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The Defense Matrix

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Thought is the basis of theory. Theory is the basis for doctrine. Doctrine is the basis for operational practice. Operational practice refines our thought. Today we'll continue our journey through thought and theory as we look at the concept of the defense matrix, a construct, an analytical tool for rationally determining defense requirements.

So what is a defense matrix? Before we dive into the subject, let's start with some definition of terms to make sure we're all starting from the same point. We'll keep these definitions as simple as possible to ease our way into this.

Defense: Protection, having to do with the means of protecting oneself or others from perceived danger.

The next one is a toughie but for our purposes let's define it as follows:

Matrix: A structure that links common and disparate elements into a comprehensive whole. A matrix allows us to view individual elements as a part of a larger, cohesive context.

These are the key definitions. However we'll be using other terms as we go along so let's define some of those as well.

Force: Having to do with physical instruments of power such as weapons and weapons systems.

Non-force: Having to do with non-physical instruments of power such as economic means or cyber technology.

Regional: Having to do with a defined geographical area of a planet.

Planetary: Terrestrial, having to do with the earth or other planet.

Defense … Defense … Defense:

Ever since humanity first reached its collective hand out in the search for food, water, and shelter, we have been concerned with defense. We have ever been focused on defense of ourselves, our means of survival, our family, our clan, our tribe, our nation, our country, and now at the beginning of the 21st century with the planet we live on. Use of force by mankind as a means of defense has over the millennia evolved from the first proto-human with a bone or wooden club to the sophisticated technology driven weapons of today. In between, we have

organized ourselves in ways that allow a more effective, efficient use of force in pursuit of that defense.

We have created military organizations of various sizes and purposes, given them roles and missions to carry out to achieve the common defense, and invented and built equipment designed to enhance our ability to defend ourselves. OK, OK. These same organizations and equipment have been used just as often in offensive wars and actions against neighboring peoples. But ultimately, the basic instinct behind it all was to preserve, protect, and defend (albeit by expansion and gaining of resources at someone else's expense) our family, our clan, our way of life. We're not going to indulge ourselves with a discussion of offensive versus defensive war, or whether a particular military campaign or action had justification. Rather we will content ourselves with the exposition that all human conflict has its basis in the desire to ensure the survival of the individual and by extension that individual's family, etc., right up through the various national political entities we have constructed.

Frequently, that defense has taken the form of perceived or actual force and the will to use it. The perceived threat of the use of force has often been enough to ensure protection from a potential foe. However, ultimately, the possession of sufficient means to defend oneself with is meaningless if one is perceived as unable or unwilling to use that means. The contrary is also true. One may have all the will in the world but still be perceived as helpless if the means to defend is lacking. Be that as it may, a discussion of willingness to use force is best left to other venues. We'll focus instead in conceptual terms on the defense matrix as a means of analyzing the sufficiency of means (equipment, personnel, economic tools, etc.), as a structure composed of those things that provide the means for defense.

In The Beginning

Early humans didn't know that they were creating a force structure based on need when the first club or stone was picked up and used to defend against attacking beasts or encroaching neighbors. However, that's exactly what they did. They needed something to give them an edge over that threat and the piece of bone or wood lying there or the stones on the ground happened to be available. When they proved more effective than teeth and fists in driving off enemies they were kept and later consciously looked for and improved upon. As time passed someone discovered that a long pointed stick was more effective than a club in certain circumstances and the spear was added to the inventory of available tools/weapons. And so it went, with need contributing to the development of tools that might also be usable to defend against one's neighbors. Somewhere along the line, humanity began to actively develop tools specifically designed to give them the upper hand in combat with those neighbors and the cycle of weapons development was set in motion. Common sense and the knowledge gained from the bitter fruit of experience were the guiding principles behind how each nation's military establishment grew. Of course a certain amount of luck in what technology was developed (i.e.: bronze, iron) where and when also contributed to the relative effectiveness of individual weapons and the armies that used them. Over time, as military forces became more complex, a science of warfare gradually evolved where roles and missions of forces and their employment as a whole and of their individual components became the focus of future development. Force, Defense, Regional Defense, and Planetary Defense Matrices can be used to examine our own capabilities and those

of potential adversaries as we seek to determine the adequacy of our defense measures to face present and potential future threats.

Force Matrix:

A matrix, as defined earlier, links common and disparate elements into a comprehensive whole and allows us to view individual elements as a part of a larger, cohesive context. A force matrix is a means of linking the elements of a force component (roles and missions and available force structure) with an actual or perceived threat and the means to counter it. This matrix can be used to quantify available forces vis-à-vis their stated roles and show any gap that exists between available forces and the ability to counter existing or future threats. Lets use one of our early human ancestors to provide an easy example of what a force matrix might look like.

So we have our caveman from times past bee bopping along the prehistoric countryside trying to make a living for himself. What might his roles and missions be? I think we can categorize them pretty simply into:

1. Find shelter

2. Find water

3. Find food

4. Defend self and 1, 2,and 3 from all comers.

Presupposing that he's been able to achieve numbers 1, 2, and 3, what might his force matrix look like to help him accomplish number 4? Maybe something like this.

Roles and missions: Defend self, shelter, water and food supply
Force available: Fists, club
Threat: Wild animals, neighboring family of 20 with fists, clubs, and spears
Force needed to counter threat: Fists, clubs, spears, more people
Gap/Shortfall: Spears, 10 + people capable of carrying weapons

Boy oh boy, our caveman sure has a significant problem here. He's short of spears and people in a big way. How will he be able to effectively defend his means of life against a numerically superior and better-equipped foe? If it came down to a confrontation right now between the two camps, our caveman would be just out of luck. However, if he had some time to prepare, what could he do to change the odds some?

Well, our caveman could do a number of things. If he were the stealthy type, he might eliminate the neighbors one by one using his fists and club. He could steal one or more of the spears. He could attempt to raise a family of his own to equalize the numbers. He could invite other single cavemen to share his territory, also raising the numbers on his side. He could become a member

of the neighboring family, thus eliminating that threat and solving the problem of the force gap in one fell swoop. These are pretty much traditional answers to the problem faced by our caveman. Variations of these have been used throughout history with varying results. The Israelites destroyed Canaan through conquest. The Romans tried inviting Germanic tribes into the empire to bolster its defense against other foes. The ultimate results were not exactly what they had in mind. Smaller areas tied themselves to stronger neighbors in feudal times through pledges of fealty. Today we might call these policy options. The trick is to select the right option for the threat. Of course one must also identify the correct threat.

Thus the last piece in the force matrix is the solution to the shortfall in capability. In short, it's a plan to solve the problem and allow the force component to carry out its roles and missions. For our caveman, the complete force matrix might have looked liked this.

Roles and missions: Defend self, shelter, water and food supply
Force available: Fists, club
Threat: Wild animals, neighboring family of 20 with fists, clubs, and spears
Force needed to counter threat: Fists, clubs, spears, more people
Gap/Shortfall: Spears, 10 + people capable of carrying weapons
Solutions/Policy Options: Become one of the family

In a physical sense, our caveman's force matrix is composed of fists and clubs. That's the available force, the weapons he has at hand. But as an analytical tool, as a way of thinking about the problem he faces, the force matrix becomes a way of viewing his situation in a larger context that allows him to identify solutions and take actions to improve his situation.

Defense Matrix:

Simply stated, a defense matrix is the combination of individual force and non-force matrices into an overall matrix that permits defense of (or projection of power from) an area, people, or nation. Sounds complex doesn't it. In reality it's quite simple. Let's look at an example to see what it's all about.

Let's say that in ancient times there was the fictional city-state of Kalakar located in the northern central portion of the equally fictional Andorian Sea. Situated at the end of a large peninsula, the primary land access to Kalakar was along the flat plains of the peninsula. It's location led naturally to the development of a large merchant fleet, and an army and a small navy to defend the merchant fleet, the city and its trading routes. In simple terms, what might the force matrices of Kalakar look like?

City-State of Kalakar: Ground Force Matrix: Technology: Bronze weapons
Roles and Missions: Defend the city of Kalakar from all land attacks
Force available: 1.Infantry: 2,000 w/ shield, sword, and spear in phalanx 2. Cavalry: 500 light cavalry w/ shield, sword, and javelin

Threat: Three rival city-states (Sierra, Rumo, and Ngogo) located inland with no water access but with sizeable armies composed of: 1. Infantry Sierra: 1,500 w/shield, sword, and spear in phalanx, 500 composite bowmen, 300 slingers Rumo: 2,000 w/shield, sword, and javelin in century squares, 300 short bowmen, 500 spearmen (Iron weapons) Ngogo: 1,000 w/ shield, and sword, 350 short bowmen, 400 spearmen, 200 slingers 2. Cavalry Sierra: 100 heavy cavalry (armor, shield, sword, and lance), 300 light cavalry Rumo: 700 light cavalry Ngogo: 200 light cavalry 3. Chariots: Sierra: 100 two person war chariots (driver plus 1 w/ short bow & javelin) Ngogo: 200 three person war chariots (driver plus 1 w/ shield, sword, and spear plus 1 w/ short bow) 4. Elephants: Sierra: 50 War Elephants (driver plus platform w/ 2 composite bowmen)
Force needed to counter threat: Infantry: 3,000 w/ shield, sword, and spear, 500 bowmen, 400 w/ spear and javelin, 100 slingers Cavalry: 200 Heavy Cavalry, 700 Light Cavalry Chariots: 100 three person war chariots
Gap/Shortfall: 1,000 Infantry, 200 Heavy Cavalry, 200 Light Cavalry, 100 War Chariots, Iron Weapons

City-State of Kalakar: Naval Force Matrix
Roles and Missions: 1. Defend the merchant fleet 2. Defend the city-state from naval attack 3. Defend the trade routes (merchant fleet routes) 4. Transport and support ground forces as necessary
Force available: Galleys and biremes (in 2 mixed squadrons of 25)

Threat: 1. Pirates that frequent the eastern portions of the Andorian sea (mostly simple galleys operating in groups of up to 5 ships) 2. Naval forces from the rival city-state of Lumbago situated at the Western end of the Andorian sea (galleys, biremes, and triremes in 4 mixed squadrons of 30)
Force needed to counter threat: 1. Mixed squadron of 10+ ships to patrol the eastern Andorian Sea against Pirates 2. At least 5 mixed squadrons of 30 ships to counter the Lumbago threat and protect fleet 3. Triremes
Gap/Shortfall: 1. 4 mixed squadrons of ships 2. Triremes 3. Transports to carry ground forces

OK. We've looked at the two force matrices for Kalakar but we're still missing something. If you remember our caveman force matrix, you've probably noticed that we've left the solution portion off both the ground and naval force matrices. Why you may ask would we do that? Well, as we combine individual force matrices into a larger, more comprehensive defense matrix, the solutions for the shortfalls found in an individual matrix become part of the overall solution to meeting the defense requirements of, in this instance, Kalakar. OK. So what would the solution portion of the defense matrix for Kalakar look like? Bearing in mind the purpose of the defense matrix is to defend/protect Kalakar against all threats, the solution portion of the matrix might look something like the following.

Kalakar Defense Matrix: Solutions/Policy Options:
1. Acquire the technology for iron weaponry
2. Ally with Rumo (offer access to Kalakar port and trade routes)
3. Pay tribute to Lumbago
4. Develop triremes
5. Build a minimum of 5 mixed squadrons of 30 ships to counter Lumbago threat and protect trade fleet
6. Build transports
7. Train and equip some additional ground forces (based on success of option 2)

What's this you say, two of the solutions have nothing to do with developing force capability. Not strictly true. Allying with Rumo gives access to the ground forces of that city-state thus equalizing the force balance with the two remaining inland rivals and perhaps lessens the requirement to add additional ground forces for Kalakar. It also gives access to Rumo's iron

technology (superior to bronze weaponry). Paying tribute to Lumbago gives Kalakar the time to build up its naval forces to meet the Pirate threat and safeguard its trade routes without having to take on Lumbago in the near future. The net result is an increase in the overall Kalakar force capability vis-à-vis the perceived threat and an increase in Kalakar's ability to meet its ultimate goal of defending itself and its interests.

Thus when we look at a defense matrix, more than just force capabilities come into play when we look at the mix of possible policy options (solutions) available. Although we will not focus on it in this article, economic factors may be as important in achieving defense goals as purely force-based options. Giving Rumo access to Kalakar port and the trade routes now gives Rumo a vested interest in ensuring the security of Kalakar, its merchant fleet, and the trade routes covered by that fleet. This economic option may do more to safeguard Kalakar than adding another 1000 infantry would have done. Thus, when we consider a defense matrix, non-force based options must also be factored into the mix of solutions/options as we look at how best to solve the shortfalls we have discovered through our analysis.

A defense matrix can be much more detailed and in-depth than our Kalakar example. Each component can be further sub-divided according to mission. For example, with Kalakar we might have examined the types of things the ground force is required to do (scout, skirmish, engage in close contact field battle, man the city walls, etc.) and then determined whether the existing force was composed correctly to accomplish all those things. If not, then we then have the ability to examine the force mix, the missions, and the perceived threat and decide what kind of additional ground forces would be required.

Regional Defense Matrix:

A regional defense matrix is the combination of individual defense matrices into a coherent whole to permit defense of, or projection of power from, a region or hemisphere of a planet.

In simple terms, the Air Force, Army, Navy, and Marines have force matrices. The United States has a defense matrix composed of those and other force and non-force matrices. NATO has a regional defense matrix composed of portions of the defense matrices of each of its member nations. Examining combined defense matrices, in much the same fashion as we did with Kalakar's force matrices, is a means of quantifying force capability on a regional basis provided a structure exists to allow unified policy options to be exercised based upon the resultant regional defense matrix. It is possible that countries may chose to commit only a portion of their defense matrices to the regional defense matrix. In such a case, the regional defense matrix would not be equal to the sum of the defense matrices of the countries providing forces even though the force capability available through the regional defense matrix may well be greater than any of the contributing nations could muster alone.

To examine this from a less complex viewpoint, let's look at our ancient Andorian Sea example again. Kalakar has two force matrices (ground and naval force) which are components of its defense matrix. If you add the non-force capability of Kalakar to influence its rivals (economic power), we could say that the Kalakar defense matrix is greater than the sum of its force components. Now let's change the situation just a little. Lumbago has become much stronger and

has deployed an army across the Andorian Sea posing a direct threat not only to Kalakar but also to Sierra, Rumo, and Ngogo as well. Those four city-states form an alliance against the Lumbago threat but each only gives a portion of their ground forces to a common defense force under Rumo command with a joint council established to determine policy matters for the joint force. In doing so, they have effectively created a regional defense matrix to which only a portion of the ground force matrices of the member states are committed. The regional defense matrix of these states is by definition less than the sum of all their defense matrices had they combined them against Lumbago. However, as we see below, the regional defense matrix force capability of the Andorian Alliance is greater than anything that these city-states could have fielded alone. Note that all city-states have kept a force in reserve and are unwilling to provide more to the joint alliance force due to concerns about compromising their independence and freedom of action.

Regional Defense Matrix: Andorian Alliance: Technology: Iron and Bronze weapons
Roles and Missions: Defeat the Lumbago invasion. Defend the northern Andorian region.
Force available: Infantry: 4,000 w/shield and weapon(s), 600 w/bow, 200 w/spear, 300 slingers Cavalry: 50 heavy cavalry, 1000 light cavalry War Chariots: 50 two person chariots, 150 three person chariots War Elephants: 25 War Elephants
Threat: Lumbago ground invasion force Technology: Bronze Weapons Infantry: 2,000 w/shield, swords, and javelins, 400 w/short bow, 500 w/spear Cavalry: 750 light cavalry War Elephants: 100 War Elephants
Force needed to counter threat: Force considered adequate if mismatched in some areas.
Gap/shortfall: Numerical superiority in most areas. Shortfall of 300 spearmen and 75 War Elephants.
Solutions/Policy Options: 1. Request more spearmen from Rumo and Ngogo 2. Request additional War Elephants from Sierra 3. Fight with forces available

Questions of sovereignty and control over foreign policy decisions will always have an impact upon the make-up, longevity, and effectiveness of a multi-national regional defense matrix. For example, none of our city-states want to give up their independence and thus each has limited the number of troops they are willing to assign to the Andorian Alliance. Additionally, one or more of them could still seek to make a separate peace with Lumbago. Temporary unity of purpose is not always the same as willingness to form a permanent integrated relationship and today's allies of convenience may be tomorrow's adversaries in one arena or another. But while it lasts, a

regional alliance with its associated regional defense matrix can be an effective tool to enhance the force capabilities of its members against a common perceived threat.

Planetary Defense Matrix:

A planetary defense matrix is a defense matrix, a regional defense matrix, or any combination of these formed into a coherent whole permitting defense of or projection of power from a planet and/or permitting defensive actions or projection of power on a planet-wide basis.

Well wait a minute. Didn't we just finish defining those other matrices as something else? Yes we did. But that does not exclude a defense matrix from also being a regional defense matrix under the proper conditions. It also doesn't prevent a defense matrix or a regional defense matrix from intrinsically having properties that might also make them a planetary defense matrix. How so you say?

The defense matrix of the United States, for example, with its demonstrated ability to defend and project power from North America, also qualifies as a regional defense matrix. Additionally, with its space capabilities, the US Defense Matrix would also qualify as a planetary defense matrix. The air and space capabilities of the United States are sufficient to permit some defense of and projection of power from our planet. Of course it has also demonstrated the capability of projecting power on a planet-wide basis. Likewise, although not designed for that purpose, the NATO Regional Defense Matrix could also be a planetary defense matrix because of the force capability to project power on a planet-wide basis should the political goals and intent of the governing body change at some point in the future. We must also keep in mind that once we look beyond traditional force capability into the cyber dimension of warfare, we find that even the smallest nation with the least capable force matrices may still have the ability to project power planet-wide through possession of a cyber matrix capability. Thus whether a planetary defense matrix exists may no longer hinge on traditional force matrix capabilities.

Perhaps at this point we should also make the crucial distinction between capability and behavior. As we saw above, a defense matrix may contain a force and/or power projection capability that also makes it a regional and/or planetary defense matrix. We can say that any defense or regional defense matrix that contains an aerospace force or a cyber warfare capability is inherently a planetary defense matrix. However, regardless of force capability, it is the decisions, objectives, and goals of the relevant governing body that determines whether a defense matrix behaves like a defense matrix, a regional defense matrix, or a planetary defense matrix. A nation with a robust traditional geo-spatial force capability may make political decisions that bind that capability into a defense matrix framework even though the capability may exist for it to act as a regional defense matrix. An alliance with a capability to project power planet-wide may chose to harness that capability only for regional applications. Thus political will and intent are just as important as matrix capability in determining its ultimate application and use.

One more time:

Let's go back to our Andorian Sea example for one final time to examine this in another fashion. Kalakar has two force matrices which combine with non-force capabilities (i.e.: economic power) to form the Kalakar Defense Matrix. The political intent of the Kalakar government determines the role and missions of the defense matrix and its constituent parts. Once the Lumbago threat arose, the Andorian Alliance was formed and created a regional defense matrix for the purpose of defeating the Lumbago invasion and defending the northern Andorian region.

Fast forward two thousand years. Our city-states are now part of the large and prosperous Kandor nation-state. Kandor has only a modest defense matrix, capable of defending Kandor itself but with little force projection capability. However, it is developing a cyber war capability that will permit it to project power planet-wide should it choose to use that capability. Thus Kandor possess only a traditional defense matrix which may soon have an inherent capability to act as a planetary defense matrix using its cyber matrix if the political decision is made to do so.

Kandor is also a member of the Northern Alliance. Other member states bring robust defense matrices to the alliance giving it a force mix capable of both regional and planet-wide action in defense of the alliance's interests. The alliance also has a large aerospace component that permits power projection into space in the immediate vicinity of the planet. Faced with an imminent threat to the planet from a swarm of large meteors, the alliance decides to only strike those threatening their own countries. The alliance does nothing to stop the others because the meteors will impact on the other side of the planet and bear no threat to the alliance countries themselves. In this instance, even though the alliance possesses a planetary defense matrix capability, the political decision is made to limit the use to a regional defense against the meteor swarm. Thus the alliance behaves as a regional defense matrix even though it has the capability to project power to defend the planet as a whole.

Non-state force matrices:

Force matrix to defense matrix to regional defense matrix to planetary defense matrix, this appears as a natural progression of force and non-force capability from least to greater starting with our caveman and extending through today's highly technologically based defense components. A defense matrix may be a regional and/or planetary defense matrix. A regional defense matrix may also be a planetary defense matrix. Political decisions, will and intent, will determine what type of matrix behavior we are confronted with. Sounds pretty good. However we have forgotten one evolutionary step. We talked about cyber technology as giving a country with only a modest defense matrix the capability of projecting power on a planet-wide basis, thus behaving as a planetary defense matrix, by using its cyber matrix. However, cyber warfare capability is not limited to states as a part of a defense matrix.

Cyber technology has extended this capability to corporations and individuals that may act as independent agents or as part of a private alliance seeking to obtain corporate, group, or personal objectives. These non-state entities already have more traditional force options available which effectively means they possess force matrices. Governed by corporate, group, or private objectives, goals, and intent, these non-state force matrices are not bound by the restraints placed upon the state's defense matrix. Possessing certain force and non-force capabilities give them the ability to project power at specific locations and times. Cyber technology, however, gives these

individuals, groups, and corporations the ability to project power on a planet-wide basis thus giving them the same options available to countries and regional alliances possessing a cyber matrix. One person, a modern caveman as it were, huddled in a darkened room, now has the ability to influence events on a planet-wide basis. When a corporation, group, or individual combines available force and/or non-force capabilities, we have the emergence of non-state defense matrices which may be analyzed in the same fashion as state controlled ones.

Caveman to Caveman:

We started with our ancient ancestor, the caveman, and looked at examples that described how force capabilities evolved into force matrices and from there to defense, regional defense, and planetary defense matrices. We end with our modern caveman in possession of the same capabilities in the cyber warfare arena that many states possess. Through it all, the concept of a defense matrix gives us the ability to quantify the capabilities possessed by a nation, corporation, group, or individual. It gives us a means of laying out force and non-force capabilities in a coherent framework that allows us to examine physical (i.e.: weapon systems) and non-physical (i.e.: economic and cyber) instruments of power in a manner designed to reveal shortfalls and gaps in capabilities against perceived threats. The matrix approach provides a foundation for the requirements process and the development of rational options based on this quantified information. What it cannot do is take into account the intangibles of emotion, personal genius, and the will to win against all odds. Nor will it show that a people armed with rifles may be capable of sending a more technologically capable opponent packing because media coverage erased a nation's political will to continue.

It's a tool:

The defense matrix is a construct, a tool, no different than the bone club our caveman found and used. And as a tool, it can and should be used to best advantage to provide a quantified measure of defense capabilities and requirements in the face of perceived threat. Shortfalls in one or more aspects of the defense matrix can but do not automatically translate into requirements at the policy level as options are determined on the basis of all instruments of power available. But the defense matrix approach provides the ability to rationally determine policy based on a quantified measure of defense capability.
