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Stinger Missile Integration during Large Scale Operations:

Reducing the Risk to Friendly Aviation and Maneuver Forces

Air supremacy during the Global War on Terrorism, followed by budget constraints, resulted in a nearly 60 percent reduction in short-range air defense (SHORAD) capabilities. There were 24 SHORAD battalions during the Army of Excellence. Currently, there are only nine — seven of which are National Guard.[i] Today's operating environment has shifted from stability operations to multi-domain battle and large-scale combat operations against peer and near-peer threats with fixed- and rotary-wing formations and large numbers of unmanned aircraft systems ranging from small to large. The demand to recreate SHORAD is high. The interim plan for covering capability shortfalls is to field FIM-92 Stinger man-portable air defense systems to maneuver units and resource the training required for their employment.[ii]

The reintroduction of Stingers on the battlefield present risks of fratricide to joint and Army airspace users not used to operating in contested airspace. Detailed maneuver planning on the air mission planning system will be paramount to synchronizing effects on the battlefield; and aviation leaders must develop SHORAD training to inform aircrews of the basics. Army aviators need to relearn the importance of incorporating the air defense overlay into their maneuver plans. Manuals that can help include the maneuver, fires, and airspace management sections in Chapters 2, 6, and 7 of the new Field Manual (FM) 3-0 [iii]; the area air defense plan sections of the 2016 FM 3-52, Airspace Control[iv]; and Army Techniques Publication (ATP) 3-01.18, Stinger Team Techniques, dated August 2017. This ATP addresses the latest communications and mission command systems applicable to Stinger teams and has a current maneuver doctrine focus.[v]

To help further development of emerging tactics, techniques, and procedures (TTPs) that complement

ATP 3-01.18 and the Stinger fielding, the author has coalesced a set of recommendations from centers of excellence (CoEs) and combat training centers (CTCs) intended for aviation planners, brigade air defense and missile (ADAM) and brigade aviation element (BAE) cells and division G5, and G35 sections. The recommendations focus on the S3 and G3's responsibilities to develop maneuver, fires and airspace control measures parallel with the development of air defense measures, as well as the commanders' responsibilities concerning renewed emphasis on training air defense warning (ADW), weapons control status (WCS), rules of engagement (ROE) and combat identification (CID). Furthermore, these recommendations should energize the functional areas responsible for integrating the air defense plan and air defense overlay into the scheme of maneuver, and training aviation mission crews and airspace users on applicable TTPs regarding identify friend or foe (IFF), communications, air defense (AD) positions and unit airspace plan (UAP) development.

Recommendation 1

Situational Awareness and Detailed Maneuver Planning. The air defense officer (ADO) at division, in partnership with the air defense artillery (ADA) and maneuver plans officers in the G35 and G5 sections and the subordinate brigades' ADAM cell

officers in charge (OICs), should create an accurate and current air defense overlay, by company, of all Stinger battle positions (BPs). To build the air defense overlay, these positions must be manually input into an air and missile defense workstation (AMDWS), as the radios used by Stinger teams will not publish to mission command systems that develop the common operational picture (COP). To ensure the COP is legible, ADA officers should only publish ADA positions and the most relevant AD measures.

Large AD measures such as low-altitude missile engagement zone (LOMEZ) and SHORAD areas associated with every Stinger position will make the airspace appear congested and non-permissive, especially when read by the joint fires community. To increase the fidelity of the air defense overlay, the ADO should also publish the ADW and WCS associated with each unit. Shared understanding of these statuses is arguably more important than large graphic control measures associated with each system. For this information, aviators need to review Appendix 7 to Annex D of the OPORD and the digital overlays from AMDWS.

Situational awareness of the Stinger locations is just part of the beginning. Stinger BP placement should be done in parallel with building the tactical plan during course-of-action (COA) development then further refined throughout the military decision-making process (MDMP), especially during the maneuver, information collection and fires rehearsals. ADOs at both the brigade and division echelons should be required to speak during the rehearsals and attend all subsequent targeting working groups and MDMP sessions to further incorporate capabilities and refine ADWs and WCSs by sector. Rehearsals that test all graphic control measures are paramount to ensuring the success of planned effects.[vi] When the graphic control measures are developed in concert with developing the UAP, and all applicable airspace coordinating measures (ACMs) and fire support coordinating measures (FSCMs) are incorporated into the airspace control order (ACO), the warfighter and airspace user will have a plan prescriptive enough to use lethal and nonlethal effects simultaneously without the threats of battlefield clutter or fratricide.

Recommendation 2

Considerations for Army Rotary-Wing Attack by Fire (ABF) and BP Development / Directly Over or Juxtaposed to Ground Forces. There are many pros and cons to developing ABF and BPs either directly over or horizontally separated from ground forces. With Stinger teams in maneuver platoons, aviators need to factor the ADW and WCS when making decisions for ABF and BP placement. If the ADW is "White" and the WCS is "Hold," Stinger teams will only fire if attacked by enemy systems, and aviators should consider the advantages of flying directly over the ground forces' operational footprint (i.e. communication, protection and mutual support).

In a scenario where the ADW increases and the WCS becomes Tight, or the ground force commander wants to employ small unmanned aircraft systems (SUAS) and mortar fires without air-to-ground communications increasing the unit's electrical signature, aviators should consider the advantages of horizontal separation. Regardless of the two options, detailed planning with standard use Army aircraft flight routes (SAAFR) and air corridors (AIRCOR) that are time sensitive and listed on both the UAP and ACO are paramount to coordinating effects during large-scale combat operations. Also important is training aircrews and aviation planners on the advantages and disadvantages of the different forms of IFF (e.g., mode 4 versus the two forms of mode 5, and the tactical scenarios best suited for every mode).

Lastly, the aviator needs to factor in enemy considerations. Helicopters and Stingers are both highly conspicuous systems and easy for a peer or near-peer enemy to detect. If intelligence reveals the enemy will lead with indirect fires when detecting these assets, placing rotary-wing directly over ground forces poses risks to protection.

Recommendation 3

UAS Placement on the Battlefield. For protection from indirect fire (IDF), commanders may develop a ROE favorable for Stingers to engage enemy UAS. To avoid destroying Army RQ-7 Shadows, the Army

UAS liaison officer (LNO) at division, in partnership with the subordinate brigades' BAEs, must have a solid running estimate of friendly UAS and their UAV ROZs. As stated in Recommendation 1, making these control measures an enduring part of the COP is only part of the solution. Operations officers must lead detailed maneuver, information collection and fires rehearsals that address collections platforms and their locations in the area of operations (AO). There are some IFF and CID capabilities for both the Stinger and the RQ-7, but these fail-safes do not replace the need for shared understanding of system locations.

Recommendation 4

Education and Training for IFF capabilities, ROE, CID, ADW and WCS. Developing a UAP and rehearsing it is important; however, in large-scale combat operations, separating systems and perspective missile flight paths vertically or horizontally through graphic control measures won't always be feasible. The brigade's airspace is a limited and contested resource the S3 must manage. Furthermore, Soldiers equipped with Stinger missiles will always have the right to self-defense. Predetermined ACMs and FSCMs are not restrictive enough to prohibit AD systems when required for protection. Below are some resources to help commanders reintroduce SHORAD instruction into their unit training plans.

1. For instruction on the IFF and CID capabilities inherent in the most advanced Stinger/FIM 92 systems, I recommend reading ATP 3-01.18, August 2017. For select audiences, there are also detailed applications on SIPR.

2. For the IFF capabilities inherent in most Army rotary-wing and RQ-7 systems, I recommend Chapter 3 of the system's operator manual, commonly referred to as the "dash ten."

3. For TTPs in developing ROEs for every AD sector, I recommend reading Chapter 5 of FM 3-01, November 2015, and the latest FM 3-0, dated October 2017.

4. For Stinger team members' CID training, I recommend ROC-V 10.1.2. and ROC UAS, available from the Maneuver Center of Excellence at Fort Benning, Georgia, through the following link: https://rocv.army.mil. Soldiers can also download ROC-V programs for their Droid or IOS through the following links: https://play.google.com/store/apps/details?id=gov.usa.rocv&feature=search_t=W251bGwsMSwyLDEsImdvdi51c2Eucm9jdiJd and https://itunes.apple.com/us/app/roc-v/id616046045?mt=8.

5. In addition to ROCV, the ADA commandant's office has developed a visual aircraft recognition (VACR) reach-back resource on the Fires Knowledge Network available at https://www.us.army.mil/suite/doc/47730570&inline=true.

6. For ADW and WCS information, I recommend Chapter 2 of FM 3-01, November 2015.

In conclusion, graphic control measures and combined arms rehearsals are fundamental to integrating SHORAD capabilities into maneuver plans. However, to support large-scale operations, Soldiers must relearn the ROE and CID skills necessary for employing Stinger teams. Reinvigorating leaders to educate and train the force on these skills and insisting ADOs are more involved in MDMP will help develop emerging TTPs required to mitigate risks to airspace users while increasing protection capabilities. ■

[i] Sydney J Freedberg Jr., "Army Races to Rebuild Short-Range Air Defense: New Lasers, Vehicles, Units," Breaking Defense, 21 February 2017, https://breakingdefense.com/2017/02/army-races-to-rebuild-short-range-air-defense-new-lasers-vehicles-units/ (accessed 27 December 2017).

[ii] Tyler Rogoway, "America's Startling Short Range Air Defense Gap and how to close it fast," The Drive – The Warzone, 9 August 2017, http://www.thedrive.com/the-war-zone/13284/americas-gaping-short-range-air-defense-gap-and-why-it-has-to-be-closed-immediately (accessed 27 December 2017).

[iii] Department of the Army, FM 3-0 Operations (Washington, DC: Government Printing Office, October 2017), 2-47, 6-26, 7-9, and 7-19.

[iv] Department of the Army, FM 3-52 Airspace Control (Washington, DC: Government Printing Office, October 2016), 1-2 and 2-4.

[v] Department of the Army, ATP 3-01.18 Stinger Team Techniques (Washington, DC: Government Printing Office, August 2017).

[vi] Department of the Army, FM 6-0 Commander and Staff Organization and Operations Change 2 (Washington, DC: Government Printing Office, May 2014), Chapter 12.

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Airspace Integration in Unified Land Operations

Execution of unified land operations requires many disciplines to synchronize assets and conditions to achieve a combined arms effort toward the end state. Army Doctrine Reference Publication (ADRP) 3-0 establishes several areas that are required to achieve this success, many of which contribute to the holistic approach that should include airspace management. Some of these are clear commander's intent and concept of operations, shared understanding of an operational environment, aggressive planning, disciplined initiative, ability to move quickly, combat power applied through combined arms, and the acceptance of prudent risk. Each of these on their own are important; but it is the combined understanding and execution of all of these that will achieve the end results.

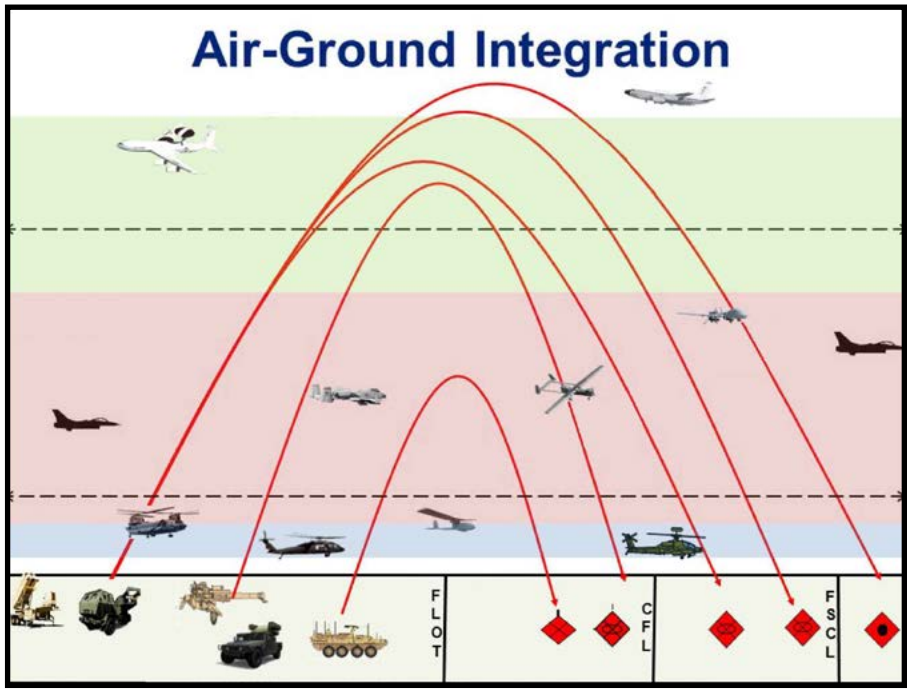

Figure 1

This leads to a question: When does airspace control (procedural and/or positive) need to be established within the planning and execution? Through great technology, the amount of airspace users and the space they need has increased tremendously (Figure 1 shows examples of airspace users). Due to this, the deconfliction of these airspace users is a critical task for any airspace management and/or control team. The U.S. military fights as part of a joint team and, within that, there will be multiple airspace users looking to utilize some of the same airspace to achieve the commander's objectives and end state.

Airspace control increases operational effectiveness by promoting the safe, efficient and flexible use of airspace while minimizing constraints on airspace

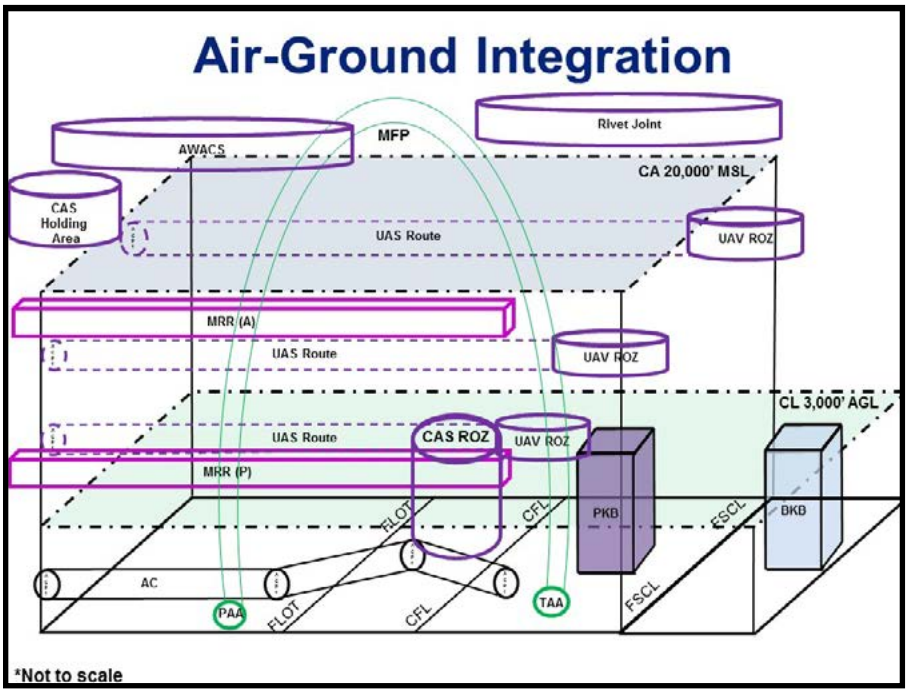

Figure 2

users (Figure 2 on page 5 shows examples of the airspace coordinating measures). Airspace control includes coordinating, integrating, synchronizing and regulating airspace to increase operational effectiveness. The process of controlling airspace has the intent of deconflicting joint intelligence, joint fires, and maneuver through time, altitude and lateral separation. The question becomes if this is so important to the success of the mission, when, how and how often are the priorities for airspace users presented to the commander for decision?

Airspace control planning is threefold and does not just exist within the Current Operations and Integration Cell (COIC). If we wait until we are in the fight to think through the airspace control, we are already fighting dynamically and not deliberately. First, the utilization of airspace to provide effective, efficient and timely joint intelligence, joint fires and maneuver is something that must start at the onset of the military decision-making process (MDMP). Just like all other warfighting functions, the constraints and limitations need to be understood with concerns for airspace control. This is not limited to planning horizons and transitions in the deliberate, but to include constraints and limitations of planning air dynamically.

Second, it must continue through the planning and targeting processes. By doing this, you are able to present to the commander for decision the priority for air just like priority for fires is presented for approval. Last, planning and coordination must occur to know who the airspace users are. With the new publication of the 3-0 series, planning for the consolidation area now takes fires and aviation into consideration. This is not a new concept, but it is something that is not fully phase IV, nor phase III operations, which requires detailed integration to allow for the forces to execute their missions. This will require an understanding of the enemy capabilities that have been bypassed, the capabilities retained in the consolidation area and the commander's intent for the consolidation area.

In addition to planning and coordination, divisions consistently recognize that they want to have a higher coordinating altitude for the Air Support Operations Center (ASOC), which is the Air Force portion of the Joint Air Ground Integration Center (JAGIC) that resides within the Division COIC, or the highest tactical headquarters they serve. Discussion of the coordinating altitude is critical to understand what is being asked and what additional tasks are being asked of the ASOC personnel to control. Many times, the coordinating altitude requested still does not provide the efficiency fires is looking for. Additionally, when the higher coordinating altitudes are requested, there is not a full understanding of what additional assets will have to transverse through, or operate in, that airspace to maneuver to the assigned mission locations.

We as a military have become comfortable with fixed-wing assets (joint intelligence or joint fires) flying at higher altitudes because of the lack of capabilities the enemy possesses. In a peer-to-peer fight, this would not be the situation, and most assets would be flying at a low to medium altitude to protect themselves. This would further require an understanding of airspace users from surface-to-surface shooters, intelligence assets, to air-to-surface shooters and what is the minimum space they need to operate in with prudent risk. Understandably, this is something that may not take place with all assets, but must be planned for. What is important to understand is that, through planning, these are things that are discovered and presented to the commander for approval. Just one example that is often overlooked is the use of minimum risk routes (MRRs) for joint assets that may need to transverse through the assigned area of operations (AO).

Surface-to-surface fires has its own airspace coordinating measures that are produced from the munitions flight path (MFP). Through planning, the field artillery has established templated position areas for artillery and the target areas of interest. If the fire support tasks are integrated properly within the field

artillery support plan and the target synchronization matrix, then we will have a starting solution for when we want surface-to-surface fires. With this information, we are able to plan airspace measures to support those templated locations and times effectively to facilitate surface-to-surface fires. Understandably, this will not be a 100 percent solution, but it will increase capabilities across the operational environment.

Looking beyond the initial MDMP it is the targeting process that allows for this synchronization to take place. No matter the echelon being a brigade, division, or corps, there is a field artillery headquarters (HQs) that owes the commanding echelon of support the apportionment of assets. Utilizing the targeting process, asset apportionment combined with an understanding of the enemy order of battle, provide the commanding HQs the capability to align sensor to shooter linkage. With this understanding, the field artillery HQs, intelligence and the aviation section are able to work through the synchronization and deconfliction of airspace to allow for timely and effective fires.

This process is not something that can survive off of the old philosophy of "big sky, little bullet." As each layer is placed upon the other, the friction points and gaps will become evident. This issue of airspace does not just reside within the division or the senior tactical HQs that has the ASOC. If divisions control the air, then how do corps and field artillery brigades coordinate for the airspace they require to shape their deep fight for the divisions? What about the division artillery assets that are traversing behind the maneuver brigades? They will require some of the airspace controlled by the brigades. ATP 3-52.1 discusses matters of airspace control and integration and is a great place to start the discussion with your planning staff.

Airspace control begins with the understanding of what airspace users are available to that echelon. Throughout the operational planning process, airspace coordinating measures are integrated and synchronized into a unit airspace plan (UAP) and then submitted to the next higher echelon. These unit airspace plans go into the final product, the airspace control order (ACO). Airspace users use this order to plan, and in extreme situations of loss of communication, will be their default order. Just like intelligence preparation of the battlefield and targeting, this does not just fall on the S-3/G-3 Air personnel. This is a discussion between the whole planning staff to ensure full integration and synchronization and allow all executors to be timely and efficient.

Airspace integration is the art of manipulating established deconfliction measures to allow multiple airspace users to simultaneously conduct operations in support of various commanders. In the absence of established deconfliction measures, integration requires coordination and real- or near-real-time airspace control to enable airspace users to safely operate near each other. (ATP 3-52.1, Airspace Control, April 2015).

The following questions are often overlooked when planning airspace. Having these established in unit SOPs will help ensure this does not get overlooked and help identify who is responsible for what.

1. Who writes the unit airspace plan?
2. How do we capture all of the users into our unit airspace plan?
3. When do we discuss the synchronization of the airspace and when do we discuss the integration of airspace into the whole process?
4. Who is the decision approval authority for what has priority within the airspace?
5. How is our planning effectively allowing us to integrate the airspace to be as permissible as possible to all airspace users?
6. Is our unit airspace plan allowing for timely and effective joint fires against the enemy?

The ability of our combined arms team to integrate ground and air operations when conducting unified land operations against a near-peer or peer enemy requires our Army branches to put emphasis on the coordinating measures necessary to preclude fratricide in congested airspace for aviation forces and on the ground for maneuver forces. We can only reduce those risks by incorporating airspace coordination and planning into our training methodology and instruction. We follow this classroom instruction with intense training in the field and exercising those coordination and planning efforts by staff so they become fully trained and mission capable. ■

References:

JP 3-52, Joint Airspace Control, November 2014; FM 3-0, Operations, October 2017; FM 3-52, Airspace Control, October 2016; ATP 3- 52.1, Airspace Control, April 2015; ATP 3-91.1, The Joint Air Ground Integration Center, June 2014.

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Flight Crew Leadership Part III: Captain's Authority *(Part II found in issue No. 62)*

Captains are vested by their company and by aviation regulations with the authority to influence others as the designated leaders of their crews. Discussions on the concept of captain's authority are prevalent in professional cockpits across the world. It is quite common these days to hear flight crews bemoaning the perceived erosion of captain's authority.

How will you react when someone challenges your authority?

Captains over 50 years of age often reminisce about the esteem they were afforded and how the few disagreements that occurred in the bygone era were handled — back in the days when "the captain was king." Any disagreements with ground personnel or cabin crewmembers were dealt with quickly and efficiently, often quite harshly. In many cultures, such respect (or fear) for captain's authority persists to some degree, while in others it is perceived as quickly receding into the annals of history.

What exactly is captain's authority? We can trace the etymological roots of the term "authority" back to early latin, when it referred to someone's advice, opinion, influence or command. Subsequently, it was introduced into french in the 12th century and english in the 13th century and explained as being a source that is used to settle an argument.

In 14th century english, the word authority was refined to mean "the power to enforce obedience." Since the 17th century, "authoritative" in english has been used synonymously as "dictatorial," which is, of course, not the leadership style we want to see coming from an aircraft captain. In its popular use today, the word "authority" continues to have different uses and connotations.

One 20th century definition explained authority as, "the power or right to give commands, enforce obedience, take action, or make final decisions." A modern dictionary defines authority as, "the power to enforce laws, exact obedience, command, determine, or judge." From a psychological perspective, "authority" is defined as, "the capacity to influence others."

Much of the early culture and processes in aviation were modeled from maritime history. As such, the concept of deference to a captain's authority originated in the maritime world, where it was discovered long ago that ships could not be governed democratically without catastrophic consequences. Not too long ago, maritime law actually expressed the matter succinctly by stating, "the captain's word is law."

Further increasing the sense of captain's authority was the tremendous respect, if not awe, most people had toward aviation's early pioneers. It is hard to believe today that in the early days of U.S. Airline aviation, one in six pilots died in crashes every year. For air mail service pilots in the U.S. in the early 1920s, the typical cause of death was fire following a crash.

As air travel became increasingly safe in the 20th century, the public started losing its awe for pilots. As the number of aviators swelled and the accident rate dropped dramatically in the 1960s and 1970s, the public sentiment toward pilots shifted. The general public and, more to the point, fellow aviation professionals such as ground support personnel and cabin crewmembers, no longer saw aviators as minor gods. The increasing accessibility of air travel following the 1978 airline deregulation act in the united states caused a further reduction in the perceived prestige of the airline pilot profession.

As the pilot in command, you have authority to take emergency action and deviate from procedures and regulations in the interest of safety.

Simultaneously, pilot acceptance of CRM during the 1980s was hampered partly by captains who viewed the movement as an attack on their authority. Most recently, in the years since the September 11, 2001, terrorist attacks, pilot unions have voiced concern that security measures have further diminished captain's authority. Security decisions are often made for a flight by government officials without consulting the captain, thus effectively usurping the captain's authority in such matters. What exactly do we mean when we speak of "captain's authority?" How about a concrete example?

This author remembers one early morning departure in the learjet in St. Petersburg, Russia, when his captain's authority was challenged. As a member of the U.S. Congress was boarding the aircraft, the military coordinator for the congressman came to the cockpit and said, "just so we understand each other, I am in charge of this aircraft and I am the one who says where we go and what we do."

A polite yet assertive statement to the contrary didn't convince the very antagonistic aide, who honestly believed he was right. It wasn't until the aide was shown the exact verbiage in the regulations explaining the authority of the captain that he was convinced and ceased his insistence. Challenges to captain's authority must be met head on, but politely. One must remember to never assume malice as someone's motivation when simple ignorance may be involved.

As seen in the previous example, regulations are in place to protect captain's authority. In the United States, Federal Aviation Regulation (FAR) 91.3 (A) states that, "the pilot-in-command (PIC) of an aircraft is directly responsible for, and is the final authority to, the operation of that aircraft." In addition, 14 CFR 121.535 (D) states that each PIC is, during flight operations, "in command of the aircraft and crew and is responsible for the safety of the passengers, crewmembers, cargo, and airplane." FAR 121.557 Allows the PIC to take any action considered necessary during emergency situations that require immediate decisions. Similar language in 14 CFR 91, 125 and 135 all have similar language empowering captains with command authority.

Soliciting participation uncovers hidden options and reaffirms authority: "Our destination and alternate just went below minimums, what are your thoughts on other diversionary fields?"

FAR 121.557 reminds us of the need to keep ATC and dispatch centers informed of our actions during emergencies.

NASA ASRS LEADERSHIP CASE STUDY 1: EROSION OF AUTHORITY?

The following incident was extracted from the NASA Aviation Safety Reporting System (ASRS) archives and shows a ground crew responding disrespectfully and unsafely to a captain's attempt to exert authority. Is such a report indicative of a wider trend of erosion in the ability of a captain's authority to influence behavior?

Report Number: 668284
Date: August 2005
Location: U.S. Airport
Conditions: Unknown
Total Flight Time: 15,000
Altitude: 0 feet
Reporter: Captain
Past 90-day Flight Time: 240
Experience in Type: 5,000 Aircraft: B-737-300
Phase of Flight: Pushback

Pilot Narrative:

ON GATE ON FRI/AUG/2005, AND TIME FOR PUSH BACK, THE PUSH CREW SAID THAT THEY WOULD TAKE THE BRAKES AND HOLD THE PUSH AWAITING FOR CLRNC FROM RAMP. THERE WAS AN ACFT BEHIND US SO THE WAIT WAS EXTENDED. WITHOUT PRIOR COORDINATION, THE FORWARD CARGO DOOR OPENED AND BAGS WERE LOADED. I ASKED THE TUG DRIVER WHO HAD GIVEN CLRNC FOR THE PIT TO BE OPENED. HE SAID THAT WE WERE JUST SITTING THERE AND HE HAD TOLD THE RAMPERS TO THROW THE BAGS INTO THE PIT.

I REMINDED HIM THAT THE CAPT WAS THE ONE WHO GAVE PERMISSION TO OPEN THE DOORS AFTER THE BRAKES HAVE BEEN RELEASED. THIS OPENING THE DOORS WITHOUT COORDINATION HAS BECOME COMMON WITH THE RAMPERS. THE TUG DRIVER THEN STATED THAT THEY COULD DO THIS IF WE WERE WAITING FOR CLRNC.

I THEN SAID, 'NOT WITHOUT TALKING TO THE CREW.' HE THEN SAID, 'SO WRITE IT UP.' I THEN STATED THAT HE SHOULD READ UP ON THE PROCS. AT THIS POINT WE HAD BEEN GIVEN PERMISSION TO PUSH AND I INFORMED THE TUG DRIVER. HE STARTED THE PUSH BY PUMPING THE ACCELERATOR ON THE TUG AND BUNCHING THE TOW BAR AGAINST THE NOSE GEAR SEVERAL TIMES. AT LEAST FOUR TIMES.

I THEN DIRECTED HIM TO STOP THE PUSH, WITHOUT A RESPONSE AT FIRST. I HAD CONCERN FOR THE ACFT NOSE GEAR AND FOR THE FLT ATTENDANTS STANDING IN THE AISLE DOING THEIR DEMOS. ONLY AFTER THE SECOND COMMAND TO STOP THE PUSH DID THE TUG DRIVER STOP. NOT WANTING HIM TO CONTINUE THE BUMPING OF THE ACFT AND REALIZING THAT HE WAS MAD AT ME, I DIRECTED A RETURN TO THE GATE AND THEN DIRECTED FOR ANOTHER PUSH CREW. WE INFORMED RAMP OF THE PROBLEM AND INFORMED COORDINATION CTL.

THE COORDINATION CTLR WAS OF NO HELP IN THE SIT AND BECAME VERY UNPROFESSIONAL AND ABUSIVE TO THE CREW INSISTING THAT THE PUSH CREW WAS QUALIFIED TO DO THE PUSH AND THUS SHOULD BE ALLOWED TO DO IT. SHE STATED THAT WE WERE BEING VERY UNPROFESSIONAL FOR KEEPING THE PAX WAITING AND THAT WE SHOULD ACCEPT THE PUSH CREW AND GO.

THE COORDINATION CTLR MADE THESE STATEMENTS WITHOUT KNOWING WHAT WAS GOING ON. THE RAMP LEAD GOT ON THE HEADSET AND INFORMED ME THAT I HAD 'NO RIGHT' TO REQUEST ANOTHER CREW. I INFORMED HIM THAT I HAD EVERY RIGHT TO PROTECT THE ACFT AND THE CREW AND THAT I WOULD NOT ACCEPT AN INDIVIDUAL WHO TAKES HIS IRRITATION OUT ON THE ACFT. HE INFORMED ME THAT IT WOULD BE FIVE TO TEN MINUTES BEFORE THEY COULD GET ANOTHER CREW, AND I SAID FINE.

SOON AFTER, THE RAMP SUPERVISOR ARRIVED AND HAD THE JET BRIDGE PULLED BACK, AND WE DISCUSSED THE SIT. HE SAID THAT HE WOULD LOOK INTO THE PROB AND REQUESTED A RPT BE FILED. I TOLD HIM I WOULD FILE THE RPT AND FORWARD IT TO HIM. WE PUSHED BACK WITH THE NEW CREW AND DEPARTED.

RAMP PERSONNEL OPENING THE CARGO DOORS WITHOUT CLRNC FROM THE FLT CREW, TUG DRIVERS NOT USING THE PROPER TERMINOLOGY, OR IMPROPER PUSHES HAVE BECOME A PROBLEM. INTENTIONALLY TAKING FRUSTRATION OUT ON AN ACFT CAN NOT BE ACCEPTED.

Transcockpit Authority Gradients (TAGs)

The captain's ability to promote assertive behavior in other crewmembers is directly impacted by the perceived authority gradient that lies between the captain and subordinates. Personal factors such as one's designated crew position, age, experience, proficiency, confidence, gender, depth of voice, reputation, physical size, assertiveness and similar qualities may help create a perception of which pilot exudes more informal authority in the cockpit.

Ideally, a captain will be perceived as having more authority than anyone else in the cockpit. A captain who creates the perception of exuding too much or too little authority is a set-up for CRM problems. It is the captain's job to know how his or her authority may be perceived by others, to be mindful of the perceived TAG and to take measures to adjust the TAG for optimal communication flow.

Three different TAGs are depicted in Figure 1 on page 10. The left side of the depiction portrays a gradient too steep for proper authority to be delegated while still being able to keep communication channels open. An overly steep positive TAG may develop when a captain is perceived as being a domineering type or when a subordinate lacks confidence or assertiveness.

An extreme example of such a TAG is when an instructor or examiner pilot is paired with a relatively new pilot. In overly steep positive TAGs, subordinates may be fearful of how a captain will react to comments, often fearing the wrath of a captain or even trying to avoid condescending comments or negative opinions being formed. Such a TAG is seen as an impediment to the free flow of communication from subordinates. Overly steep positive TAGs are especially dangerous during critical decision-making events, such as during an emergency situation, when a captain is very dependent on input from a first officer.

The middle depiction in the previous figure shows a flat authority gradient where there is equal or nearly equal perceived authority among both pilots or between two crewmembers. Such an egalitarian situation sounds quite pleasant but can actually be very dangerous because it leads to role confusion. Such a situation may exist when

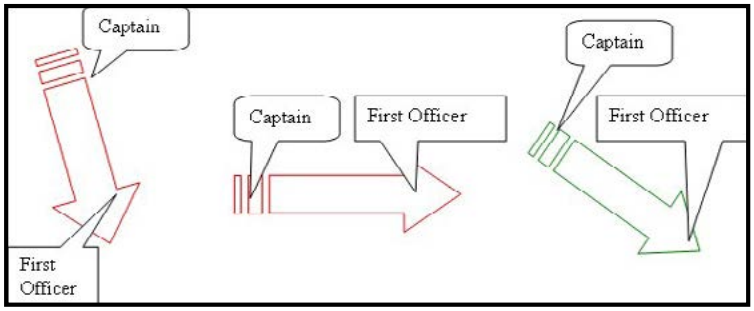

Figure 1. From left to right: Steep Positive TAG, Shallow TAG, and Optimal TAG.

two very experienced pilots are paired for a flight, or when two inexperienced pilots are paired with each other. An example of this may be two senior captains or instructor pilots who fly together. A dead giveaway of a shallow TAG is when one of the pilots says, "I thought you did that." As in, "I thought you did the walk around" or "Didn't you get the weather briefing?" Those two sample conversational exchanges are particularly worrisome when they occur after the aircraft has become airborne.

The right-most depiction in the previous figure shows the best authority gradient, where the captain is recognized by all as the decision-maker on the crew, but where subordinates feel invited to participate in the decision-making process. While making effective decisions, the captain is also making the first officer feel comfortable to voice opinions and input about the flight or situations of the flight.

A completely different situation is depicted in the Figure 2. A negative TAG occurs when the captain is still the designated leader but is no longer the functional leader of a crew. When negative TAGs are present, another crewmember exerts more influence on the decisions that are being made. Negative TAGs create very dangerous situations since the individual who is vested with official authority, as recognized by regulations and the operating organization, ceases to be the individual who is exerting authority.

Negative TAGs have led to several notorious accidents, such as the runway collision between a DC-9 and B-727 in Detroit in 1990. Negative TAGs are also known as "reverse" or "inverted" TAGs. Such gradients can occur when a highly confident and experienced first officer is paired with a less confident captain.

For example, a captain may recently have trained to fly a different model aircraft and may be paired with a first officer who has thousands of hours of flight time in the model. Such a pairing may create the correct perception of increased competence in the first officer during the technical operation of the aircraft, such as when dealing with cockpit automation, which then may foster greater perceived authority in the first officer, but only if the captain and first officer allow such a perception to develop and continue unchecked.

It is a professional responsibility of all crewmembers to be aware of the TAG and to attempt to manage the TAG. If a captain notices an overly assertive first officer who starts making decisions about the flight unilaterally, action should be taken to re-establish the TAG. Sometimes all that is required to flip a negative TAG back to a positive slope is a gentle reminder by the captain to the crewmember that input is invited but the decision rests with the captain. Likewise, subordinates must be mindful that their level of confidence and assertiveness does not take away from the captain's ability to make decisions.

As an example, imagine a charter flight where a captain new to a model aircraft is flying to a wintry location where aircraft deicing and anti-icing is required prior to departure. If the captain is paired with a first officer who has been flying the model aircraft for numerous years in northern climates, it would be wise for the captain to make use of the first officer's experience dealing with cold weather operations. The captain in such a situation should invite first officer comments; however, the captain should be cognizant of the possibility that the TAG may flip from a positive to a negative slope. A tendency to relinquish the decision-making to the first officer would result in a negative TAG.

This picture shows a full-bird colonel acting as a navigator on an Air Force C-130. Imagine a situation where a junior-rank C-130 aircraft commander is flying with the pictured colonel acting as the designated navigator. Such a situation would present a high potential for the creation of a negative TAG, especially when making decisions about navigating the aircraft.

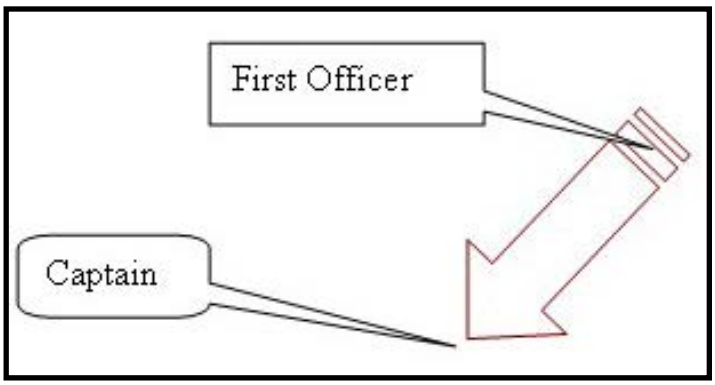

Figure 2. A negative TAG is dangerous because it means a subordinate is performing the decision-making duties of the captain.

It may be tempting for the captain in the scenario to say, "Take care of everything with the deicing. You know what you are doing much more than I do." Instead, the captain could solicit input and then say, "That sounds like a good plan. Thanks for your input. Let's proceed as you suggested." If the captain does not assert the proper TAG, then the first officer should attempt to correct the TAG by stating something to the effect of, "Captain, do you approve of my suggested plan and should I coordinate accordingly with the deicing agent?" In so doing, the first officer has reminded both the captain and him or herself of the dangers of a negative TAG developing and continuing into the future.

At first glance it may seem a negative TAG for a given circumstance is relatively harmless. The problem comes when the precedent of a negative TAG is set and left uncorrected. The possibility of future negative TAGs during the flight increases. With each occurrence, negative TAGs may lead the captain deeper into a psychological state where he or she stops actively processing information required for decision-making. Essentially, a negative TAG sets up a state of cockpit complacency and should be remedied as soon as possible. ■

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Mishap Review - H-64 Near Miss

While performing repairs on an AH-64, a technical inspector (TI) inspected a pitch change link that was turned in for repair. The TI incorrectly tagged the part as serviceable (yellow tag) and stamped the part as inspected. The TI failed to review the Component Removal and Repair/Overhaul Record and the Maintenance Consolidation Database System. As a result, an incorrectly tagged, unserviceable part was put back on an aircraft, where it failed in flight, forcing the crew to execute a landing.

History of Flight

Two AH-64 aircraft had the mission of conducting area surveillance and reconnaissance supporting maneuver forces. The two aircraft departed their forward operating base at 1233 local. While en route to the mission area, the trail AH-64 radioed that it was experiencing violent vibrations. Shortly thereafter, the aircraft yawed left and rotated nose down. The pilot made an emergency call while descending uncontrolled. Within moments the mishap aircraft control was minimally gained and the pilot's actions on the controls allowed him to execute a roll-on landing to an unimproved location. The aircraft sustained damage, while no crewmembers were injured.

Crewmember Experience

The pilot in command (PC) had 910 hours total flight time and 816 hours in series. The pilot (PI) had 960 hours total flight time and 878 hours in series.

Commentary

Within the scope of the investigation into this mishap, numerous maintenance errors were found and multiple personnel were involved in the accident chain of events. This accident classification was a C. As you can see from the summary history, this is a perfect example of a near-miss accident. Only by the skill and effort of the aviators to gain control of the aircraft and make solid emergency landing decisions were they able to prevent a Class A mishap. Leaders at the lowest levels have as much or more influence on identifying near misses, executing corrective actions and reporting them as higher-level commanders do. Leaders can make the difference. They can identify the mistakes and make on-the-spot corrections while annotating the mistake and submitting a near-miss report. Individually, these simple near misses don't seem like much; but when collectively analyzed, they can give commanders and safety officers trend information which can then be addressed locally with increased supervision where necessary and, in this case, quality control surveillance. Leaders can make an immediate difference by instituting near-miss reporting and taking prescriptive action to negate continued failures based on report analysis.■

Class A - C Mishap Tables

	Manned Aircraft Class A – C Mishap Table									as of 6 Mar 18
	Month	FY 17					FY 18			
		Class A Mishaps	Class B Mishaps	Class C Mishaps	Fatalities		Class A Mishaps	Class B Mishaps	Class C Mishaps	Fatalities
1st Qtr	October	0	0	7	0		1	2	6	0
	November	1	0	4	0		0	1	3	0
	December	1	0	4	2		1	0	6	0
2nd Qtr	January	1	0	3	0		1	1	1	2
	February	0	1	4	0		0	0	1	0
	March	0	1	5	0					
3rd Qtr	April	1	0	6	1					
	May	1	0	7	0					
	June	0	3	4	0					
4th Qtr	July	0	1	7	0					
	August	3	3	4	6					
	September	1	1	6	1					
	Total for Year	9	10	61	10	Year to Date	3	4	17	2
	Class A Flight Accident rate per 100,000 Flight Hours									
	5 Yr Avg: 1.14		3 Yr Avg: 1.09			FY 17: 0.99			Current FY: 1.03	

UAS Class A – C Mishap Table									as of 6 Mar 18
	FY 17					FY 18			
	Class A Mishaps	Class B Mishaps	Class C Mishaps	Total		Class A Mishaps	Class B Mishaps	Class C Mishaps	Total
MQ-1	10	2	4	16	W/GE	2	0	1	3
MQ-5	5	0	1	6	Hunter	0	0	0	0
RQ-7	0	16	38	54	Shadow	0	2	10	12
RQ-11	0	0	1	1	Raven	0	0	0	0
RQ-20	0	0	0	0	Puma	0	0	0	0
SUAV	0	0	0	0	SUAV	0	0	0	0
UAS	15	18	44	77	UAS	2	2	11	15
Aerostat	6	0	1	7	Aerostat	2	0	0	2
Total for Year	21	18	45	84	Year to Date	4	2	11	17

Flightfax Forum: Near-Miss Reporting

Many of us have experienced a near miss at some point in our military duties. Perhaps it was a close call with wires or a near midair collision that occurred during the 0400 air assault into a brownout landing zone (LZ). Or maybe your unmanned aircraft system (UAS) nearly collided with a rotary-wing aircraft. There might have been a time when you were almost crushed between a light medium tactical vehicle (LMTV) and a water buffalo during a company movement prep. Typically, the difference between those near misses and an actual mishap is a break in the accident chain which prevented an injury, fatality or damage to equipment.

Most personnel in aviation understand safety and risk mitigation. We are adept at doing the briefing and risk assessment worksheet. We think of safety in relation to our aircraft, the crew and the mission. But how good are we at actively reporting the near misses? Probably not as good as we are at identifying and mitigating the in-flight risk possibilities through the military decision-making process (MDMP) and the orders process.

The near misses come at us daily — unplanned, unexpected and without any cognitive process. These occurrences may be small or large. For example, the hydraulic cart that has a sticking valve that the non-standard method of getting it to work is tapping with a hammer; the electrical cords running across the designated walkways in the hangar that continually trip personnel; backing up a truck to a trailer without a ground guide; the near miss during an aircraft landing to a brownout LZ only witnessed by the command and control (C2) aircraft crew above; and the unmarked tower the crew "almost" hit during an operation.

You are thinking right now, "So what. No one was hurt." The so what is only by one or more crewmembers or personnel involved with the near miss somehow evading death, injury, or damage through some break in the accident chain there wasn't an accident. Yet studies have shown that, varying by industry somewhat, a large enough number of unsafe acts eventually results in a fatality. The safety triangle model, in ***Figure 1***, shows the correlation between unsafe acts, near misses, and minor, serious and fatal accidents. What you can interpret from the chart is that for every 300,000 unsafe acts there are 600 near misses. At the top of the triangle you will see that there is one fatality associated with the 300,000 unsafe acts. So if we can capture the near misses and take some action to reduce them, we should be able negate a fatality.

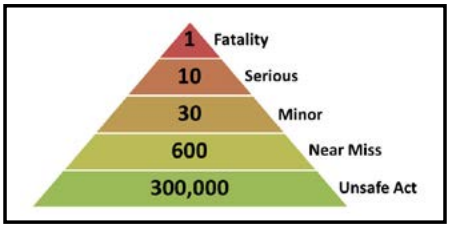

Figure 1. Safety Triangle (Conoco Phillips Marine Study)

Again, so what? What has this got to do with military operations? Actually, it has everything to do with them. As an institution, we are called upon to operate in the most demanding jobs and austere environments with little sleep and long duty hours. So if each Soldier were to start keeping a record of his or her near misses, or those they witnessed, and we consolidated those through some easy reporting procedure, we might be very surprised to see that the number of near misses is very high. Knowing about the near misses can tell us where we are on the scale and make changes to preclude reaching the top, a fatality. Each Soldier is too important to lose to injury or fatality, as well as the operational equipment you utilize each day.

How do we as an Army make a culture change in safety to start reporting the near misses? It starts with leaders taking action and developing the culture within the ranks, from platoon to division, which institutes methods to report and collect near miss information. For the reporter, the method should be very easy to record and submit to the unit safety representative. This could be as easy as a note card. Within the reporting, it should be as the amnesty box is, anonymous yet with an option to self-identify if the Soldier so chooses. Safety representatives then collect the data from the cards and feed the information up the chain. This allows commanders at the lowest level to understand their unit's near misses and take action or push to higher headquarters for assistance and guidance.

In the daily life of Soldiers executing their missions, this may seem like just another hassle. It is imperative commanders, leaders and NCOs be involved at the lowest level and instill in their subordinates that the life that may be saved is their own or one of their battle buddies. Near-miss reporting is a proactive safety style, just like the mission brief and risk assessment worksheet. The Army formally developed and instituted the cultural change in aviation to manage aviation risk and decrease the injury, death and damage to personnel and aircraft with its institutionalizing aviation mission briefs and risk assessments. Now briefs and risk assessments permeate all Army operations. It's time to permeate Army aviation units with near-miss reporting and the follow-on institutionalization within the Army as a whole. This is how we break the accident chain of events. ■

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Blast From The Past: *Articles from the archives of past **Flightfax** issues*

VOL 5, NO. 5, 3 November 1976

Static Electricity in Clothing

Recently an aviator received first- and second-degree burns when his underclothes were ignited by static electricity. He was preflighting a U-8 which had just been refueled and moved into the hangar because of cold weather. The fuel expanded as the temperature increased. When the pilot opened the fuel cap during his inspection, fuel gushed out, soaking his arm and legs. The pilot went immediately to the locker room and removed his Nomex flight suit. Static electricity ignited the fumes as he started to remove his winter underwear.

In another incident, a fuel tanker operator received second- and third-degree burns when the fuel he was recirculating was ignited by static electricity. He was wearing a cotton uniform and a nylon jacket.

Outer clothing builds a charge not only by absorbing part of the body charge but also by rubbing against the body and underwear. When the charged clothes are removed, the electrical tension or voltage increases to a danger point. If the clothes are wet with fuel, the danger is even greater. Fuel-soaked clothes can burst into flames as they are removed. Sparks can also be generated by worn footwear. Soles so worn that nails are exposed present a serious danger since fuel spills in refueling areas are common and fuel vapors near the ground ignite easily.

Recent tests by the Air Force indicate that the buildup of static electricity does not differ greatly by uniform type. A blend or synthetic uniform is no more dangerous than a pure cotton uniform. The tests do show that it is possible to exceed 2650 volts when the uniform is removed. Theoretically, 2650 volts can ignite gasoline-air mixtures (vapor). Other variables such as temperature and humidity may affect the static buildup, but regardless of this, the tests indicate there is a potential danger and it differs little with uniforms or mixes of uniforms.

If fuel gets on your clothes, leave the refueling area immediately and deluge or thoroughly soak the clothes before you take them off. If there is not enough water at the site to soak the clothes thoroughly, ground yourself to a piece of grounded equipment by taking hold of it before you take off the fuel-soaked clothes.

Read FM 10-68 for more information on static electricity.■

Mishap Briefs

Utility Helicopters

UH-60

L Model– While conducting NVG training, the right MLG strut compressed and undercarriage made contact with the ground, sustaining damage. (Class C)

Unmanned Aircraft Systems

RQ-7

B Model– Aircraft lost power to the lights on roll-out under the TALS and veered left striking arresting gear. The aircraft went off runway, separating its MLG and nose wheel. (Class B)

B Model– During mission execution, the AV experienced a loss of propulsion. FTS was deployed and AV was recovered. (Class C)

B Model– Aircraft experienced loss of link followed by loss of RPM. FTS was deployed and aircraft was recovered. (Class C)

B Model– Aircraft experienced servo flap failure during recovery phase of flight. FTS was deployed and aircraft was recovered. (Class C)

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