Dodging the Silver Bullet

How to Survive on Today's High Tech Battlefield

"If you can be seen, you can be hit
If you can be hit, you can be killed."

U.S. Army Tactics of
the Individual Soldier

I have spent my Air Force career flying what fighter jocks joking call "targets." During the Cold War, I piloted EC-130's along the Iron Curtain at 25,000 feet trolling for "Trons" or electronic signals. In a conflict, we were to take those trons and radiate them back disrupting the enemy's communications and radar. Come war, we had a limited life expectancy considering how easily enemy interceptors and surface to air missile's (SAMs) could reach out and touch us. Now I fly C-5A/B Galaxies, a big, fat target for any militia soldier with a shoulder fired SAM. More and more arsenals are filling up with "Silver Bulletted" precision guided munitions with kill probabilities approaching 100%. For me, as a highly visible target, this is a serious matter to consider, if I am to successfully deliver my cargo. In the many hours, I have spent droning in the sky, I have pondered how best to defeat these missiles that can readily reach out and touch me. Looking at it from the attacker's point of view, I identified a series of steps that an attacker has to successfully step through to shoot me down. I realized that by defeating any of these steps, I save my aircraft and deliver my load. Using this series of steps, I developed a tactical attack model that I use to workout a defense plan against potential attacker. This article outlines this model in series of steps I call "The Targeting Cycle."

THE TARGETING CYCLE

In analyzing an attacker's problem, I found a common set of five actions or steps that an attacker must successfully complete. Failure at any step results in a failed attack and the "Silver Bullet" missing its mark. Any attacker must find the target, decide to attack, then physically or otherwise breach through all the natural and enemy barriers to reach that target, and finally to hit the target with sufficient force to kill it.

The five steps in the targeting cycle workout to be:

FIND DECIDE REACH HIT KILL

To Find The Target. The attacker must to know, actively or passively, that a target is out there. Without knowing there is something out there, how can one even think about engaging it. Finding something out there brings up the question of whether it is friend, foe, or neutral. Knowing it is a foe is of limited use; if an attacker cannot track it sufficiently to plan, execute, and deliver an attack. Part of finding and tracking a target requires a sufficient level of accuracy to know where and when to hit it with the weapons or resources at hand. Many a successful

defense relies on defeating an attacker's ability to find, identify, and/or track a target. Defensive countermeasures included, but are not limited to, stealth, sensor jamming, and physical camouflage.

To Decide To Attack. For a potential target to become an intended target an attacker has to decide whether to engage it or not. Several factors drive this decision. Is it a threat? Can it be successfully reached and engaged with the available resources? Is it worth the effort? Will the attacking force survive the attack? Is the collateral damage cost prohibitive? Is the threat of reprisal greater than any potential return? Subconsciously or consciously, an attacker address all these questions, thus a defender can manipulate the answers to his/her advantage. For example, the United States strategic defense against nuclear weapons is currently predicated on deterring a nuclear attacker's decision to launch a nuclear strike with a threat of massive retaliation. fear of retaliation is not the only Influence on an attacker's decision making process. An attacker can be influenced by a technical inability to engage or a fear of revealing his/her position or presence. Deception can also fool an attacker's decision making process.

To Reach The Target. The attacker has to somehow cover the physical space between it and its target. This means overcoming any natural barriers, such as time, distance, terrain, water, airspace, ether space, gravity, and/or vacuum; as well as, overcoming any active and/or passive defenses of the target and/or its supporting forces. Defeating this step is a common approach used in most defense plans.

Examples include:

- The Chinese building of the Great Wall during the Han dynasty
- The British reliance on the English Channel and their fleet for defending the British Islands
- The United States reliance on the Pacific and Atlantic Oceans as strategic defensive barriers
- The USSR use of an integrated air defense of radar, SAMs, and interceptors
- The proposed United States anti-ballistic missile or Star War systems

To Hit The Target. After overcoming the physical and man-made barriers, the attacker must touch, physically or otherwise, the target, that is hit it or deliver an intended force close enough to affect the target. Put simply, the attacker has to hit what he/she is aiming at; this despite any maneuvering or dodging a target may do. Hitting the target means hitting it in the right spot, which goes back to the find step in the targeting sequence. Hitting the wrong spot is at times worst than not hitting it at all; since a miss may give the attacker's presence away. The key for a defender is knowing when and from where an attack is coming from and then taking appropriate actions to move out of the way (i.e. evade the attack) or to force the incoming weapon to miss (i.e. jamming or fool its sensors). Defeating this step is the basis for chaff/flare systems and jamming pods.

To Kill The Target. Hitting the target is not the same as killing the target. An attack must have sufficient force to kill or rather neutralize the target. An attacker does not have to or may not be able to physically destroy its target, but it can neutralize it. A weapon system that does not have

an effect, is not used, or fails to complete its mission is a neutralized weapon system. If an attacker can adversely impact its target this way, then it has successfully killed it.

Many times a weapon impact has little or no effect. This is a reoccurring theme in the history of tactical warfare. Tank armor negated machine guns in WW1 trench warfare. The Confederate ship CSS Merrimac's ironclad sides thwarted the Union blockade ships' broadsides. In each case, it was not a case of finding, deciding on, reaching, or hitting the target; but a case of defeating an attacker's ability to kill the target.

In defense, the key is to minimize a weapon's impact, either through physical protection (shielding or armor) or active damage control to rapidly minimizing any damage. Many a flyer has this mental picture of an airplane disintegrating in midair when hit by a missile; but air warfare history is ripe with examples of aircraft surviving multiple hits, completing their missions, and returning home. Numerous battle damaged B-17s and B-24s successfully completed their WW2 German raids. The B-52s still rained bombs on North Viet Nam and returned to base despite having SA-2 SAM missiles stuck in their tails. For me, I find it hard to believe that the 2 lb. explosive from a shoulder fired SAM would have a catastrophic impact on my C-5 Galaxy, a 700,000 lb. aircraft. This goes to show that it takes more than just getting there. It takes getting there with the right amount and type of force at the right spot to complete a successful attack. Aircrew aircraft malfunction training, the Army's M1A1 tanks' reactive armor, the Navy's shipboard damage control teams are three of the numerous ways to defeat this aspect of the targeting cycle.

Another important aspect in killing a target is knowing whether you actually killed it. What is commonly referred to a battle damage assessment. In many ways, this circles back to the find step of targeting cycle; since an attacker has to determine if the target is still there or not. If the target is not killed, then an attacker has to execute another targeting cycle sequence. Many times the assessment is based on observing the weapon impact and detonation. A defender can exploit this by playing possum or stealing away in the confusion of the battle. WW2 submariners used this defensive tactic when they pumped out oil and debris to make an attacking destroyer think the submarine had sunk.

DETAILED EXAMPLE

While there are a multitude of examples, the targeting cycle of an attacking nuclear ICBM and the defensive tactics employed to derail each targeting cycle step provides the most vivid and readily understood example. To launch a nuclear missile, one needs to know where to target that missile. Normally, the targeting planners identify and or find the target(s) in coordination with the intelligence community and guidance from the national command authorities. An accurate aim point is only contingent on what the nuclear weapon's destructive area and the target's level of hardened protection. The decision step is made by the national command authorities based on whatever political, strategic, or operational factors they perceive and desire. The reach step is achieved by the ICBM's ability to launch into low earth orbit and release its warhead for a ballistic supersonic reentry over the target area thousands of miles away. The hit step is completed with the successful weapon impact and detonation within the intended target area within a time frame that insures that any mobile target is still in the area. Neutralizing or, in this

case, destroying the target is accomplished by insuring that the explosion's heat and over pressure is sufficient to overcome any of the target(s) hardening measures. Accessing whether the target was actually destroyed is verified by satellite or aerial reconnaissance after the dust settles.

To defend against such an attack requires the defender to defeat at least one of the missiles target cycle steps. In the first target cycle step, "find," a defender can make sure any threatened target is either well hidden or mobile enough for an attacker not to know where it is. Mobility is the defensive concept behind mobile ICBMs. For the Decide step, deterrence is the most effective and most commonly used defensive tactic. Here a defender makes sure that an attacker realizes any nuclear attack is not worth the retaliation that would rain down as result. Defeating the penetration step is the defensive idea behind President Reagan's Strategic Defense Initiative (SDI) or Star War's proposal. The idea is to intercept the ICBM and/or nuclear warhead while in flight before it can reach its target(s). It is a real technological challenge to find, track, reach, hit, and kill an ICBM or its warhead considering the available time (the 30 minute ICBM flight time), the distance (thousands of miles of area and 80,000 feet of altitude), and the target size (a moving 2-300 ft ICBM and its 6 ft warhead). While technically difficult, this still makes a great deal of tactical sense should deterrence fail to influence the decide step of an attacker. Because of a nuclear explosion's destructive area, it is hard to negate the hit side of an ICBMs targeting cycle; since a near miss is as good as a hit; though Cheyenne Mountain makes a stab at it. The only possible defense is to get out of the destructive radius of the explosion. The United States does this when it flushes the bomber force upon warning of inbound ICBMs. Shielding and hardening have also been used extensively, but this is really a defense against the collateral damage from a near miss.

Other examples of applying the targeting cycle are provided in the below matrix:

ATTACKER	FIND	DECIDE	REACH	HIT	KILL
Nuclear ICBM	National Intelligence	National Command Authorities	Sub-orbital, supersonic intercontinental flight (speed - 1000s Ft/Sec)	Warhead detonation w/in kill zone	Satellite or visual recce of crater
Medieval Archer	His Eyesight	- Archer - His Lord	Direct flight of the arrow (Speed - @60 MPH)	arrow impacting its aim point	Seeing target fall
WW1 Artillery	- Preset target grids - Forward observers	- Fwd Observer - Battery commander	Ballistic delivery	Round(s) impact in target area	- Enough explosive force to detroy target area - Visual recce

WW2 B-17	- Photo recce - Bombsight	- Target staff - Bombardier	- High altitude, high speed - Fighter escort (Speed - 300 mph)	X number of bombs on target	- Visual recce - Photo recce
Stealth Bomber	- Satellite imagery - Intelligence	- Target staff - Pilot	- Stealth - C^3CM - Terrain Mapping	- PGM - GPS	- Press reports - Impact Video Satellite Recce
PGM Precision Guided Munitions	- Loaded target - Electronic, optical or IR sensor	- Shooter - Programmed instructions	- Direct flight - Small size (Speed -	- Impact on aim point	- Press reports - Impact Video Satellite Recce
Targeting an Aircraft	- Air/Ground radar - Pilot's eyesight	- Trigger puller - Radar controller	Maneuver into effective weapon's range (Speed - Up to Mach)	Weapon detonation on the aircraft	- Critical airframe failure - Target aircraft flees
Targeting a Missile Sub	- Active sonar - Acoustical detection	Attacking commander	Torpedo or depth charges	Detonation on or near the sub hull	Sound of ship breaking up and/or surface debris

TARGETING CYCLE AND A COMPLEX ATTACK ENGAGEMENTS

The above sighted examples may be stating the obvious; it does provide one with a framework to analyze or breakdown any attack's tactical process and/or a defense against it. This model is a tool to analyze warfare's tactical side, but it can be used to dissect more complex situations or engagement. One can string a sequence of individual targeting cycles to analyze the layers of a complex engagement. Here, the overall targeting cycle is first executed by the attacker, then by the attacker's weapon system, and finally by the attacker's actual weapon. All the steps in all three targeting cycles must be successfully completed for overall success. For example, the engagement between two warships can involve several targeting cycles running in sequence - the attacking fleet's targeting cycle, the attacking ship's targeting cycle, the attacking weapon system's targeting cycle, and finally, the missile's targeting cycle used to reach out and hit the enemy ship.

An analyst can also used this tactical model to analyze the tactical aspects of operational and strategic levels of warfare. The only difference between two individuals fighting hand to hand and a clash between two nations or armies is the amount of resources and the engagement's

complexity. For both, each has to find their target(s), decide to commit forces, reach their targets, then hit them with sufficient force to killed or neutralize them. Below is a simple matrix applying the targeting model on current and past operational and strategic engagements.

ERA	FIND	DECIDE	REACH	HIT	DESTROY
Pre-Feudal Warfare	- Scouts eyesight - Human eyeball - Stumble into each other - Agreed to meet for battle	- Commander - Events	- Mass to overcome enemy mass or fort - Hack your way through (Speed - walking)	- Get one or more soldiers to kill or capture the enemy leader	- Killing or capturing the enemy leader - Routing the enemy forces
Roman Army's Defense of the empire	- Scouts eyesight - Human eyeball - Stumble into each other - Agreed to meet for battle	- Emperor - Commander - Events	- Marching over well built road system - Well trained soldiers hacking their way through with spears and short swords	Attack in systematic and well coordinate formations to get to the enemy leader	- Killing or capturing the enemy leader - Killing or selling enemy forces into slavery
Napoleon	- Wide area, multi route troop advances - Integrated spy network	- General with the big picture	Cannonade followed with massed conscript troops charges (Speed - fast horse)	- Bullet or cannon shot - Bayoneting	- Demoralize the enemy army - Possession of the capitol
Nelson and the British fleet	Fast picket ships covering enemy ports and sea routes	- Nelson & his captains - The weather	- Integrated fleet action (Speed - 5-10 Knots)	- Targeted cannonade on the ships	- Enemy lowering of their colors - Sinking enemy ships
World War I Trench Warfare	- Recce Planes - Artillery observers - Telegraph	- General staff planning	- Mass artillery - Mass infantry (Speed - 30 MPH)	- Wide area bombardments	- Grinding down of opposition forces
1940 German Blitzkrieg	- Aerial reconnaissance	- General Staff - Commanding General	Rapid advancing armor with air support - Bypass strong points	- Penetrate weak point and getting into enemy rear area	- Disruption of enemy rear - destruction of coordinate resistance

World War II Strategic Bombing and Armor Warfare	ULTRA code breakers, Signal intel, Radar, Photo reccon	- Operational research - Targeting staffs - General staff	- Mass formations - Coordinated fast moving armor and tactical air units (Speed - 50-350 MPH)	- X number of weapons on target - Depth of armor penetration	- Visual recce - Signal intercepts
Electronic Warfare	Identify enemy frequency	- EW officer - Preset response	Sufficient wattage to cover the ether space to the targeted receiver(s)	Delivery of electronic energy on right freq at the right moment	Disruption or blockage of signal reception

CONCLUSION

For any attacking weapon or weapon system to succeed it must complete five basic steps - Find, Decide, Reach, Hit, and Kill. Any attacking system, be it man, beast, or machine, has to successfully step through these steps or actions to neutralize a target. First, it has to know if there is anything out there and where it is. Then a decision must be made to attack. Once decided, the selected weapon or force has to successfully cover the physical space to reach the target, overcoming all natural and enemy obstacles. Once there, the force or weapon has to hit or impact the target. This force or weapon must have sufficient force to kill or neutralize the target. For overall success, the attacker must successfully complete each action step, if not the attack will fail. Thus any successful defense is predicated on defeating one or all the steps of an attacking force's targeting cycle.

In the end, I figure that I am not the helpless fighter jock's "target," as would first appear. That is because any attacker has to know when and where I'll be. Then he/she must decide it is worth the effort and/or the negative consequences of targeting my aircraft. Once decided that attacker must transverse time and space to touch my aircraft. After all that, an attacker must somehow hit my aircraft with enough force to bring it down. If I can throw a wrench into any of those five steps, I will live to deliver my load.

Now I realize that this simple tactical model can be used by more than an aircraft commander in accessing his/her defensive options. It can readily be used to assess operational and strategic offensive/defensive options. It can also be to analyze the potential of any offensive or defensive weapon systems or strategies. I have found it very useful and hope the reader can use it in assessing any tactical engagement from both sides of the action.

Major Robert Richardson, USAFR
Annapolis, MD

Disclaimer

The conclusions and opinions expressed in this document are those of the author cultivated in the freedom of expression, academic environment of Air University. They do not reflect the official position of the U.S. Government, Department of Defense, the United States Air Force or the Air University.

This article has undergone security and policy content review and has been approved for public release IAW AFI 35-101.