Case Study of a Fourth Generation MRM Program at a Corporate Aviation Operator

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ABSTRACT

Research in aviation maintenance human factors maps the evolution of MRM training programs into four distinct generations bridging attitude awareness programs, behavior changes, and process and structure changes. This paper analyzes a fourth generation MRM program from the perspective of the multi-step process, developed by the authors, as a guide for airlines to develop their own human factors programs. This analysis demonstrates that the corporate maintenance human factors program under review is a forerunner; however, a few additional, definitive steps during the planning, implementation, and follow-up would make this program more robust.

INTRODUCTION

Patankar (1999a) presented ten steps to developing a Maintenance Resource Management/Maintenance Human Factors (MRM/MHF) program in an introductory workshop during the Thirteenth International Human Factors in Aviation Maintenance Symposium. In the fourteenth symposium, Taylor & Patankar (2000) presented a comparative analysis of four generations of MRM programs based on their field observations at several aviation maintenance facilities in the United States. The present paper analyzes a previously published case of a corporate aviation operator (cf. Patankar and Taylor, 1999) from the perspectives of the "ten steps" and the "four generations of MRM." The authors conclude that this corporate aviation operator, whether intentionally or not, was successful in implementing some of the ten steps, and its program classifies as a fourth generation MRM program.

LITERATURE REVIEW

The Corporate Case

Instead of using the traditional Crew Resource Management (CRM) training programs available in the market, the corporate operator under study--Company A-- decided to use an alternative approach to risk management. They chose QuantumPro Management System (QMS), an innovative management program that focuses on organizational change through improved communication. In adopting the QMS program, Company A's strategy was to effect both an organizational change as well as an individual change. In order to implement this strategy, the company had to provide a structure and a process. Their structure was the requirement of briefings among pilots, among mechanics, and between the pilots and mechanics. Their process was the use of "concept alignment process" (CAP) as a way of ensuring that all parties are acting on the same concept. If all parties are not acting on the same concept, CAP provides a way of resolving ambiguous and/or conflicting viewpoints among the communicating parties in various briefings. After the indoctrination of the QMS among the pilots, it was applied in a streamlined format to the maintenance function. In this latter application, it was called Error Reduction and Decision Making Protocol (ERDMP). It was used for preflight pilot-mechanic briefings, post-flight pilot-mechanic debriefings, and briefings among the maintenance personnel.

The basis of the CAP is a simple communication protocol that desensitizes rank and provides means for all the individuals to share information. At the heart of this protocol is the *concept*. A *concept* is defined as an idea, remark, or an observation that is stated by one person and is either affirmed or challenged by the co-worker. If a difference between the points of view is stated, it is the team's responsibility to seek validation for that *concept* from an independent third source. If one *concept* can be validated and one cannot, the validated concept shall become the working concept. If both concepts can be validated or if neither concept can be validated, the most conservative of the two is chosen. Once a working concept is agreed upon, it shall be further scrutinized using a predefined judgement process. Often in this process, the mechanics, managers, and pilots go beyond this point to

research the cause of the discrepancy in the *concepts* and recommend appropriate changes. Changes have been made in operating policies and procedures, maintenance manuals, and other documentation as a direct result of this process. The pilots have been using this process for six years and the mechanics have employed it for just over two years.

Ten Steps to Developing MRM Programs

Patankar (1999a) presented the following ten steps to guide new MRM program developers in designing and implementing their programs.

Step 1: Understand the Corporate Mission or Purpose

It is imperative that the Human Factors (HF) manager understands the corporate mission and abides by the corporate values for him/her to receive support from the top-management. Kotter (1998) states that one of the main reasons for change programs to fail is that the changes are not anchored in the corporation's culture. If the HF manager does not align his/her MRM program with the corporate purpose, he/she risks failure.

"With change, the task is to manage the dynamic, not the pieces" (Duck, 1998 p.57). The HF manager should be able to identify all the components required to make the MRM program successful at his/her airline and then orchestrate these components such that he/she is able to manage the dynamic and not the individual pieces. Such an action requires strong commitment from the CEO or a person who enjoys an incredible amount of political strength in the airline.

Step 2: Personally Practice MRM Principles

If the HF manager is able to practice some of the key HF principles such as communication skills, teamwork, and avoiding complacency, he/she will become an active role-model for others to follow. Also, personal practice will demonstrate the manager's commitment to the MRM program because "Management is the message. . . Everything managers say-or don't say-delivers a message. . . Top-management should start by requiring a change of behavior, and when that yields improved performance, the excitement and belief will follow" (Duck, 1998 p. 61-63).

Step 3: Identify and Recruit Key Persons to Champion Your MRM Program

"The scarcest resource in any organization are performing people" (Drucker, 1998 p. 19). Some airlines have used representatives from all the "interest groups," for example, one could use representatives from the labor union(s), management, FAA, and outside consultants. "People are naturally scientific. They must see the reasons for change" (Martin, 1998 p. 131). Once these persons see the reasons for the change and they have a positive attitude toward the MRM program, they exhibit HF-compliant behavior consistently. They will act as positive role models similar to the HF manager. They will consciously and unconsciously influence the development and implementation of the MRM program.

In selecting these key persons, one should also try to seek leaders rather than managers. Although leadership and management are not mutually exclusive qualities, the point is that a person needs to posses leadership qualities in order for that person to effectively champion the MRM program. The reason for this choice is based on Kotter's (1998 p. 38) observation that "Management is about coping with complexity and leadership is about coping with change." Successful implementation of an MRM program is a cultural change process.

Step 4: Align the MRM Mission with the Corporate Mission

If the goals and vision of an MRM program are not aligned with those of the airline, the MRM program is not likely to succeed. Generally, the purpose of most MRM programs is to bring about a change in behavior such that it enhances safety; therefore, it is highly likely to be aligned with the corporate purpose of most airlines. However, if there is any doubt about this alignment, explicit changes must be made to the corporate purpose/values prior to launching an MRM program.

Sometimes, it is evident that the published mission statement is different from the prevalent practices. For example, one of the corporate values may be to respect the employees, yet the employees may be working without a contract. In such cases, large-scale management changes need to take place prior to the initiation of an MRM program.

Step 5: Articulate a Vivid Vision for Your MRM Program

Vision provides guidance about what to preserve and what to change (Collins & Porras, 1997). The typical MHF training programs discuss certain desirable behaviors and caution the participants about unsafe behaviors. However,

they do not present a clear vision with vivid description of what it will be like to achieve the MHF goal. Consider the following example of Sony's envisioned future, as articulated in the 1950s:

>"We will create products that become pervasive around the world... We will be the first Japanese company to go into the U.S. market and distribute directly... We will succeed with innovations that U.S. companies have failed at —such as the transistor radio... Fifty years from now, our brand name will be as well known as any in the world... and will signify innovation and quality that rival the most innovative companies anywhere... 'Made in Japan' will mean something fine, not something shoddy" (_cf._ Collins & Porras, 1997 p. 237).

Step 6: Develop an MRM Program Implementation Strategy

Is the MRM program going to seek an attitude change first or a behavior change first? A layered approach that combines both attitude change and behavior change could be used to offer instruction and practice sessions in small units. For example, instruct one group of mechanics and their supervisors in the fundamentals of human factors and then provide them with practice sessions to implement these human factors principles in their daily work. Based on the feedback received from these participants, the instruction and practice sessions could be refined.

The behavior-first approach is results-driven; therefore, it "stakes out specific targets and matches resources, tools, and action plans to requirements of reaching those targets" (Schaffer & Thompson, 1998 p.91). If a company has already completed the awareness part of the training, it is critical that it uses the data available on effectiveness of MRM program, and focuses the future efforts on results-driven implementation. Consider this remark by the hockey star Wayne Gretzky, who explained his success by saying, "I skate where the puck is going to be, not where it has been" (cited in Augustine, 1998 p.174). From an implementation perspective, a company needs to think about why its MRM program will not be implemented. If the HF manager is able to effectively identify these reasons, he/she may be able to plan a counter-strategy and thereby have a higher probability of success.

While planning the implementation strategy, it is also essential to note how exactly one is planning to evaluate the performance of the participants. Do the participants have any specific incentives to practice the newly learned behaviors? The HF manager should try to envision why the participants may not practice the newly learned behaviors even if they agree with them. The HF manager should try to identify the obstacles in practicing the HF-compliant behaviors because "not removing obstacles to the new vision" is another key reason for change programs to fail (Kotter, 1998 p. 13). The problem, however, is usually with middle or upper management not willing to make the required changes. They view the situation from a different context. For example, in the case of one major airline, the researchers observed that the airline had initiated self-directed teams in maintenance to improve the quality of work. The managers thought that such teams were a threat to their position. So, they subtly undermined the effort of the teams and eventually abandoned the concept. Dismantling the self-directed teams left technicians very bitter and they lost trust in the management. The mechanics and the managers were considering the concept of self-directed teams from different contexts: the mechanics were using the self-directed teams to make process changes that improved quality; whereas, the managers were feeling insecure due to the increased self-reliance of their mechanics. "Context is like the color of the light, not the objects in the room. Context colors everything in the corporation... People have contexts just as organizations do. Our individual context is our hidden strategy for dealing with life; it determines all the choices we make" (Goss, Pascale, & Athos, 1998 p. 89-100). Context can change attitudes for the worse—as seen in the example above, or for the better.

Step 7: Obtain Resource Commitments from Upper Management

A large-scale change program such as the MRM program requires consistent commitment from the management in terms of the conventional resources like time, personnel, and money. Some companies may acknowledge the value of an MRM program, but just may not have the personnel to spare for training or the budget to actually implement the changes that are suggested by their employees. If this is the case, the upper management needs to seriously evaluate the company's core purpose and values. Nothing is more detrimental to the MRM program than the participants losing faith in it because they cannot even get the basic equipment to do their jobs. For example, the researchers observed that some of the participants from a major airline's MRM program continued to use belt loaders as

ladders even after their MRM training. They knew that this practice was dangerous, but they were told by their supervisor to continue with this practice because he did not have the budget for a new ladder.

Also, some airlines have experienced several changes in their upper-management in the recent years. Consequently, the middle management is not very sure about the resources available for the MRM program. Unless, a detailed plan is endorsed by the top-management and appropriate resources are allocated to it, the new middle management is not likely to honor the commitments of the prior middle management.

Step 8: Develop Means to Build Employee Trust

Sometimes, the MRM program has a tendency to be construed as another management fad of the week. To steer clear of this interpretation, it is essential that the HF manager takes concrete steps toward building mutual trust among the employees and a trust in the program. One of the best ways of developing this trust is to demonstrate through behavior, action, and results that the program works. ". . . trust in a time of change is based on two things: predictability and capability. . . Predictability consists of intention and ground rules: what are our general goals and who will we make decisions? To trust an organization, both managers and their reports must define the capability that each is providing; and each side has to believe that the other is capable of playing the new role" (Duck, 1998 p. 65-72). Typically, the management seems to be encouraging the mechanics to use the HF principles and practice safe behaviors, but on the other hand, they do not support a mechanic who uses the lock-out tag-out procedure to stop an unsafe activity. No wonder, in such a climate, that trust becomes a critical issue. Because of such experiences of the front-line maintenance personnel, it is very difficult for MRM champions to establish trust. "One of the paradoxes of change is that trust is hardest to establish when you need it the most." (Duck, 1998 p. 69).

Step 9: Develop Tools to Measure MRM Success

The tools used to measure an MRM program's success should be responsive to the details articulated in the vision statement and to the program's goals. These tools should also interrelate very closely with the corporate values. If there is a strong correlation between the core values, program goals, program vision, and program measures, the implementation and continued evolution of the MRM program is very likely. In the long-term, it will certainly

have a positive affect on the organizational and professional cultures at that airline.

A difficulty that many HF managers have experienced is the difficulty associated with proving the financial viability of MRM programs. Two distinct approaches are now available to HF managers: Return On Investment (ROI) from MRM training and Activity Based Costing (ABC). Taylor (2000) presented a formula to calculate the ROI from MRM awareness training programs. This formula acknowledges the concurrent implementation of multiple safety initiatives and enables the HF manager to calculate the ROI from MRM training as a portion of the total ROI from all safety initiatives. Patankar and Taylor (2000) further demonstrated that targeted MRM training programs can achieve their specific goals with a significant degree of success. Some change program implementation experts, on the other hand, are advocating ABC. "It not only measures what it costs to do a task, it also records the cost of not doing, such as the cost of downtime, and the cost of reworking or scrapping a defective part. The costs of not doing, which traditional cost accounting cannot and does not record, often equal and sometimes even exceed the costs of doing. Activity-based costing therefore gives not only much better cost control, but increasingly, it also gives result control. Its greatest impact is likely to be on the service industry" (Drucker, 1998 p. 5) Once in a while, the accountants need to be reminded that "enterprises are paid to create wealth, not control costs." (p. 12). "When one leading company can demonstrate the long-term advantage of its superior performance on quality or innovation or any other non-financial measure, it will change the rules for all its rivals forever" (p. 26). Whether one measures the training ROI or uses the ABC approach to quantify the financial impact of an MRM training program, the results of such measurements will provide quantitative evidence that supports the positive effects of good MRM programs. Nonetheless, non-financial measures such as employee morale, job satisfaction, and organizational attachment can also be used determine the MRM program's success. The tools used to measure MRM success must consider both financial and non-financial impact of MRM programs.

Step 10: Develop Structures and Process to Sustain MRM-based Changes

For an MRM program to be truly effective, it must stand the test of time and management changes. The outcomes of these programs should be strong enough to protect the

program and the organizational culture, irrespective of the management changes. The airline should truly be able to "preserve the core and stimulate progress" (*cf.* Collins & Porras, 1997). Certainly, other change programs will emerge in the future, but the airline's core values must be preserved.

Fourth Generation MRM Programs

The fourth generation MRM programs are defined by Taylor and Patankar (2000) as systemic programs that use the knowledge gained from the experience of the past three generations and from recent innovative processes to standardize communication and tactical decision-making. For the first time, these programs are being designed and implemented from a systemic perspective. Data from the past three generations of MRM programs shows that different MRM programs usually achieve different results. Airlines are now adding a skills training module to their classroom instruction and making it a true "training" program that is more likely to result in more open communication (Patankar & Taylor, 2000). These airlines are also aware of the interpersonal trust issues that impede self-disclosure, and they are striving to incorporate a maintenance error investigation (MEI) module in their training, and in their larger program, so that the participants understand the goal and the procedure of such investigation. In the skills training module, the airlines are beginning to train their maintenance personnel to use simple, standard processes to detect and resolve differences in information through third-party validation. The airlines are now better informed about the capabilities and limitations of MRM programs, and they are embarking on a new result-oriented approach to safety through strategic, system-wide, changes.

Understanding the human factor in unanticipated events.

Real time knowledge of what human factors lie behind classes of maintenance errors is important to obtain, and it is central to the long-range and comprehensive success of MRM. Processes for a human-centered maintenance error investigation (MEI) are becoming objects of serious interests in aviation maintenance organization (Allen & Marx, 1994; FAA, 1999). However, full-blown maintenance experience with such programs is limited. Recent assessment of MEI in the U.S. shows that there has been little commitment yet by either the air carriers or repair stations to see such error investigation and analysis become a new way of doing business (Marx, 1998).

Trust within the maintenance system.

Informal reports from users suggest that the mechanics' limited trust of the MEI process creates an obstacle to its widespread diffusion. Unless a strong culture for open communication and assertiveness already exists in their organization, relatively few mechanics will voluntarily or willingly disclose what they believe to be the "real story." A mechanic's individualism (Taylor, 1999; Taylor & Patankar, 1999) and self-reliance (Taylor & Christensen, 1998) can create a barrier to their trust in others.

In order to develop a strong safety culture, a maintenance organization must first recognize its own organizational and occupational culture, and it must appreciate the interplay between these two with the effects of national origins and cultures of its individual members (Taylor, 1999; Patankar, 1999b).

Direct focus on behavior change

The focus of contemporary MRM programs is now moving toward active error reduction through structured communication. Patankar and Taylor (1999) described a case from the corporate aviation environment that uses a "behavior-change first" approach instead of the prevalent "attitude-change first." In the earlier MRM generations 1 and 3 (*cf.* Taylor and Patankar, 2000), companies simply provided classroom instruction and hoped that the desired change in attitudes and behavior would take place automatically. This strategy focused on changing the participants' attitude toward safety through education and persuasion, and sometimes skills-training. Its developers hoped that participants' behavior would change as a consequence of the classroom experience alone. Unfortunately, the evaluations of such "training" programs for improving communication revealed that the subsequent behavior change is limited – either in scope or duration (Taylor and Christensen, 1998).

At the same time there were companies that began to provide a simple structure and process for communication among the following departments associated with aviation operations: flight crew, maintenance, and administration. These companies assumed that if they provided a simple, consistent communication and decision-making process, and the outcome of this process was promptly acted upon and continuously supported, their employees would continue to use it and could eventually change their attitudes. The immediate interest of these companies was in

changing their employees' work-related communication behavior. They did not use the better known "attitude change" approach taken in MRM generations 1 and 3.

The Structured Communication Process

Basically, there are two aspects to achieving new communication behavior: first, a structure which requires connected parties to communicate and second, a process that is followed consistently—regardless of the outcome.

Structure: An example of structure might be an organizational policy for line maintenance which requires that for each flight an aircraft mechanic act (either by direction or discretion) as its liaison mechanic. This person is expected to meet with the flight crew and discuss the maintenance issues with them. The pilots are expected to remain available after arrival to discuss maintenance discrepancies with the mechanic. During such discussions, both the flight crew and the maintenance mechanic(s) are required to follow the pre-agreed communication process described below. Another example of structure is a policy requiring that (a) maintenance shift turnovers take place face-to-face and (b) mechanics, leads, and foremen briefly review the outgoing shift's use of the pre-agreed decision-making process.

Process: The process for enhanced aviation communication has been observed and documented (Lynch, 1996; Patankar & Taylor, 1999). Its originators have titled it the Concept Alignment Process (CAP). Figure 1 illustrates a flow chart of this process. According to CAP, a "concept" is an idea or a piece of information presented by an observer of, or a party to, a technical decision. All members are expected to present their concepts. If the members present differing concepts, the CAP is initiated. Once the difference in concepts is recognized in Step 1 (see figure1), the participants must seek validation of their concepts (Step 2) through third-party source such as a flight manual, air traffic controller, maintenance manual, company policy, etc. If only one concept can be validated, it is executed (Step 3). If none of the concepts can be validated or if all the concepts can be validated, the most conservative concept is chosen (Step 4). The chosen course of action, when executed in Step 5, will eliminate "active failures" (cf. Maurino, Reason, & Lee, 1997). Additionally, when multiple concepts are stated, whether valid or not, the members are expected to take the additional steps (Step 6) to investigate the reasons for the existence of multiple concepts. Such an investigation is aimed at providing systemic solutions to minimize the occurrence of invalid concepts and thereby minimize "latent failures" (cf. Maurino, Reason, and Lee, 1997), as indicated by Step 7. In figure 2, steps 6 and 7 are presented with dashed line because most people tend to accept the first-level finish, Finish 1 rather than pursuing the process two sets further.
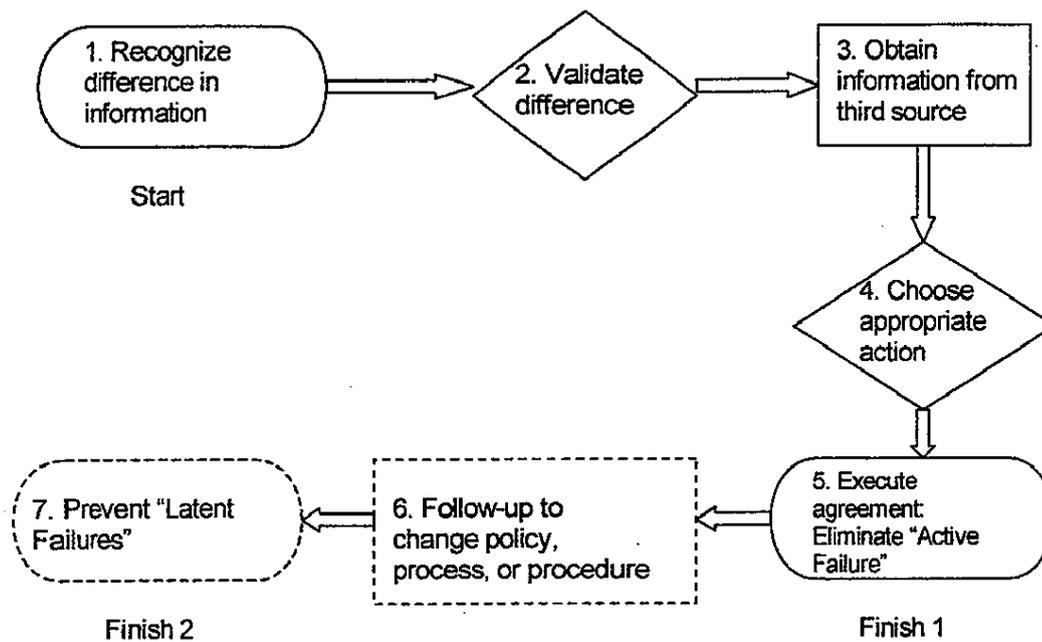
Figure 1: Flow chart for the Concept Alignment Process

The CAP addresses the following causes of human error accidents (Lynch, 1996): (a) non-adherence to procedure, (b) incorrect tactical decisions, (c) lack of attention or complacency, and (d) failure to challenge another member's error.

The CAP provides objective procedures, thus making the use of this process observable to all. It provides team members with decision-making and conflict resolution methodology. It reduces chances of acting on incorrect concepts by facilitating collaborative task completion and decision-making. It reduces interpersonal conflict and defensiveness through the understanding that what is challenged is the concept and not the individual. All of these benefits have been observed in the use of CAP in the maintenance environment. The following description of the corporate case highlights those benefits.

Organizational safety culture and management support

Assuming that organizational culture has the potential for the greatest impact on safety, Helmreich and Merritt (1998) present strategies to unify and strengthen the organizational culture and aim to introduce safety as a shared value.

Management's commitment, Helmreich and Merritt suggest, is prerequisite to successful implementation of a new process or a new protocol because although an organizational culture is shaped by all of the employees, an organizational change is defined by the upper management. "Senior Management is a part of, not apart from, the culture; that is, it does not look down upon the organization and direct it by edict, rather it influences the culture as a participating element within the culture" (p.124). The change has to be top-down, through concrete and consistent examples.

METHODOLGY

This research compares Company A's MRM program with the ten-step process recommended by Patankar (1999a). Additionally, the characteristics of Company A's MRM program, especially its strategy and effectiveness, were mapped against those of the four generations classified by Taylor and Patankar (2000).

The data collection and analysis would have been easier and more objective if the corporate operator had a written MRM plan. In the absence of such formal plan, the authors have based their comments on field observations and

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interview data.

RESULTS

Step-by-step comparison

Step 1: Understand the corporate mission or purpose

The company's core purpose is "to make technical contributions for the advancement and welfare of humanity;" while the aviation unit's purpose was to provide the company employees with a safe aircraft. The aviation unit operated scheduled service to four to five plant locations to transport engineers and managers. On some occasions, they also flew the top executives to specific destinations outside their normal routes. When asked whether they would delay or cancel a flight for a safety-related issue, the management and the employees consistently said that they would. Such overriding importance of safety over production goals was supported by our observations of the times when two of their aircraft experienced maintenance problems.

One of the parent company's core values is innovation. The company will not develop a product if the technology is not innovative enough. Perhaps, it is because of this core value that the aviation manager wanted to find a Crew Resource Management program that was better than the type practiced in the airline industry. Also, such CRM program—the QuantumPro course--would be in perfect alignment with the company's core purpose.

Step 2: Personally practice MRM principles

In his book about how the company was built, one of the founders of the company expressed his unique objective: to expand and diversify only when the company can build on its existing strengths, and with the recognition that it has proven capability to make a contribution. Since the aviation manager has been with the company for over 25 years, he seemed to be fully attuned with the founders' ideology. He was among the first to take the QuantumPro course, and then he became the one to model its implementation.

Step 3: Identify and recruit key persons to champion your MRM program

This aviation department manager could not have done a better job in identifying and recruiting the key persons to champion the QuantumPro program. One of his pilots became a complete believer in the CAP process, and became a crusader for its consistent implementation. This pilot worked with the maintenance personnel and together,

they customized the CAP process for maintenance use.

The director of maintenance took keen interest in the QuantumPro course and modified its content to meet the maintenance department's needs. The maintenance personnel called it "Error Reduction and Decision Making Process (ERDMP)."

The aviation manager, the chief pilot, the director of maintenance, and some highly enthusiastic program champions, actively modeled proper implementation of the QuantumPro program. Consequently, the process was taken seriously by all personnel and the employees effected several safety-related changes in the organization.

Step 4: Align the MRM mission with the corporate mission[1]

Although the corporate mission was clear and the aviation department's purpose was clear, the mission of the CRM/MRM program was not documented.

It is possible that the aviation department did not encounter any obstacles from the corporate management in implementing the CRM/MRM program because these programs were, at least intuitively, compatible with the corporate mission and purpose. Nonetheless, a written mission and goals document would have been useful.

Step 5: Articulate a vivid vision for your MRM program[1]

Although the aviation department did not have a written vision for either their CRM or MRM program, their program champions were extremely effective in keeping the spirit of these programs vibrant. Perhaps, this live enthusiasm for both programs was more effective than a written statement by their manager. As the concept alignment process was practiced and subsequent structural or procedural changes were made, the employees' belief in the program increased. Having an enthusiastic support from the program champions facilitated an incremental belief in the program among all the employees.

Step 6: Develop an MRM program implementation strategy[1]

Upon reviewing the various types of Crew Resource Management programs that were available in the market, the aviation department manager and his pilots chose CMR

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[1] Note: The corporate case needs to strengthen these areas

Inc.'s QuantumPro because it focused on observable behavioral changes irrespective of the internal attitudinal changes that may or may not take place within the individuals. However, only the flight department received a regular class in CRM. The maintenance department had only its director go through the class, and rest of the personnel got some training from one of the pilots and the maintenance director. So, it seems that the maintenance department may not have had a clear MRM program implementation strategy. However, the program champions, both mechanics as well as pilots, were very enthusiastic about the CRM/MRM program and they inspired the rest of the employees to use the QuantumPro system and its derivative, the ERDMP.

Step 7: Obtain resource commitments from upper management

The original QuantumPro course attended by pilots and the director of maintenance was quite expensive. This course also included take-home exercises that consumed several hours of personal time. Perhaps, this cost is not as significant as the cost of changes that result from implementing such a CRM/MRM program. The authors did not note any explicit resource commitments other than the course costs. However, the aviation department manager was effective in implementing structural and procedural changes in their daily business, as recommended though the implementation of the CRM/MRM program.

Step 8: Develop means to build employee trust

The aviation department manager, the chief pilot, and the director of maintenance were able to build a strong sense of trust in QuantumPro and ERDMP. The researchers witnessed some instances where the maintenance personnel and the pilots had the opportunity to follow the pre-agreed process and determine corrective action. When each party observed that the process was successful and their managers supported it, regardless of the outcome, their trust in the process increased.

Step 9: Develop tools to measure MRM success[1]

The CRM success was being documented by some pilots, but the maintenance success was not getting such attention. The case study presented by Patankar and Taylor (1999) constitutes external evaluation, but the company needs an internal, more regular evaluation system.

Step 10: Develop structures and processes to sustain MRM changes[1]

Within a year of implementing the MRM program, the company went through a layoff cycle. Now, the company has acquired new aircraft and has hired a new director of maintenance as well as some new mechanics and pilots. Since the department manager has remained the same and some of the original CRM/MRM program champions are still with the company, it reasonable to expect a resurgence in the MRM program in the near future.

A Fourth Generation MRM Program

Based on the experience of the first three generations of MRM programs, the fourth generation programs, such as the Company A case, are starting to address the issue of balance among individual and organizational changes. In theory, both the organization and the individual must change in order to effect a long-term change in the safety culture. The first generation MRM program customized the concepts from flight-CRM training to maintenance-CRM/MRM training by focusing on teamwork—communication between two or more individuals – but it was still personal change and little attempt was made to support it through organizational structure or process. The second generation MRM programs used focus groups to solve specific problems resulting in some organizational changes and some individual changes, but because these programs were focused at specific problems, once problems were solved and to continue the process proved difficult, the programs were discontinued. The third generation MRM programs focused on individual awareness resulting in mostly passive individual change (Patankar and Taylor, In Print).

Now, as illustrated in Figure 2 below, the fourth generation MRM programs are trying balance the organizational change with the individual change. Such balance provides structure and processes for individuals to practice the desired behaviors, as well as the encouragement and personal support for individuals taking a positive attitude about safety, as well as knowledge and skills for how to do it. Strategy or purpose guides the balance. If either the organization or the individual does not perform the requisite function, the resultant behavior will be unbalanced, and it will not achieve the higher levels that are possible through planning (Taylor & Patankar, 2000).

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[1] Note: The corporate case needs to strengthen these areas
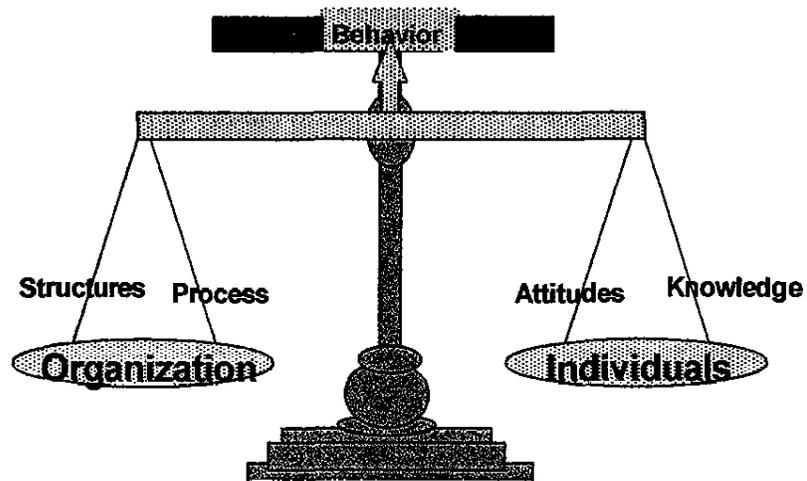
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Figure 2: The balance between organizational change and individual change

CONCLUSION

The corporate aviation case discussed in this paper, used a fourth generation MRM program and demonstrated a superior implementation strategy. Many of the traditional barriers to MRM implementation such as lack of management follow-up, loss of focus due to employee turnover, and lack of skills training on how to use the MRM knowledge were overcome by Company A.

Additionally, the organizational culture at Company a valued innovation and strived to achieve a balance between the individual change (change in attitude and knowledge) and organizational change (by providing structures and processes that facilitate MRM implementation weak in some details of MRM implementation, it demonstrates a superior implementation strategy. It seems as though some of the steps in this case were informal; however, the corporate culture is such that it seeks to change their organization as well as the individual.□

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