Title: Technical Proficiency and Non-Technical Team Coordination for Effective Decisionmaking

Author: Randy E. Cadieux, Major, USMC, MS.

Author Affiliations: United States Marine Corps, Member of the American Society of Safety Engineers, High-Reliability Organizing

Principle: Decisionmaking Under Conditions of Uncertainty

Situation:

While there may be a perception that military units have absolute control and authority over the majority of circumstances and individual service members, there are times when the external environment requires adaptation of procedures and non-technical team coordination skills to avoid incidents and mishaps. Personnel in numerous high risk industries can become task-saturated when the external environment places unexpected demands on individuals, crews, and systems. During these situations effective task accomplishment while maintaining adequate safety margins can be extremely challenging. This is also the case with Navy and Marine Corps aviation operations.

Oftentimes Navy and Marine Corps aviators are faced with situations where initiative, sense-making, and rapid decisionmaking are required to maintain resilience and to continue mission execution after experiencing a disturbance in operations. While military aviators are required to follow numerous regulations and comply with rule-based procedures, there are times when initiative and proactivity is required to maintain the safe conduct of the mission. Adaptability and flexibility are critical components of safe, effective, and efficient mission accomplishment. Achieving a balance between obedience to rules and initiative for mitigating risk and maintaining safe operations is a key component of military aviation.

An example of adaptation and initiative for coping with uncertainty can be seen on a daily basis at Naval Outlying Fields (OLFs), which are used to conduct aircraft landing practice. OLFs are moderately controlled, but the control is primarily rule-based and coordination of traffic is normally performed by a Runway Duty Officer (RDO). This limited control, combined with the challenge of instructing an inexperienced student at an OLF is challenging enough for the military instructor-pilot, but the situation becomes further complicated when traffic volume increases and when normal and emergency operations training is combined at one airfield. The risk of mid-air collisions is increased during these situations and instructors must cope with the situation by prioritizing and limiting tasks to only what is absolutely necessary at the time. By utilizing technical flying skills and the non-technical skills of Crew Resource Management, instructor-pilots and students coordinate with each other, with other aircraft, and with the RDO to keep the mission flowing and to mitigate risks.

Similar situations can occur in other sectors as well. Highly technical team-based procedures in high risk industries often require a high level of proficiency, non-technical team coordination, and prioritizing in real-time to accomplish tasks and avoid incidents and mishaps. Offshore oil platform crews, natural gas hot-tapping and plugging crews, mining crews, healthcare teams, and commercial aviators may at some point be required to rely on technical proficiency and teamwork to adapt and maintain resilience and safe operations when exposed to a rapidly changing environment.

Methods of Implementation:

During tactical KC-130 operations aircrews may be exposed to numerous hazards, and available system and human resources must be used to identify and assess the hazards, identify courses of action to mitigate the hazards, and to ultimately decide on and execute a risk mitigation strategy. During assault
support missions pilots and aircrew members must rapidly assess and make sense of the situation, and react appropriately while minimizing the level of unintended consequences. Oftentimes aircrew members have limited control of hazardous external situations, but they can successfully work together to create strategies for mission accomplishment and risk mitigation during dynamically changing environments.

In Marine Corps KC-130 operations each crew member has different assigned tasks and they must work together as a functional team to effectively accomplish the mission. While the crews work together to complete tasks, each crew member must be technically and tactically proficient at his or her own crew position. This individual skill level includes knowledge requirements and proficiency at operating aircraft equipment and systems. This technical competence combined with team-based non-technical Crew Resource Management skills facilitates decision-making when the levels of certainty degrade during the course of tactical missions.

Aircrew involved with Naval Aviation primary flight training also face significant hazards in the non-tactical environment. Routine operations in the T-34C aircraft expose pilots and aircraft to multiple hazards which require a high-degree of human involvement as a form of procedural risk control. Real-time decision-making, including coordinating with external resources, such as pilots of other aircraft and air traffic control is often required to mitigate risks. Additionally, during early stages of training, student aviators lack comprehensive technical aircraft control skills, which increases the requirement for instructor pilot competency in technical and non-technical skills. Through the use of numerous procedural risk controls, non-technical team coordination skills, communication, task prioritization, and specific focus, instructor-pilots make time-critical risk-based decisions to facilitate the safe accomplishment of daily training missions.

Results:

In Navy and Marine Corps aviation operations technical proficiency and effective Crew Resource Management may increase the level of effective decision-making among aircrew members. The Marine Corps has demonstrated consistent success in the KC-130 community while maintaining a very high safety record. Additionally, despite the constant exposure to high-risk training environments, T-34C crews have demonstrated a consistent ability to make sense of complicated situations, make time-critical risk-based decisions, and achieve consistent results in terms of quality pilot production.

Conclusion:

The concepts of technical proficiency and crew coordination have consistently enabled successful and reliable results in both the KC-130 and the T-34C aircraft. Detailed pre-mission planning can help improve the likelihood of successful operations, but the real-time interaction among crew members takes the planning into the next level of mission execution. This interaction and coordination is critical for mission success. Numerous organizations across industries may be able to improve operations and gain higher levels of consistent operational excellence by training operators to achieve high levels of technical competence and developing behaviors among employees which facilitate effective and efficient teamwork. The combination of these concepts and programs may facilitate enhanced adaptation, initiative, and decisionmaking during dynamically changing environments with high levels of uncertainty.