INTRODUCTION

The aviation industry, perhaps more than any other except the nuclear industry, has always expended considerable time, energy and resources in proactive measures to enhance operational safety. Throughout its history such efforts have resulted in a steadily improving industry safety record which have made traveling by aircraft the safest mode of transportation ever devised by mankind. The early beginnings of this journey were marked by many simple, seemingly obvious, changes which had a dramatic impact on the safety of flight. Improvement in aircraft design, standardized training, regulation, enhanced navigation systems, and the development and use of better materials and processes were a few of the fundamental changes which bore considerable fruit in the form of dramatic improvements in flight safety.

Like most endeavors focused on refinement, however, optimizing operational safety in aviation was much easier in the early stages of our industry's growth than it is today. Early efforts produced dramatic results and often were much simpler to identify and understand. The investment required by the industry was also much more modest; there was a much greater "bang for the buck." As high impact low investment problems were resolved, the industry found each generation of intervention to be increasingly more difficult to identify and implement. As anyone who has studied the logistical concepts of reliability or fault prediction knows, each iteration of improvement carries with it an exponential increase in difficulty and expense.

Lulled into a false sense of security by dramatic improvements in safety and a resultant low accident rate while at the same time faced with the exploding investments in time, energy, and money to further resolve safety issues, the industry has languished in relative complacency toward new safety initiatives. The industry seemed content in the fact that air travel is, by far, the safest form of transportation devised by man. The uncomfortable truth, however, is that, without further advances in the safety of flight operations, projected growth in airline travel will result in unacceptably high accidents within the next decade.

Projections of this nature have recently spurred the industry into frenzied activity to identify and address new safety initiatives. Areas previously deemed “safe enough” have now come under renewed scrutiny. The “big” or easy to resolve safety issues and those with potentials of producing dramatic safety gains have, for the most part, been resolved. Thus, as we toil in renewed efforts to improve aviation safety, we find today’s labors at improving operational safety to have become much harder, the tasks more complex. It seems that we are left with only hard questions.

## THE ISSUE OF SAFETY CULTURES

Historically, attempts at optimizing safety had most often stopped with an evaluation of the causal factor which was most apparent. The last link in the error chain. The Honorable Jim Hall, Chairman of the National Transportation Safety Board, recently cautioned that “the proximate cause is not the same as the probable cause; we must dig deeper to get to the true safety issues.”<sup>1</sup> The initial focus of safety initiatives on the machines of aviation resulted in dramatic improvements in aircraft design and technology. Aircraft design, technology, and mechanical failure soon faded as an important causal factor in aircraft accidents and incidents. Human errors rapidly replaced mechanical considerations as the principle causation of accidents. Focusing on the proximal human operator or technician soon became the primary locus of investigative scrutiny. Early research and efforts to determine and manage human errors focused almost exclusively on the actions of individual technicians. The analysis of individual human errors which were either causal or contributory to accidents or incidents soon revealed, however, that many of these errors were not isolated events with their origin rooted solely in intrinsic human failings. Instead, many were exogenous in nature and demonstrated that errors were often the result of forces or influential factors pervasive to the context of the work environment. At the very least, the work culture often blunted the individual’s safety focus and error control strategies. It soon became apparent that the most effective way to promote further advances in industry safety was to develop strategies whereby the work environment promoted optimal safety. To move aggressively toward a higher degree of safety within the aviation industry, therefore, research and intervention strategies must now turn to the “mechanism” of human enterprise, the cultural and interrelational aspects of the corporate workplace.

### What is a Workplace Culture?

Although many workers and managers resist recognizing it, work is a “social” event which takes place within the context of a corporate “societal” structure. Like any other social activity, the personalities, feelings, and actions of individuals in the aviation industry workplace are influenced by the contextual goals, expectations, constraints and influences imposed by the corporate structure. Issues such as corporate economic health, operational climate, rules, discipline, communication, personal freedom and power, and individual achievement and rewards influence worker behavior in much the same way that citizens are influenced by the social structure of a country or government. The honorable Jim Hall, [NTSB](#) Chairman, recently described corporate cultures as having as “its basic components...the beliefs held by workers and managers in an organization about the way operations ought to work. The practices and customs that have become the norm, and ...how these various factors are valued either positively or negatively.”<sup>1</sup>

Not unlike other cultures, workplace cultures are shaped by many factors. Rules and codes of conduct are one of the foundations defining an environment’s culture. Commonly shared beliefs such as moral and ethical values, work goals and performance expectations as well as normative expectancies about responsibilities, accountability, discipline and fairness are the bedrock of the societal context of a company. Just as in the cultures of countries and communities, these facets of social order are brought to life and framed in importance through interpretation and implementation by charismatic individuals. Many mistakenly assume that these influential people are those individuals given leadership authority by the corporate structure. Observations and studies performed by Purdue University researchers have demonstrated that the most influential and charismatic individuals in work cultures are not necessarily, and quite often not, the company’s managerial leaders.

## **Moving Toward Safety Cultures**

A contemporary theme in the aviation industry is that the corporate cultures of aviation organizations must become “safety cultures” if the industry is to successfully move toward a higher state of operational safety. Within such “safety cultures” the preeminent focus of the corporation is the optimization of safety at all levels, all of the time. As the central, core valuation of the organization, safety takes precedence over all other parameters in operational decision making within such cultures. Each employee, regardless of their position, job description, or task, exudes the belief that safety must be guarded above all else.

## **Safety Culture: Something an Organization “Is” or “Has”**

The development of safety cultures within the aviation industry seems to be stuck in the quagmire of misunderstanding as to what constitutes a “safety culture” and how best to develop an organization into one. There even seems to be a fatalistic belief among some that a “safety culture” is something that an organization “is” or is not. To these individuals, an organization has intrinsic attributes, one of which is its collective attitude about safety. The organization, therefore, is presumed to “develop” or mature with these intrinsic attributes and these individuals believe that little can be done to change these characteristics after the fact. Among these individuals, there is a pervading belief that an organization “either has it or it doesn’t” and it is futile to attempt to change an organization’s collective safety attitude. The rationale used by these individuals often centers around their belief that the organization’s safety attitude is comprised of the employees’ collective individual attitudes and beliefs tempered by the organization’s safety policies and procedures. They propose that changing the organization’s structure, policies, or procedures will do little to overcome the tremendous inertia represented by the employees’ collective beliefs. They seem also steadfast in their belief that changing enough individual attitudes to effectively change the momentum of the collective employee mindset is beyond the realm of possibility.

Equally disturbing are those who believe that a “safety culture” is simply something an organization “has” and that the organization can attain this status through the implementation of managerial edits and structural, policy, and procedural changes. Cultural experts suggest that considering a safety culture to be something that an organization has “emphasizes management’s power to change the culture through the introduction of new measures and practices.”<sup>3</sup> It is asserted that “because of the important role of practices in organizational cultures, the [‘has’ approach] can be considered as somewhat manageable.”<sup>6</sup> Considering the frustration many may feel at the prospects of trying to change the collective mindset of the organization’s employees as would be required for the “is” approach, it is not surprising that many, especially in management, have rushed to embrace this prospective. Unfortunately, a misunderstanding of the true nature of the problem has fostered a belief by some that all that is needed to move an organization toward being a safety culture is to proclaim such and to implement changes in policies and procedures which they deem will promote safe practices. While it is certainly true that “practices are features an organization has” and it is undeniable that corporate policies and operational practices play critical roles in fostering an environment conducive to the development of a safety culture, the simple implementation of these changes does not guarantee that a safety culture will emerge within the organization. Such a belief, however, ignores the fact that the proximate cause of human errors are individuals. Without addressing the need to elicit the active participation of the individual employee in the scheme for enacting safe work practices, the success of such an approach is doubtful. As the normal “agent” of errors, individual workers are a necessary facet of any successful strategy.

A safety culture exists only within an organization where each individual employee, regardless of their position, assumes an active role in error prevention. True safety cultures exist only in organizations which are populated by individuals who are continually vigilant for error potentials and seek to limit such opportunities full-time regardless of management leadership or operational or economic conditions. According to one of the world's leading authorities on human error management, "An ideal safety culture is the engine that continues to propel the system towards the goal of maximum safety... regardless of the leadership's personality or current commercial concerns."<sup>3</sup> As such, it is the development and embodiment of a collective work ethic supported by an organizational structure which aggressively pursues the optimization of employee and operational safety as one of its fundamental precepts of business.

Safety can be portrayed as a "living" facet of an organization which possesses a true safety culture. It pervades all aspects of the organization and its operation. It is aggressively pursued and promoted by every individual employee. Thus, it could be characterized as something the organization "is" since, as an organizational attribute, it will survive individual shortcomings in operational procedures or practices and/or worker vigilance or action. Even though, according to James Reason, "we must acknowledge the force of the argument asserting that a culture is something that an organization 'is' rather than something it 'has'" he goes on to declare that "if [an organization] is to achieve anything approaching a satisfactory 'is' state, it first has to 'have' the essential components."<sup>3</sup> We must, therefore develop a corporate structure and climate wherein safety will naturally actualize. An environment in which individual and collective efforts of employees will spontaneously foster optimal organizational safety. As Reason goes on to say, these procedural, policy, and structural changes "can be engineered...the rest is up to the organizational chemistry."<sup>3</sup> A true safety culture is, therefore, the amalgamation of effective safety planning, strategic changes to policy and procedural changes, and the development of a collective employee attitude which actively supports and pursues safety at all levels.

## ***Developing a Safety Culture***

If, as Reason suggests, corporations must first cultivate the correct climate for a safety culture to develop in, it is first necessary to provide the fundamental elements for the company to "have" a safety focus. Such cultures do not, however, spring to life simply at the declaration of corporate leaders. Nor do simple edits or mandates move a corporation toward a safety culture. Building a successful safety culture with lasting impact requires that considerable effort and expense be dedicated to the venture over a protracted period of time. Corporate cultures do not happen spontaneously but rather "emerge gradually from the persistent and successful application of practical and down-to-earth measures."<sup>3</sup> The implication is that movement toward a safety culture must be addressed as a "strategic" initiative of the company with all of the requisite requirements for the dedication of talent, time, resources, and longitudinal commitment as other strategic programs.

To be effective, a safety culture must be freely and enthusiastically embraced and supported by management and labor alike as a corporate way of life. Each must “see the culture as a global property that emerges out of the values, beliefs and ideologies of the entire membership of the organization.”<sup>3</sup> This type of commitment leaves no room for changes in the pre-eminent status of safety. Despite operational pressures and economic considerations, each employee must remain steadfast in their dedication to safety as the first priority.

Reaching this lofty goal is by no means easy. Most companies represent cultures which have considerable inertia. Overcoming years of established goals, beliefs and norms and realigning them to assume the new dynamics of a progressive safety culture will require considerable planning and dedicated implementation. As Hofstede suggests “Changing collective values of adult people in an intended direction is extremely difficult, if not impossible.”<sup>6</sup> As Carroll Suggs, CEO of Petroleum Helicopters, suggests “acquiring a safety culture is a process of collective learning.”<sup>3</sup> This is true not only for the working masses but also for management. The emphasis is on “collective” learning. If nothing else has been learned from the research at Purdue University, researchers have learned that many answers to critical safety questions are readily apparent to the employees who perform the day-to-day operations. Structuring an environment where management is willing and open to learning from their workers is crucial to promoting an effective safety culture. Such an environment “depends critically on respect – respect for the skills, experience, and abilities of the workforce and, most particularly, the first line supervisors.”<sup>3</sup>

## ***Characteristics of Safety Cultures***

While each individual company must find the correct “chemistry” to make the various attributions of a safety culture work, there are certain fundamental ingredients which must be involved in the safety culture equation. James Reason provided some much needed insight into the identities of these necessary elements in his recent presentation at the [NTSB](#) “Corporate Culture and Transportation Safety” conference. According to Reason, safety cultures must be “informed cultures” characterized by four important company attributions. Companies which possess a “good safety culture” are organizations which also have the characteristics of being a good reporting culture, a committed learning culture, an organizationally flexible culture and a just adjudicative and disciplinary culture.

## **An Informed Culture**

Reason suggests that an “Informed Culture” is “one in which those who manage and operate the system have current knowledge about human, technical, organizational and environmental factors that determine the safety of the system as a whole.”<sup>3</sup> The implication is that such cultures will have all of the requisite knowledge and information upon which to make informed decisions about safety issues. Central to such a culture is a thorough understanding by all employees, from the managers to the front line workers, of the importance of human error management and a generalized understanding of the human factors underlying the causation of errors. The understanding of human error, its types and causes is essential in order to cause all employees of the organization, from the highest manager to the front line worker, to recognize that human errors are an intrinsic part of being human. All organizations and individuals are susceptible to making them and, without proper error management techniques, they can lead irrevocably to undesirable outcomes. Only through such an understanding will all members of the organization develop a “state of intelligent and respectful wariness” which fosters the heightened state of vigilance for error potentials and dedication to performing safe acts which constitute the environment of a safety culture.

## [A Reporting Culture](#)

Keystone to the success of a safety culture is the effective gathering of information about the types and causes of human error which are prevalent in the organization. As Reason insists, such an organization will focus on “creating a safety information system that collects, analyses and disseminates information from incidents and near misses, as well as from regular proactive checks of the system’s vital signs.”<sup>3</sup> But the information system itself is not enough. For an organization to be a good safety culture, every individual must be supportive of the uninhibited collection of information about human error causation. This can only be accomplished when the information about such errors is gathered completely and honestly. Self-reporting is a necessary facet of such a culture since it is the only way to insure a complete and accurate representation of the true nature and context of the organization’s human error puzzle. For this reason, a reporting culture must be “a corporate climate in which people are prepared to report their errors and near misses.”<sup>3</sup> Since an accurate portrayal of human errors and their causes depends so heavily on honest reporting, the organization’s safety information system therefore “depends critically on the willing participation of the workforce, the people in direct contact with the hazard” to aggressively report safety issues.<sup>3</sup>

## [A Just Culture](#)

Implicit to the development of a safety culture is a system of just adjudication and discipline. A safety culture based on the need to divulge complete and honest error data depends fundamentally on the reporter’s trust that the organization will fairly evaluate the intent and actions of the erring individual and assess appropriate discipline. O’Leary and Chappell state, “For any incident reporting programme to be effective in uncovering the failures which contribute to an incident, it is paramount to earn the trust of the reporters...Trust is the most important foundation of a successful reporting programme.”<sup>7</sup>

To be effective and promote participatory error reporting, the organization must be dedicated to a system of unwavering consistency in the evaluation of causation and intent as well as the assignment of just discipline. When pursuing causation, the system must not only look beyond the most proximate individual in the event chain to exogenous actions or influences of the organization and/or other individuals but must also evaluate the evil intent or active negligence of the error perpetrator. The method by which the system performs these evaluations must be clear to all involved and must always be consistent in both evaluation and disciplinary action. If it deemed otherwise by workers, “A single case of a reporter being disciplined as the result of a report could undermine trust and stop the flow of useful reports.”<sup>7</sup>

The expressed need for a just culture has been misinterpreted by some to mean that the industry should seek a blameless reporting system. As Reason states emphatically, “A no-blame culture is neither feasible nor desirable...”<sup>3</sup> He goes on to say that a just culture is “an atmosphere of trust in which people are encouraged, even rewarded, for providing essential safety-related information ...but in which they are also clear about where the line must be drawn between acceptable and unacceptable behavior.”<sup>3</sup> Industry technicians have expressed repeatedly to Purdue University researchers that they want and feel that they need to be held accountable. Most suggest the use of systems similar to the “substitution test” proposed by Neil Johnston’s or another similar peer reviewed process as a fair system for assessing accountability. Reason describes the substitution test in the following way, “This [test] involves asking the individual’s peers the following questions: Given the circumstances that prevailed at the time, could you be sure that you would not have committed the same or similar type of unsafe act? If the answer is ‘no’ then blame is almost certainly inappropriate. The best people can make the worst mistakes.”<sup>3</sup>

## [A Learning Culture](#)

The single most important facet of a good safety culture is that it aggressively learns from its mistakes. Reason proposes that an organization is a good learning culture if they have “the willingness and the competence to draw the right conclusions from its safety information, and the will to implement major reforms when their need is indicated.”<sup>3</sup> The organization must be dedicated to ferreting out the answers to hard safety questions. To identifying human error causal factors wherever they occur and despite who influenced or perpetrated the error. Upper management must commit the resources necessary to effectively decipher the causes of error and to develop and implement appropriate intervention strategies to correct causal factors. In light of the significant investment required in time, effort and resources, to gather a comprehensive database of human error reports and the dire consequences of not remedying safety failings, one would presume that an organization would be committed to learning from its mistakes and implementing solutions based on that learning.

## [A Flexible Culture](#)

To become an effective safety culture, an organization must be flexible enough to modify its operational structure and procedures in order to accommodate changes dictated by the error data. Organizational rigidity will insure that nothing will change despite the enormous efforts and resources committed to collecting and analyzing human error data. It is possible that moving toward a safety culture will require a total rethinking of the structure and design of the organization. Jim Hall, Chairman of the [NTSB](#), indicates that safety investigators within his organization look critically at the structure of the organization after an accident. Highly hierarchical and authoritarian management structures often predispose the organization to rigidity when it comes to accommodating changes. Reason suggests that “shifting from the conventional hierarchical mode to a flatter professional structure, where control passes to experts on the spot, and then reverts back to the traditional bureaucratic mode once the emergency has passed.” May be a more appropriate model.<sup>3</sup> Regardless of the organizational structure, it is imperative that it be sufficiently flexible to accommodate the changes necessary to implement effective safety solutions.

### ***Safety is a Shared Responsibility***

Previous safety refinement efforts have significantly limited design and technology causal factors of aviation accidents, leaving human error as the most prevalent contributor to incident and accident generation. It is estimated that in excess of 80% of the aircraft industry’s incidents and accidents have as their root cause some form of human error. Organizational safety, therefore, be it viewed from the employee injury or product perspective, has as its quintessential center human error management. Human error management is a collective effort. It cannot be mandated by management or government, engineered out of existence by fleet engineering, nor totally prevented by the most proximate individual in operational chain of events. It takes the collective efforts of all members of an organization to successfully manage human errors. Human errors do not occur in a void, they occur within the operational and cultural environment of the organization. Just as the organization’s operational performance is the collective effort of all employees, so too is safety and error management.

### **Management’s Safety Role**

It has long been recognized that management plays a critical role in promoting company environments in which there is a greater or lesser commitment to safety. Case studies of industrial accidents in all types of business contexts have implicated managerial involvement in human error caused accidents and incidents. The National Transportation Safety Board (NTSB) and aviation accident and safety investigators have long recognized that the aviation industry is not immune to the influences of corporate cultures and managers whose primary focus is other than safety.<sup>8</sup>

Chairman Jim Hall recently stated that when performing accident investigations, the [NTSB](#) looks at management practices, policies and attitudes as potential influences on the generation of errors. He goes on to say that “flags” the NTSB uses to “recognize potentially unsafe cultures” include such things as “management thinking and practices that are antagonistic or indifferent toward their employees in safety sensitive jobs”. Another sure indicator of a poor safety climate within a company is when the “organization’s practices... vary from the accepted standards found in the industry.”<sup>1</sup> This is often indicated when “it is determined that an employee’s operating performance conform to carrier procedures or reflect the accepted values and attitudes found in the carrier and an unsafe situation still occurred.”<sup>1</sup>

To correct such a climate, management changes are not enough. Instead, “we must understand that the best management in the world cannot overcome the influences of a corporate culture that is bent on emphasizing other attributes over safety.”<sup>1</sup> It must be remembered that “companies can, through their actions, communicate to their employees an attitude that subsequently influences the degree to which employees comply with operating rules and with safe operating practices”<sup>1</sup> For this reason, it is an imperative that management take proactive measures to design, implement and nurture an environment which actively promotes safety in a consistent manner at all levels and at all times. Instilling all employees with a “collective mindset” centered around a “safety first and always” corporate lifestyle is the single most important contribution managers can make to developing an effective safety culture.

To be effective, these efforts must be highly visible to all employees. There must be a demonstrated commitment, both organizationally and personally, by the highest levels of management in order for the safety message to be unequivocal. Management must be totally and unwaveringly committed to providing the impetus, direction, and resources for the implementation of safety initiatives.

### [Individual Employee’s Safety Role](#)

The individual employee, especially the frontline worker, must be the vanguard of safety for an organization. It is widely recognized that human errors may originate at any level within an organization and may be rooted in company procedures, policies, or other factors. Despite the fact that many individuals other than those in proximate positions may be the origin of the error chain, the fact remains that the vast majority of the time the frontline worker represents the last possibility for recognizing the error and preventing it from becoming an event. For this reason, it is imperative that organizations instill in all employees the understanding that they are critical players in error management.

Preparing individual workers to assume the role of safety vanguard is a potentially difficult proposition. Workers must first recognize their critical role in the process of organizational safety and error management. This is a necessary precursor to the internalization of their role as active error inhibitors and leads to the pivotal dedication and motivation which are keystones to their success as safety advocates. In order to reach a state of mind which allows for the internalization process to occur, workers must first be made aware of what human errors are, how they are generated, how errors can be prevented, and how they, as individual workers, can play an important role in accident prevention. Only then will workers relinquish their reliance on the organization and others to maintain safety in the workplace.

Workers will be receptive to acquiring the tools to assume these duties once they perceive themselves in the role of safety advocate and guardian against error generation and propagation. Building on their basic understanding of the nature and types of human error, they will learn to become sensitive to error potentials and actively vigilant for existing errors as they perform their duties.

### **Unity and Clarity of Focus on Safety**

Of paramount importance in developing a safety culture is the need for the organization to foster a highly visible, strongly supported, and unified corporate safety initiative. This requires the establishment of clearly defined and communicated safety goals. It requires the unwavering dedication of adequate effort and resources to support the safety initiatives throughout all levels of the organization. Perhaps most critically, it requires that all employees, from the highest levels of management down through the frontline worker, have a fervent belief in and an exhibited dedication to safety first and always.

The identification of safety as one of the guiding principles of the organization is critical to establishing an effective safety culture. Declaring clearly and emphatically the message that safety is the primary concern in all operational matters sends an unambiguous mandate to all workers that safety is not to be compromised for any reason. Experts suggest that organizations cannot develop a true safety culture without this clear message that safety is the organization's pre-emanate concern. James Reason relates that in organizations with strong safety cultures, "people way down the line know what they are supposed to do in most situations because the handful of guiding values is crystal clear."<sup>5</sup> Defining these safety goals in clear and simple terms allows no opportunity for "interpretation" and supports a uniformity of treatment at all levels by everyone concerned. As Reason states, "a strong [safety] culture is one in which all levels of the organization share the same goals and values."<sup>3</sup> This is a critical facet of the safety culture since, as NTSB Chairman Hall puts it, "It takes the full cooperation and dedication of every level in an organization to produce an atmosphere where safety is given pre-eminent status in a corporation's strategic planning"<sup>1</sup>

### **Issues Inhibiting Safety Cultures in the Aviation Industry**

Research studies at Purdue University at numerous organizations and in various sectors of the aviation industry have determined that a myriad of forces are at work which support and inhibit the development of safety cultures in today's aviation workplace. Moving large corporations toward a pervasive safety focus among all employees is a formidable task which requires considerable time, effort, and resources. Overcoming the inertia of a large workforce populated by individuals from various backgrounds, each with differing views on the importance of safety and understandings on how to effectively control human errors, approaches the impossible. It certainly is not an easy, low-cost, or short-term venture. Just as moving a corporation toward compliance with a major initiative like the quality program [ISO 9000](#), moving the corporation toward an effective safety culture will require a total rethinking of the business philosophy, goals, organizational structure, and operational priorities of the company. Unfortunately, most aviation concerns are attempting to resolve this critical issue by issuing edicts, enacting one-time programs, or simply publishing motivational posters. In all but a few cases, there seems to be a lack of long-term commitment to make it happen as most organizations labor under the impression that a "band aid" is needed when, in reality, major reconstructive surgery must be undertaken to place the organization on the road to recovery.

Over the last several years, researchers at Purdue University have participated in a large number of research studies with various aviation organizations from a diverse segment of the aviation industry. These studies have provided valuable insight into why many organizations are resistant to movement toward the establishment of safety cultures. Throughout the research, a generalized and pervasive theme concerning factors inhibiting safety culture formation was noted regardless of the size or nature of the organization's aviation commerce. Many of the same factors were prevalent among various air carriers and even in other segments of the industry such as manufacturing, corporate operations, and even large general aviation concerns. The research referred to in this article encompasses a broad range of methodology, including extensive research observations, surveys, and interviews, and involves a diversity of organizational types and sizes. Due to the sensitivity of the research, names of the organizations and the number and nature of their aviation business are revealed. Instead, the research is referred to as an aggregate and is referred to in general terms as the Purdue research. Due to the pervasiveness of the issues, readers may be tempted to interpret the material as centering around their organization or feel that they know what organization is being represented by the article. This would be a misrepresentation of the facts as the article represents no one specific organization but rather the generalized state of the industry at large.

## ***Corporate Cultures Verses Work Cultures***

One issue which is prevalent among many organizations is the belief that establishing a “corporate culture” which espouses and promotes safety is sufficient to move workers to a greater safety focus and a generalized reduction in error generation. The expectation in these organizations is that simply establishing a corporate culture which declares safety as a central focus and structuring a climate which responds to safety concerns will insure a change at all levels and result in a replication of these precepts throughout the organization. Such misunderstandings seem rooted in confusion of the difference between corporate cultures and work cultures. This perception by the researchers was supported by conversations with managers who portrayed an expectancy that establishing safety as a corporate goal and structuring safety training, programs, and initiatives would result in a corporate culture shift which would permeate the organization. They fully believed that the concepts would reach all levels of the organization and be embraced and supported by every worker.

It was the researchers’ observation that in many cases, the corporate safety initiatives were lost as they filtered down through middle management. In numerous cases, frontline workers received mixed signals and confusing messages. The corporate “safety goals” were brought to their attention but localized operational pressures and attitudes sent a clear message that “nothing has changed.” Many workers viewed corporate safety initiatives as another “flavor of the month” program that would soon fade into oblivion.

Organizational initiatives within these companies seemed to be predicated on upper management’s belief that changing the corporate culture would change the culture at the most remote level of the business. Their failure to differentiate between the true nature of a “corporate culture” as opposed to the localized “work culture” appeared to be central to this misunderstanding.

Perhaps the best way to portray the difference between corporate cultures and work cultures is to use the analogy of the game of football. In the game of football, the conference or league sets the dimensions of the field of play, the boundaries, goals, field markers and the rules of the game. This is not unlike the “goals”, procedures, rules, and expectations set out by corporations as they establish the character of their corporate culture. Much like the game of football, however, this does not insure a winning team or that the game will be played as expected. How the game is played is left to the coaches and the individual players. The individual football team, much like the local workers of the work culture, will have a collective perception of the importance of certain rules and a collective view of sportsmanship (ethical values). Much of their performance depends on shared beliefs, expectations, and team play. In the same fashion as coaches and team captains, local managers and charismatic workers determine the actual nature of the local work culture. In order to actually having a winning (safety) team, it is imperative that these local influences provide the proper interpretation of the operating procedures and actively pursue the corporate safety initiatives.

In larger organizations, Purdue researchers often noted a wide diversity in the local work cultures and their emphasis on safety between the various stations of the company. In many instances, marked differences were even noted at various locations or on different shifts at the same station. This finding sends the clear message that safety cultures cannot be a corporate level initiative only. Instead, it must represent values and actions which are fostered and supported at the most proximate level. The research performed at Purdue strongly suggests that localized influences can either reinforce or defeat the best corporate safety initiatives. The actual manifestation of safety in a work environment is directly related to the value and emphasis ascribed to safety initiatives by frontline managers and charismatic workers.

## **The Industry as a Reporting Culture**

As Reason states, one of the foundations of a true safety culture is that it is a reporting culture. To move toward zero errors in any environment, it is first necessary to identify and understand the nature and causation of errors prevalent within the context of that specific environment. The systematic identification, classification, and evaluation of the human errors leading to incidents and accidents is a keystone to understanding the true causes of errors. Without the venue of a robust data set rich in both error type and context, safety researchers and practitioners are deprived of the critical information from which they can glean the true nature and causation of maintenance errors. Any prospects of moving toward a safety culture, either industrial or organizational, must first begin with the careful structuring, comprehensive implementation, and critical evaluation of a historic database of maintenance error events. Due to the relative rarity, latent nature, and diversity of maintenance error incidents, true understanding can be realized only through the review of a large number of events. Therefore, the rapidity with which the industry, and even more specifically individual companies, can reach a state of understanding necessary to formulate effective error control methodologies is dependent upon devising a system for collecting large amounts of maintenance error data without exposing the industry or individual companies to significant risk.

Efforts to move the aviation industry toward a better understanding of the causes of maintenance errors have been stymied by the lack of a comprehensive and telling database of error case histories. Repeated attempts to implement various industry-wide data base schemes have been neutered by several forces. Fundamental to the repeated failure to establish a comprehensive maintenance error data set is the lack of a mutually agreed upon classification scheme (taxonomy) for the causal events leading to maintenance errors. It is incumbent upon safety researchers and practitioners to help guide the industry toward a pragmatic way to classify and evaluate error data so that its evaluation will illuminate the causes of maintenance errors and lead directly to effective intervention strategies to control or eliminate these errors. While this is a formidable undertaking, it is, none the less, a necessary first step toward effective error management. Developing and implementing efficient and effective intervention strategies will prove to be elusive without this pivotal precursory step.

From the perspective of formulating a comprehensive and discerning data set of maintenance error causes, it is generally agreed that the number and diversity of such events within most companies is sufficiently rarified to make meaningful interpretation a long-term venture. To move the industry toward a more timely and meaningful resolution, numerous safety advocates are encouraging the establishment of an industry-wide error database of shared information between companies. The larger event pool and the richness of both error type and context afforded by such a strategy promises to provide a more effective means for isolating, identifying, and classifying error causation so that maintenance error management strategies may be contemplated.

The prospects of an industry-wide database are troubling to many company managers. In the highly competitive environment of the airline industry, concerns about the potential that such information could be used to leverage a market advantage is viewed as having ominous potentials. In the United States, companies have expanded concerns. The litigious implications of collecting historic data on maintenance errors seems insurmountable to many industry leaders. The potential that such data could be used in tort cases to implicate the carrier causes many managers to be resistant or even openly antagonistic toward the concept of sharing error data. Another apparent concern is that of loss of public image and trust at the hands of what some consider to be a hyperactive media bent on sensationalist portrayal of highly rarified events. The assertion by some that the collection of maintenance error data would cause a “feeding frenzy” among sensationalistic media mongers is hard to dispel considering the demonstrated propensity by some media factions to focus on isolated, sometimes unrelated facts when presenting a story line. Considering the public’s interest and sensitivity to media releases with regard to air travel safety, this is an argument which must be carefully considered during movement toward an industry-wide collection of data. In terms of establishing an industry-wide error database, the pivotal question seems to be finding a way to maintain the confidentiality of such information. Companies in the United States are especially concerned since discoverability of such information under the Freedom of Information Act (FOIA) is a very real and ominous probability.

Resistant to becoming involved in an industry-wide effort to collect and analyze maintenance error data, many companies have attempted to design and implement internal databases of error events. It has been our researchers’ experience that in the vast majority of cases, these database have centered around the simple accumulation of incident reports whose structures are founded on little or no intrinsic analysis algorithm for ferreting out error causation. Attempts at data analysis during industry research partnerships with numerous companies have forced Purdue researchers to conclude that, despite the best intentions of these company efforts, the robustness and accuracy of these data sets leaves much to be desired. In fairness to the companies, however, it is very difficult to structure an effective data collection and analysis tool when no error taxonomy, hierarchy, or cause and effect relationships have been defined and generally agreed upon for maintenance errors. These resulting attempts at data collection were subsequently generally diffused in their focus, simplistic in analysis, and reactionary in their application. In addition, it was not uncommon to find that organizations were accruing data but had never attempted to analyze it. The vast majority of data rendering by companies was summative in nature and generally the simple relating of numbers of accidents and incidents with little definition of human factor implications. Most commonly, the organizations had made no attempt to normalize the data or perform a trend analysis to gain insight into the transitional state of human errors within the

organization. Poorly designed data collection techniques centered around incomplete or inaccurate metrics coupled with poor or incomplete tracking procedures resulting in little insight regarding the rate of error generation or the nature or causes of the errors being committed.

Another important facet of a good reporting culture is the free and uninhibited reporting of safety issues that come to the attention of workers during the course of their daily activities. Research at Purdue indicated that technicians are generally reluctant to report safety issues or to make safety recommendations. Many organizations we visited had established safety reporting programs whereby technicians could report safety concerns or raise safety related issues. Technicians reported that they did not use the system and most often reported the reason to be that they “never heard anything back about the report” or “no one listens to me anyway.” One worker jokingly reported that “the janitors empty the box once a month and throw the suggestions away.” This futility seemed to be rooted in the fact that most programs did not have any structured feedback systems to inform the worker that the suggestion or concern had been reviewed and of the final disposition of the suggestion or concern. When it came to reporting errors or safety infractions, workers reported that they seldom reported the issues and related that this was most often due to their concerns about the possibility of punitive action against them.

## **The Industry as a Fair Culture**

As Reason points out, one of the principle ingredients of a successful safety culture is the fair evaluation of events leading to rule infractions, incidents, or accidents and the just administration of discipline when things go wrong. There exists a general perception among aviation workers in various career fields that much of the evaluation and subsequent discipline meted out for such events lacks fairness of treatment and that penalties are often not suitable or proper in their nature. This is especially true of their feelings about company imposed sanctions. It is often reported by employees that they feel managers and companies are more interested in assigning blame and making an example out of proximal individuals rather than finding the true cause of the event. Researchers have witnessed numerous cases where individuals were assessed sanctions for events which involved component design, procedural, or other causal factors which produced an environment or conditions which predisposed the technician to execute an error. In one particular case, a design flaw of a certain component caused repeated errors being committed by technicians during the component’s installation. The practice of assessing blame to the proximate individual, in this case the erring technician, resulted in numerous technicians with outstanding safety records being blamed and punished for an exogenous causal factor. Because the “true” cause, the defective design, is being ignored, the likelihood that this error will continued to plague the aircraft’s operators is great. Only through addressing the actual cause of the problem and redesigning the part will we be able to eliminate this error potential.

Also expressed to the researchers during the study was the concern that employees felt management avoided taking ownership of errors they were responsible for causing. Several expressed the feeling that the reason some managers were so quick to place blame on workers was to avoid their own implication or that of the system. This should not be construed to imply that workers did not feel that they should be held accountable because that was not the case. If workers were truly responsible for making an error, researchers found that they reported strong feelings of guilt. In discussions with technicians, it was often expressed that they felt they should be held accountable for their actions and, indeed, wanted to be. They expressed the general belief, however, that the current system was often unfair in its evaluation and harsh in its discipline.

## **The Industry as a Learning Culture**

Historically, the aviation industry has generally been an effective learning culture. Throughout its history, aircraft designs have been steadily improved through the critical evaluation of accidents and incidents. One needs look no further than the industry's Airworthiness Directive and Service Bulletin system for proof of that fact. It is also true that systematic assessment of flight crew performance and accidents involving flight crew errors has led to numerous improvements in flight deck design and crew training. This even holds true for flight crew human factors issues such as those that lead to the development of Crew Resource Management and Line Oriented Flight Training programs. Unfortunately, the industry has struggled with identifying and structuring similar efforts in other aviation fields, particularly maintenance. This failing is due, for the most part, to the lack of dedication of resources to the tasks of identifying causal factors leading to maintenance errors and the structuring of effective intervention strategies. In fairness, however, the effort is still quite young.

There seems to be a generalized reluctance, however, on the part of governmental agencies and companies alike, to dedicate resources and effort on the magnitude of those spent on design and flight crew issues when the questions revolve around maintenance. Perhaps this is due, at least in part, to the historically low rate of maintenance involvement as a causal factor in aircraft accidents and incidents. As an industry, we must, however, renew our efforts to provide the resources and energy which are required to identify and control maintenance errors lest they assume a new magnitude of contribution. Without finding the resources to ferret out the causal factors of maintenance human error, such errors will, no doubt, become a significant issue early in the next century.

Much could be done, however, by individual companies to promote learning from errors and safety breaches. Organizations wishing to foster a safety culture must develop a proactive and aggressive system of learning from its mistakes. Repeatedly throughout the research, it was noted that many organizations fail to provide effective feedback to frontline workers regarding maintenance errors or safety infractions. It was also noted that mechanics also felt that they had little in the form of performance metrics which would inform them of their individual level of performance. Many mechanics reported that safety briefings occurred only on an infrequent and irregular basis and normally lacked substance or specific examples. It was also noted that maintenance stations generally lacked an effective means for forwarding safety information. The most common method used for conveying safety information in the workplace was through the use of safety bulletins which were posted on a central display board. Mechanics related to researchers that they felt the use of bulletin boards and company mail for relating safety issues to be highly ineffective methods of distributing safety information.

## **Management's Safety Role**

There is no doubt that management's role is a difficult and critical one during the transitional period of developing a safety culture. Management must provide adequate resources to meet the needs of the developing culture and provide consistent and unwavering support for safety initiatives.

Research at Purdue suggests that workers perceive management to be less than dedicated to the formation of a true safety culture. Many expressed the concern that management valued operational concerns over safety. They felt that this resulted in operational pressure to meet departures at the expense of safety. It was the observation of the researchers that this perception was generally not founded in the expressed edicts or actions of management and was, instead, often self-imposed by the worker. Regardless, the perception was pervasive among workers. This would indicate an apparent need for managers to send a clear and unambiguous message to the workers that safety was the primary concern and was not to be compromised for operational performance.

A common theme among maintenance technicians is that they generally feel that they are not respected or appreciated and that their contribution to safety and operational performance is undervalued. It is not surprising that researchers found the greatest dedication to safety and operational performance at those facilities where technicians enjoyed the respect and appreciation of their immediate managers. This fostered an environment of trust and resulted in good working relationships which promoted effective and efficient work efforts toward collective goals.

Probably the most important contribution management can make toward developing a safety culture is that of providing the leadership and resources necessary to promote a unified commitment to safety. In many arenas, researchers found sporadic and often inadequate commitment of resources to the development of safety initiatives. It was common to witness dramatic swings in commitment of resources during changing operational conditions or periods of economic stress. While it is understandable that corporate resources must be routed to the point of greatest need, the message received by workers is that safety is an important goal of the organization only when things are going well. For safety programs to be genuinely effective, management must be committed to providing adequate, consistent, and unwavering leadership, energy, and resources to the development and implementation of safety initiatives.

## ***Unity and Clarity of Safety Focus***

Purdue University research observations suggest that perhaps the single most prominent barrier to the development of safety cultures in today's aviation industry is the failure of many organizations to promote highly visible, clearly defined and obviously supported safety goals. As a result, studies indicate that the focus on safety during work activities is dramatically mixed. Workers generally perceived that safety was "important as long as it did not interfere with operational performance." Many also related their belief that "upper management is promoting safety but they really aren't committed to providing the resources necessary to make it happen." It was often portrayed to researchers that the new safety initiatives were just another "flavor of the month" and would soon fade like all of the previous programs and initiatives.

In many cases, researchers found genuine support and commitment to safety at the upper levels of the organization's management structure. In a large number of organizations, upper level managers sincerely believed that safety must be improved and were committed to moving the organization toward safety cultures. However, as any other initiative or program is, the mechanics of making safety "happen" in the organization was handed down to middle management. With little guidance or insight into how to design, implement, or resource the initiative, middle management often failed to move the company any closer toward the development of safety cultures. Thus the safety commitment and support is often lost as it filters down through middle management.

To maintain a dedication to safety at all levels, it is imperative that the statement of clear, concise, and unambiguous safety goals be communicated to all employees. This message should be initiated by the highest level manager of the organization and be reinforced by all lower managers. Every individual employee should perceive these goals as, in Jim Hall's words, "guiding values" which are "crystal clear." Only through establishing these goals as uncompromisable and unquestionable guiding principles of the company can we build an environment in which "people way down the line know what they are supposed to do in most situations because the handful of guiding values is crystal clear."<sup>5</sup>

## ***Operating Procedures Training***

It was observed throughout the research at numerous locations that much of the training employees receive regarding operational procedures was provided through “on the job training”. Further investigation revealed that in many instances, this type of training did not involve the use of designated trainers or a standardized training curriculum. Instead, much of this experiential training was accomplished by pairing the trainee with another, more experienced technician who was perceived to be accomplished at the task. Without specific training for the [OJT](#) mentors or training material guidelines, these experiences provide less than the desired results. Trainers often reported that they had forgotten to cover some of the material. In several instances, trainers were overheard making comments like “this is what the procedures say to do, but this is the way we do it here.” The net effect of utilizing unstructured OJT training is that new personnel are trained inconsistently in operational procedures and “norms” become institutionalized. Without a set training curriculum, critical information is lost when the trainer fails to remember to include the material during the training experience. If the individual being trained is later designated as a trainer for someone else, the likelihood that this information will be conveyed to future trainees is remote. It was even reported to researchers by technicians that they had occasionally been signed-off as having received training for which they had received only partial or, in some cases, no training at all. It is an important commitment to safety for management to insure that operational and safety training experiences are effectively structured, uniformly administered, and provided adequate resources to provide adequate training experiences for inexperienced workers.

### **Selecting Safety Advocates**

In an effort to promote greater safety in the workplace, many organizations have instituted some form of a safety advocacy program. As a part of this type of program, many organizations have designated local “safety representatives” or advocates to facilitate local safety initiatives and monitor conditions and safety concerns. In the vast majority of cases, the number and distribution of these individuals is inadequate to properly support the development of local safety cultures. Many stations had only one safety representative to support the entire maintenance staff at each specific maintenance location. Survey results indicated that these representatives were deemed as “important” and “effective” by workers on the day shift at most locations. Respondent technicians also reported that they “frequently” observed safety representatives performing their duties and felt that they were making an important contribution to station safety. Not surprisingly, however, “swing” and midnight shift workers reported that they seldom, if ever, saw safety representatives and felt that they were ineffective at promoting safety in the workplace. To promote a safe work culture on every shift, it is necessary to structure a system of safety advocacy which has representation every working day and across all shifts in order to demonstrate management’s commitment to a safe work environment.

Another problem was apparent in the way that safety representatives were selected. Researchers noted a vast difference in safety focus and the perceived importance of safety among various stations. In an effort to identify why such differences existed, researchers evaluated the structure, initiatives, implementation, and advocates at each of the numerous stations. It was determined that the wide disparity in perception and outcomes was not a result of the minor differences which existed between the programs' structures, initiatives, or implementations. Rather, the differences seemed to be related to "who" was selected to be the safety advocate.

Organizations appeared to select safety advocates in one of two different ways. At some locations, the most effective and respected maintenance technicians were asked to be the safety advocates for the station. It was observed that these locations had a much better safety focus and the safety initiatives were deemed to be highly successful. By comparison, other locations assigned the safety advocate positions to technicians who were ineffective in their maintenance positions or who didn't get along well with others in the work environment. The premise seemed to be that these "misfits" were not productive as mechanics, so why not put them in a position where they were not responsible for operational performance. The problem with this strategy is that it sends the message that "safety is not important.... look who management assigned to the safety position." To provide optimal support for such advocacy programs, management must carefully consider who it selects for the advocate positions. Selecting highly effective and respected technicians for such positions demonstrates management's commitment to safety and promotes "buy-in" from the other technicians.

## **Individual's Safety Role**

There is much that the individual worker can and should do to promote an environment which actively resists error generation. Maintaining a constant vigilance for error potentials and utilizing all available resources for human error management are among some of the rudimentary activities which individual workers can do which will significantly contribute to the reduction of maintenance errors as well as a safer workplace.

## **Resisting Complacency**

Studies at Purdue University uncovered a convoluted commitment to safety by individual workers. The vast majority of workers observed in the field maintain an ardent commitment to "flight" safety. Maintaining and protecting the integrity of the aircraft was the center of their universe. These same individuals, however, demonstrated a very low regard for protecting their own or other worker's safety from injury and gave little priority to the damage and destruction of ground service equipment, tools, and fixtures. On the one hand, they were very concerned about the aircraft and its operational safety. This heightened state of concern seemed to be equally matched with a much lower regard for issues not related to aircraft integrity.

When technicians were asked if they would correct a fellow worker if they observed them performing an unsafe act or procedure which would impact flight safety, the vast majority said that they would bring the issue to the attention of the individual. These same individuals, however, reported that if they observed a fellow worker performing a procedure in a way that might cause them personal injury or damage equipment, they reported a generalized reluctance to bring the issue to the attention of their fellow worker. Researchers were troubled by these responses since it is their opinion that a true dedication to safety is exhibited throughout all activities. It is important to instill in all workers a strong and universal commitment to safety and a resistance to becoming complacent with regards to any safety issue.

### ***Don't Take Risks***

When reviewing the historic data on maintenance accidents and incidents at numerous organizations, it was troubling to find that many events involved knowingly taking risks. Research observations at various aviation locations and involving widely different aviation business settings lead researchers to believe that this is a pervasive issue. Workers were observed leaving ladders and other equipment near an aircraft during “functional checks”, often relating to the observer “I think it will miss [the object]” or “it should be OK”. Workers were frequently observed using ground equipment, work stands, or other support equipment which they knew had defects or was unsafe. Technicians were observed on several occasions using equipment not designed for the procedure because “the correct [item] is not available” or “I would have to go clear down to [place] to get the correct [item]”. Individual workers should be encouraged to resist taking risks during any procedure. If they are not absolutely sure the activity will be successful, they should openly question continuing the procedure.

### ***Utilize Error Management Techniques***

It was evident throughout the research that individual workers do not effectively utilize organizational error management tools and techniques. Technicians seem to be totally committed to their own personal error management techniques and harbor a belief that they are superior to any company or governmental systems. Despite the fact that maintenance “task cards” and manuals are specifically designed to be a part of the human error management strategy, many technicians do not effectively utilize them as such. In their defense, however, few recognize them as error management tools. After observing many technicians “pocketing” task cards or manual instructions and reading them only at the completion of the job or when performing the “sign-off”, researchers asked workers their perception of the purpose of the document. The vast majority related that these items were “instructions” for performing the work. It is well established that maintenance technicians are resistant to using “instructions”. When researchers explained how the document could be an effective error management tool, many were surprised and seemed to view the documents in a new light. The research suggests that workers are not fully aware of the various error management techniques available to them and how to optimize their use during the performance of their daily duties. It is the researchers’ belief that bringing the true nature and proper utilization of such documents to the attention of the worker could have a significant impact on organizational safety.

## SUMMARY

To effectively move aviation organizations toward proactive safety cultures, we must first provide the ingredients for the organization to “have” a collective safety focus. The industry must solve the problems of providing an industrial environment in which organizations can become informed by determining a method of effective error reporting. Such a system should go beyond reporting accidents and incidents to the establishment of metrics which will assess all types of human errors and the human factors which lead to such errors. It should also provide an industry-wide database so that even the smallest company may benefit from the knowledge gained through such a venture. Critical to moving aviation organizations toward safety cultures is the need to provide a fair and equitable means of adjudication and discipline. A system which provides for consistent and fair assessment of causation and the assignment of appropriate discipline. Aviation organizations must actively seek to learn from even their smallest mistakes. This will require an increased dedication to organizational learning and involve a consistent and unwavering commitment of resources, energy, and time.

How do we know that we are making progress toward our goal of becoming an organizational “safety culture”? James Reason provides guidance as to what one can look for in an organization to determine if there is the requisite commitment to safety necessary to become a safety culture. He poses the following questions as a means of assessing an organization’s safety commitment:[3](#)

- Which board members have responsibility for the organizational safety – as opposed to conventional health and safety at work concerns?
  - Is information relating to organizational safety discussed at all regular board meetings – or their high-level equivalent?
  - What system, if any, does the organization have for costing the losses caused by unsafe acts, incidents, and accidents?
  - Who collates, analyzes, and disseminates information relating to organizational safety? By how many reporting levels is this individual separated from the CEO? What annual budget does this person’s department receive? How many staff does he or she oversee?
  - Is a safety related appointment seen as rewarding talent (you’re going places) or is the organizational oubliette for spent forces?
  - How many specialists in human and organizational factors does the company employ?
  - Who decides what disciplinary action should be meted out? Are the defendant’s peers and union representative involved in the judgement process? Is there any internal appeals process?[3](#)
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