



## **Supersonic Safety**

# **A Fighter Pilot's Guide to Reducing Human Error**

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**Introduction:**

Since 1954 the US Navy fighter pilot community has reduced its mishaps by over 99%. Using the tools and techniques invented by NASA and widely adopted throughout aviation, tactical jet pilots have changed the safety culture from high risk to high reliability.

These tools and techniques have nothing to do with aviation specific skills. Rather, they are based on increasing teamwork and human performance levels to identify and mitigate human error from the cockpit.

Until the late 1970s, the focus in aviation was on building safer aircraft. But experts found up to 84% of mishaps were due to human error. Born from a NASA workshop, Crew Resource Management (CRM) quickly became the redefining factor in aviation's safety culture.

CRM training has proven so beneficial that the Federal Aviation Administration (FAA) now mandates that every U.S. Navy fighter pilot, every Air Force pilot, and even every FAA sanctioned airline pilot receive CRM training at least once a year.

By understanding human performance factors, flattening the hierarchy, and learning from their mistakes, elite Navy fighter pilots have created a culture of "we" over "me" mentality - making them the safest, most precise operators in the world today. This program will take you behind closed doors to learn the lessons that the aviation community has learned in blood.

Flight Level Solutions provides process training that is unlike any other CRM or safety program in use today. Our fast paced, exciting, results based programs leave participants motivated and ready to create a true "culture of safety."

Today we introduce the seven critical skills of CRM - communication, assertiveness, leadership, decision making, mission analysis, adaptability, and situational awareness, but also incorporate TRM skills battling egos, stress, fatigue, and task saturation. We address the "Wingman Mentality" of mutual support - you watch my back, I'll watch yours. True safety cultures rely on every participant becoming an equal "wingman" in all matters of safety. From the boss to the newest hire, everyone has not only the authority, but also the responsibility to call at "Safety Time Out" or "Knock It Off" to prevent a mishap. Finally, we will present the Top Gun brief and debrief methodologies, and an understanding of error management and mitigation.

Our CRM process tools and techniques are applicable to nearly every industry. Any workplace where teamwork, communication, and leadership are vital, our programs are improving performance with lifelong results.

Use this book as a framework, highlight key points, take notes in the margins, and dog-ear pages to review and reaffirm ideas. We look forward to the opportunity to share the skills that will truly change safety in America's workplace.

## **Communication:**

"The greatest enemy of communication is the illusion of it."

Definition - The ability to clearly and accurately send and acknowledge information, instructions, or commands, and provide useful feedback.

\*When communication is ambiguous. \*

Words	7%
Tone	38%
Non verbal (e.g. gesture, posture, facial expression)	55%

Mehrabian (1972)

Standardized and pre-briefed terminology is the key to success,  
ie- no slang!

**Assertiveness:**

Definition - the willingness to actively participate, state and maintain a position, until convinced by the facts that other options are better.

**\*\*Requires the courage and initiative to act.\*\***

**Comfort level** - An internal anxiety gauge that alerts us when something isn't right... and needs to be corrected.

### **Behavior Types**

#### **Passive**

Overly courteous	Avoids conflict
Along for the ride	Beats around the bush

#### **Aggressive**

Dominating	Intimidating
Abusive/hostile	<b>**Aggressiveness IS NOT assertiveness**</b>

#### **Assertiveness**

The perfect balance of forcefulness and tact.

### **Responsibility is on leaders:**

- Encourage open atmosphere
- Teach new personnel - don't reprimand
- Debrief inappropriateness
- Incorporate lessons learned

### **Most Conservative Response**

If a disagreement exists, take the most conservative response until more information is available

### **Three Strike Rule**

In extreme situations, if the person challenged doesn't respond after two demands, regardless of rank the challenger takes command of the situation with a Safety Time Out/Knock It Off.

### **Situational Awareness:**

Working memory is short. 18-20 seconds without rehearsal.

Can be freed up through experience.  
Fatigue and stress hurt working memory.  
Working memory is susceptible to distraction.

Definition - the degree of accuracy by which one's perception of the current environment mirrors reality.

**Up to 88% of human error is due to loss of situational awareness.**

### **Model Of Situational Awareness**

78% Level 1 Error - Gathering of data  
17% Level 2 Error - Comprehension of data  
3% Level 3 Error - Projection of what will happen in future

### **Clues to Situational Awareness Problems**

Ambiguity - info from 2 or more sources doesn't agree  
Task fixation - focusing on one thing  
Confusion  
Lack of required information  
Failure to maintain critical tasks  
Failure to meet an expected checkpoint  
Failure to resolve discrepancies  
A gut feeling that things aren't right

### **Maintaining Situational Awareness**

Good brief  
Fitness for work  
Minimize distractions during critical tasks  
Sterile Cockpit  
Update - regularly compare mental models  
Monitoring - be aware of clues of "zoning out"  
Speak up - Assertiveness  
Time management

### **Questions To Calibrate Situational Awareness**

What is the immediate goal of your team?  
What are you doing to support that goal?  
What are you worried about?  
What is the current problem, size, and intention?  
What do you think the situation will look like in \_\_min and why?  
London Fire Brigade

## **Fatigue and Stress:**

"Boss, I'm good to go, I'm just a little tired.."

Fatigue is a physiologic state. NOT affected by rank, experience, motivation, or attitude.

**8 hours lack of sleep is equivalent to BAC of .08.**

### **Signs And Symptoms Of Fatigue**

Irritability, bad mood	Tolerance for error and risk
Short patience	Reduced motivation
Impaired communication	Forgetfulness
Reduced vigilance, inattention	Lapses and microsleeps
Task fixation	

### **Identifying Fatigue**

No simple measurement of fatigue  
If we can't measure it, we miss it  
Self-assessment is unreliable

### **Fatigue CAN Be Predicted**

Hours of continuous wakefulness  
Circadian rhythm effects  
Sleep debt = (ideal - actual sleep) x days  
Sleep disorders

### **Fatigue Countermeasures**

Go into high tempo events well rested  
Schedule with knowledge of circadian effects  
Minimize shifts < 12 hours  
Schedule and encourage naps

### **Stress - Chronic Causes**

Fatigue	Work tempo
Family stress	Financial difficulties

### **Coping With Stress**

Recognize	Eliminate stressors	
Let it out	Exercise	Counseling

**BE A GOOD WINGMAN!!**

**WATCH OUT FOR EACH OTHER!!!**

## **Threat and Error:**

To err is human. Cicero, 5AD

### **Threat**

Definition - anything that increases an event's complexity that can decrease safety margins.

### **Active Threat**

An issue that increases the likelihood of an error being made.  
Environmental (weather, geography)  
Human factors (fatigue, stress, etc.)  
External factors (co-workers, mechanical failure)

### **Latent Threat**

Aspects of an organization that can cause active threats to appear.  
Poorly written Standard Operating Procedure (SOP)  
High work tempo  
Bad safety culture

### **Threat Strategies**

Clearly defined roles for each job  
Effective brief  
Complacency addressed and acknowledged  
Workload management delegated  
Effective use of other TRM skills

### **Error**

Definition - deviation from expectations or intentions

**Error Management** - process of correcting an error before it becomes catastrophic.

Verbalize  
Verify  
Monitor

Break the chain by recognizing errors, and fixing them.  
Don't assume someone else will notice.

Norm - unwritten practice accepted by most members of organization  
Drift - gradual departure from an intended course of action

How much drift do you expect/allow on your team?



## **Brief/Perform/Debrief/Perfect:**

### **Brief**

Planning - briefer should have clear understanding of the task

Preparation - practiced, uninterrupted conducive atmosphere

Presentation - sharp, on time, professional

#### Outline

Overview - quick look, introduce all team members

Objectives - clearly define measurable objectives

Tactics - define each member's tasks, more detailed  
cover common problem areas/challenges  
contingencies, emergencies

Review - quick recap of big picture

Questions?

### **Debrief**

The most important consideration with respect to the debrief is to have one! Many debriefs are neglected or glossed over due to follow-on jobs, debrief space availability, or several other reasons. Too often, valuable "lessons learned" are lost because of a lack of interest in conducting a meaningful analysis of the event.

Be organized - well structured, efficient, professional

Set a professional tone - set personal feelings aside

Nameless/rankless - use of 3<sup>rd</sup> person

### **Outline**

Cover any safety problems first

Everyone bring back details for reconstruction

Conduct

Accurate - recall what happened first

Effective - analyze, teach/note lessons learned

Efficient - be quick, how can we do better tomorrow?

Overall goal - would these same people make the same mistakes tomorrow?

Did anyone knowingly or unknowingly violate the SOP?

### **Room go-round**

Ask each team member:

What did you do well?

What didn't you do well?

Did anyone else on the team miss any successes or failures today?

Recap

Debriefer sums up the missions and the team's successes and failures

Incorporate "Lessons Learned" throughout organization

## **Teamwork:**

### **How do teams differ from groups?**

- Level of performance
- Interdependence
- Shared mental models
- Attitudes

### **Teamwork Advantages**

- Sharing of info and ideas
- Mutual performance monitoring
- Improved decision making
- Synergy
- Overcome individual biases

**vs.**

### **Disadvantages**

- Stifling of individuality
- Time/effort to build team
- Decision making difficulties
- Group pressure
- Involves complex comms

### **Effective Teamwork**

- Mutual performance monitoring (The Wingman Mentality)
- Intra-team communication and feedback
- A willingness to both criticize and accept criticism openly

### **Team Performance Strategies**

**Set the tone**

- use sound briefing techniques
- stress team's importance
- examine each member's strengths/weaknesses
- ensure everyone knows their role

**Define and brief objectives**

- Prioritize goals (commander's intent)
  - Must haves
  - Nice to haves
- Map out a course of action
- Keep the big picture - Situational Awareness

### **Crew Resource Management Take Aways**

#### **Complacency**

- It's everyone's problem
- Address it and fight it every day

#### **Egos**

- ASSP is only as good as its next mishap
- If you think you're too good for standardization, or too good for CRM, you need it the most