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14. ABSTRACT

SA is a pilot?s (or aircrew?s) continuous perception of self and aircraft in relation to the dynamic environment of flight, threats, and mission, and the ability to forecast, then execute tasks based on that perception. It is problem solving in a three-dimensional spatial relationship complicated by the fourth dimension of time compression, where there are too few givens and too many variables. It encompasses the individual?s experience and capabilities, which affect the ability to forecast, decide and then execute. SA represents the cumulative effects of everything an individual is and does as applied to mission accomplishment.

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DESPERATELY SEEKING SA

"NO TALLY! NO JOY! NO CLUE!" doesn't necessarily indicate a total loss of situational awareness (SA). However, it does represent a less than desirable level of SA relative to mission accomplishment and margin of safety. Loss of situational awareness continues to contribute to the spectrum of aviator experience from hair-brained war stories to tragic loss of life and aircraft. Whether loss of SA is identified during the post mortem of a mission gone bad or an accident investigation, SA has remained elusive even when it is the focus of scientific studies, safety investigations, or training programs.

Recently, an Air Staff process action team was created to address the questions, "Just what do we mean by situational awareness? Can it be measured objectively? Can SA be learned? Can we select for it? If it can be measured, when in the flying training process should we take measurements?" A cursory review of studies has shown widespread interest in SA, but provided no conclusive results that might acceptably define SA and answer these and other questions. The Advisory Group for Aerospace Research and Development (AGARD) has sponsored conferences and has published a collection of studies concerning SA. Various MAJCOM training programs contain SA oriented segments, but are not focused on SA. What we do have are various programs such as Cockpit Attention Task Management (CATM), Aircrew Attention Awareness Management Program (AAAMP), Cockpit Resource Management (CRM), Mission Oriented Simulator Training (MOST) and Aircrew Coordination Training (ACT) which deal with specific areas of human factors which impact flying airplanes. However, no one has an "SA Training Program" per se. Emphasis has been placed on spatial orientation, task management, "g" induced loss of consciousness (GLOC) and attention awareness, with SA appearing more as a collateral issue than a goal. But, these factors alone or in concert are not SA, yet SA cannot exist without them. We are, indeed desperately seeking SA.

The search for SA has been approached from many directions resulting in disparate views from operators and technicians alike. The slice and dice method of determining what SA is and does has not enlightened the average aircrew in pursuit of the holy grail of perfect SA. One reason is an apparent lack of a consistent operations perspective and direction in addressing SA. Another reason is an inherent tendency to treat SA as a separate entity in the overall cosmic approach to aviation. The search for SA obviously could use an operational focus to provide direction and guidance for research and training alike.

Let me propose that SA should be the umbrella under which applicable human factors research and training are pursued. SA applies to every individual on every type of mission in a universal sense. Human factors should be ordered into a supporting role under SA to support mission accomplishment. Each of the human factors, coupled with an individual's experience and capabilities, combine to support building and maintaining a given level of SA. The level of SA will be affected by the complexity of the mission, the intensity of the threat and the amount of attendant distractions in and out of the cockpit.

The following is an operationally oriented, composite definition of SA derived by the Air Staff group from numerous independent studies and training programs. SA is "a pilot's, (or aircrew's), continuous perception of self and aircraft in relation to the dynamic environment of flight, threats, and mission, and the ability to forecast, then execute tasks based on that perception." It is problem solving in a three dimensional spatial relationship complicated by the fourth dimension of time compression where there are too few givens and too many variables. It encompasses the individual's experience and capabilities which affect the ability to forecast, decide and then execute. SA represents the cumulative effects of everything an individual is and does as applied to mission accomplishment. It's what allows you to successfully complete the mission, or to recognize the need to abort. It keeps you out of the dirt and out of someone else's space.

Operator accidents or incidents are due to a critical breakdown in one or more of the myriad of human factors which results in the loss of SA. However, inadequate SA, in a relative sense, routinely affects successful mission accomplishment and the desired margin of safety. Satisfactory ordering of the involved human factors will not create SA, but is necessary to create the environment in which to achieve some relative level of SA. Thus, SA is the driver in safe, successful mission accomplishment.

Taking the positive approach, it may be to our advantage to consider spatial orientation, task management, GLOC avoidance and attention awareness as building blocks in creating and maintaining a favorable environment that allows pilots and aircrews to successfully complete the mission. What has been lacking is an operationally oriented approach to the study and training of SA. Since the mission of the Air Force is not to "maintain spatial orientation", but "to fly, fight and win", we need to establish an overall direction to that end. Focusing on SA should help accomplish that. Using SA as the framework and goal for research and training, it will be up to the human factors scientists, training specialists and the operators on how best to define, measure, select for and train human factors and SA .