

S E C O N D L I N E O F D E F E N S E
Delivering Capabilities to the War Fighter

A CONVERSATION WITH GENERAL CORLEY ABOUT THE FUTURE OF AIR POWER



THE FUTURE OF POWER PROJECTION

REPORT 1

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Enduring Goals

In late August 2010, Second Line of Defense's Robbin Laird visited with General Corley and had a wide-ranging discussion of the future of air power. General Corley retired November 2009 as the 4 star commander of the Air Combat Command, with headquarters at Langley Air Force Base, Va. and Air Component Commander for U.S. Joint Forces Command. ACC operates more



than 1,200 aircraft, 27 wings, 17 bases and more than 200 operating locations worldwide. General Corley is a widely respected air power thinker and joint force commander. In this interview, General Corley provides us with a *tour de horizon* on air power and national security strategy with a special emphasis on how to leverage the new capabilities and to build upon those capabilities for the future joint and coalition force.

SLD: Could you first lay out your thinking about why we have a combat air force and the role of that force within the joint forces?

Corley: We've described it in a variety of different ways, but the US Air Force is historically associated with 'global vigilance', 'global power', and 'global reach.' I think it's with good reason that we start with 'global', because if you spin the globe and park your finger at any point on the globe, the Combat Air Force (CAF) will be able to influence operations at that point.

Traditionally the CAF was combat air power, but today the CAF is more than just fighters and bombers operating in the air. It is our air, space and cyberspace Airmen, organizations and capabilities to deliver global power and to provide for global vigilance.

USAF global tool sets are necessary to underpin a national military or a national defence strategy, which, in turn, underpins a national security strategy. Global power and global vigilance are where I would start as we discuss the role of the CAF.

What are the enduring contributions such a force must provide? What are the enduring ends, which have applicability across a range of military operations? I think sometimes, people are wanting to carve out the limited utility of service A, B, or C, what that service contributes in terms of niche capabilities for the broader the range of military operations, rather than focusing upon joint capabilities across the global operational spectrum.

In my mind, I think enduring capabilities for a CAF is, first, the ability to dissuade and deter, and I probably think I would add the word reassure. I think we are missing the point if we don't have an ability to dissuade an adversary, to deter an adversary, or to reassure an ally.

Another key enduring end is decision superiority. How do I make a more fact-based or more informed-based decision than does my adversary? Whether my adversary is someone regular or irregular, nation state, near peer, new peer, or some extremist, how do I make decisions that are better in a shorter period of time than the adversary can make?

SLD: A term we use in place of C4ISR is C4ISRD. C4ISR are the tools that can either get in your way or facilitate good decision-making.

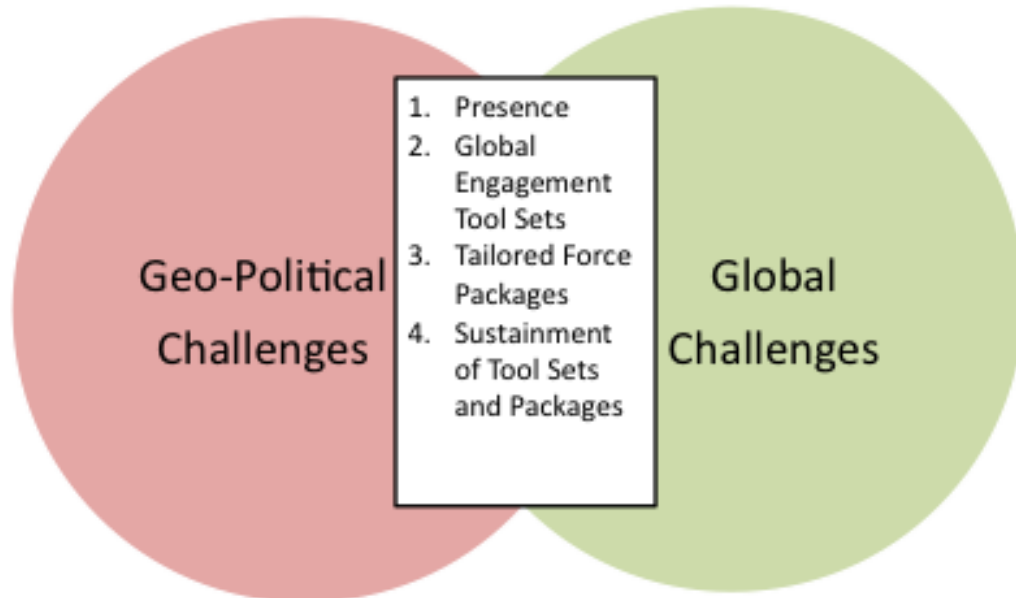
Corley: We seem so enamoured to start each conversation or punctuate the conversation at only a platform level. We want to talk about an MQ9, or we want to talk about a predator. Such an approach totally misses the point.

How does information that flows from sensors on board a platform (whether air based or space based), how is that used? How is that information assessed, analysed, distributed and used for what purpose?

Ultimately, what we want is to make better-informed decisions. So, dissuade, deter, reassure, first, then decision superiority is a second enduring end. I would argue whether it's today in Afghanistan or in some other future operation, what you call C4ISR D is crucial for mission success.

SLD: What you're describing are persistent requirements throughout different spectrums of warfare operating in a variety of scenarios. These are constants, which are necessary to achieve mission success.

USAF ROLES IN EXERCISING SOVEREIGN OPTIONS IN THE 21ST CENTURY



Corley: All true. They are ends. Another enduring end, and a theme that is pulled through the JOE or the joint operating environment, plus pulled through the Capstone Concept for Joint Operations, is the necessity for operational freedom of action. I believe that the ability to deliver on freedom of action is again, an enduring end for a CAF. Whether it's a maritime domain, or an air domain, or a cyber-domain, or a space domain, the desire to obtain and maintain freedom of action is a necessity; it's an end that you have to deliver on.

SLD: If you go back to the point about deter, dissuade and reassure, if we talk about the United States and its allies from this point of view, we have a number of regional partners, very few of them have global reach. If the United States doesn't bring global reach to the party, then it's going to be very difficult to give allies freedom of action, because their freedom of action is constrained within the region in which they operate.

Corley: All true. Otherwise, deterrence theory does not work. There's another word I would throw out for consideration, and that's the word credibility. If we are absent the tools to underpin the global precision attack concept of operations, then we can't deliver on the enduring end to dissuade and deter. If we can't deliver on dissuade and deter then what happens is that allies are

not reassured and those allies could make choices to proliferate a family of capabilities not consistent with U.S. strategic interests.

The CAF needs a flexible set of tools that friend and foe alike can credibly believe might be



used. Use of them, in turn, would imply that use of even more powerful tools would be used, if they don't accept my interpretation of the situation. If I don't have the "front game" tools that I can employ rapidly and to facilitate accurate, rapid decision making, the other guy may clearly misunderstand my longer-term intent. Ironically, the more you reduce effective deployable tools, the more you risk creating a WW1 situation in which sides start mobilizing capabilities without a sense of the end game.

(Seen here is of Lt. Col. Berke USMC Top Gun pilot assigned to the Raptor team at Nellis AFB where the Raptor has been used in shaping joint con-ops for an integrated air-naval capability).

SLD: If you're absent the proper tools, you're absent the credibility.

Corley: This week, twelve F22's, and six B-52's are rolling into Guam for the purpose of supporting a continuous bomber presence in Guam. In my mind this feeds into the dissuade, deter and reassure aspect that needs to be underpinned; but if you are absent flexible tools or you're unwilling to use those tools, then your ability to underpin that enduring end begins to disappear.

SLD: Are there other enduring ends which you would consider important?

Corley: I have talked about dissuade, deter, and reassure then we talked about decision superiority. We also briefly discussed operational freedom of action. A last enduring end that I would like to emphasize is persistent pressure. Persistent pressure provides the joint force coercive pressure in the form of multidimensional, distributed, coordinated, lethal and non-lethal effects. This locks down areas of interest and denies an enemy freedom of action. By the way, all these enduring ends are not mutually exclusive. They have inter-dependencies across them.

Shaping an Effective Concept of Operations

The enduring goals, ends, or objectives of the CAF are underpinned by a set of concepts of operations. For the air domain, air superiority is a service core competency of the Air Force, bol-

stered by collaborative competencies from other services that also contribute to air superiority. This is a constant of operations that underpins operational freedom of action.

If you don't underpin operational freedom of action, then again, your freedom from attack, freedom to attack, freedom to manoeuvre vanishes. If that vanishes for the joint force, then I don't think you have an effective fighting joint force. I also think your ability to dissuade/deter comes called into question.

We can take note of an example of that when I talked about the global precision attack. If we can no longer hold targets at risk because we no longer have credible assets to be able to strike targets, whether that's lethal or non-lethal ways to strike those targets, then we are no longer credible.

For example, when the 509th bomb wing's 20-year old B-2 platform no longer possesses the ability to penetrate anti-access environments, even with the finest aviators, maintainers, logisticians, then the global precision attack concept of operations is called into question. If it's called into question, can you credibly dissuade and deter? And so the ends begin to come apart.

SLD: We clearly are working in a relatively constrained fiscal environment, how do we maximize the air superiority effort in these circumstances?

Corley: The approach is to leverage extant legacy assets through building upon the foundation provided by F-22s and F-35s. For example, if I've got a fleet of F-15s, how can I leverage those F15s in a potential future environment at the challenging end of the scale with the range of military operations? F-15s today, or F-18s, or F-16s, do not possess the needed survivability inside an anti-access environment. One can say what you will, argue what you won't, they will not be survivable.

And from con-ops point of view, they're being pushed further and further out due to terminal defences or country wide or regional defences that exist. And this diminishes their utility, but they can still be effectively utilised.

For example, you may take an existing platform, like an F-15 from the Air Force and begin to apply a pod to provide for infra-red search tracking, so that it could basically begin to detect assets and then feed that information back to other assets. Or, by providing for connectivity with some advanced tactical data link, that platform, in turn, could be directed to launch weapons from it.

Even if we have the capabilities of platforms like F-35, F-22, B-2, or a follow on long range strike platform, they ultimately will be limited; limited by what? Limited by things such as, what is their capacity to carry weapons?

If I'm going to be able to apply persistent pressure, then I have to have some capacity to employ others' weapons. If I eventually run my F-35s out of SDBs, or out of JDAM's, is there a way for them to still contribute to the fight because they're inside of that anti-access bubble, still using their sensors, still communicating? Can I contribute to weapons employment from other platforms, outside the anti access bubble to enable the concept of operations and apply persistent pressure?

SLD: When, the F-35 or the F-22's are in the anti-access environment, they will carry less weapons because they're internal to the aircraft, as opposed to external to the aircraft. So almost by definition, they're going sub-optimal in terms of the full load they could carry if they were not in an anti-access environment.

Corley: A CAF aerial vehicle needs to be lethal; it needs to be survivable; it needs to be supportable, and design traits have to enhance survivability. You are exactly right in your argument that they have a limitation in terms of lethality capacity from a weapons metric due to the design for enhanced survivability.

The weapons are, in fact, inherently limited because of internal carriages; internal carriages which were demanded in a design trade, to enhance the survivability aspect of the platform itself. We have four weapons bays in an F-22, two weapons bays in an F-35, three weapons bays in a B-1 for example. You can try to optimize the different types of weapons that you carry, but, of course, once you take off with that set of weapons, functionally it is, in fact, limited. I only have so many weapons I will carry inside the aircraft.

Shaping Future Capabilities

SLD: We have barely scratched the surface in building next generation weapons for the F-35. Weaponization for these new aircraft, especially with the nano-technology developments and miniaturisation, we can see many innovations enhancing the capability inside the aircraft over the years ahead. We're talking about a thirty-year life cycle for this aircraft.

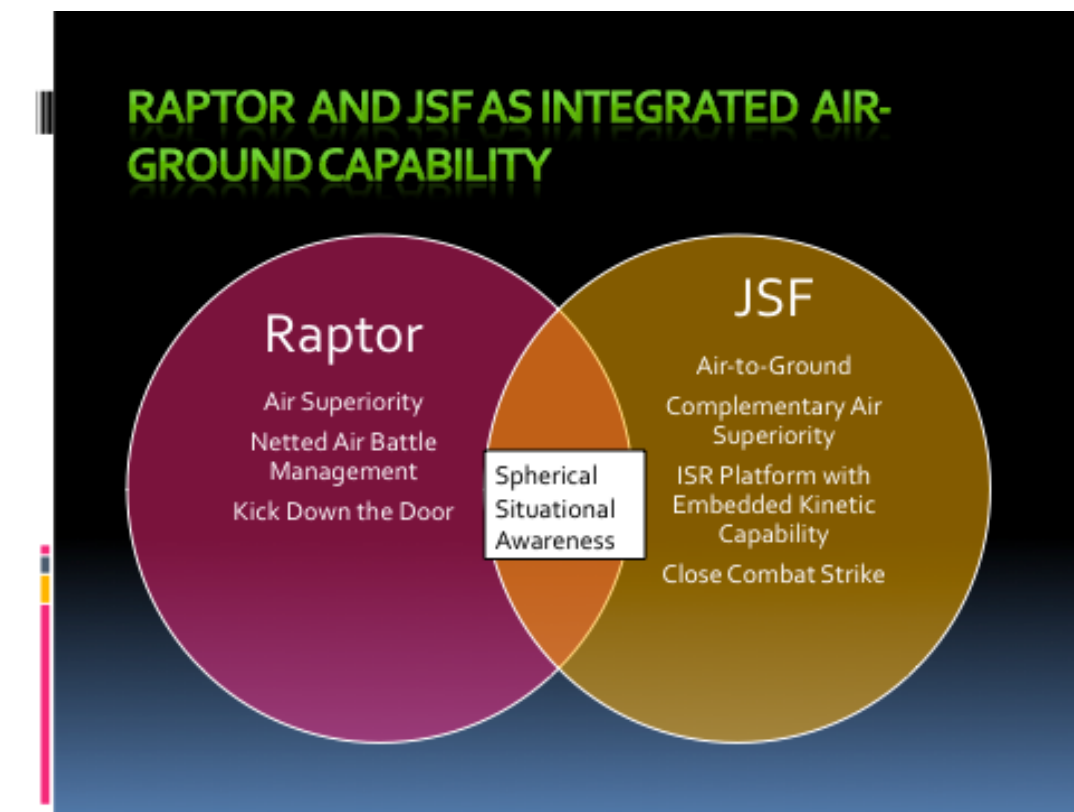
Corley: Or you could even potentially examine, are there other weapons that are not necessarily yielding blast-frag effects but still yield a kind of an effect on a target? It doesn't just necessarily have to be a size/weight thing.

We should not simply extrapolate an evolutionary path where we go from what was a two thousand pound JDAM, a small diameter bomb and a small diameter bomb that's launched at 1.6

MACH, has this kind of range, that arrives at a range, or you can say, I can tailor the number of weapons carried on a B-2 by the use of a five-hundred pound class weapon, therefore I can get an equally larger number of targets. It doesn't necessarily translate that the effects are more from this process.

SLD: If you add another trend line -- innovative thinking about small UAVs -- you could be dumping a small fleet of UAVs out of a bomb bay, for various uses and various effects. Certain 2010 judgements about the value of the internal base of the F-35 and F-22 are certainly not going to be accurate 10, 20, 30 years from now.

Corley: Of course not, and I would hope it's sufficient for us to argue that any development of a major weapons program that I'm aware of in the Department of Defence that's going to have three decades plus worth of military utility. It's going to have a growth associated with those three decades; it's not just going to be stagnant unless someone makes a conscious decision and a foolish decision in my mind, to stop this development.



Leveraging the New Baseline

SLD: When you are talking about modernization of the assets, there are two ways that you can look at this. One is you've introduced the F-35/F-22 as a new baseline. You're reaching back to

modernize the extant fleet, what you're not doing is going about and buying newly manufactured versions of legacy aircraft.

Corley: In fact, I'm advocating against that. When we talk about modernizing legacy assets, we're talking about modernization of those legacy assets to try to yield the greatest degree of combat capability across the entire fleet. But the risk I talk about can be measured as risk of failure of the concept of operations. Even if I modernize them with the new data links so that they can communicate with platforms inside of an anti-access bubble, there are inherent limitations. What if an adversary in the strategic process winds up with a new weapon to push them further out, therefore yielding their weapons carriage capacity as moot, because now their new weapons don't in fact reach back inside that anti-access environment?

SLD: Another key element, which the new assets introduce, is enhanced reliability rooted in viable supply chains.

Corley: It's an essential element. For example, if you take a look across the F-15 platform, there are some hundred and fifty plus points worth that are single point failures, structurally alone. We really don't have insight into what the structural viability of those platforms is; so as you're investing in modernization in new systems, advanced tactical data links, and other things to leverage the ability of those legacy platforms, it's not without risk.

Until you complete teardowns, you won't have a sufficient understanding of the real service life of a platform. If we invest those modernization dollars in structurally unsound legacy platforms, could those modernization dollars have been better spent some place else? They certainly would not be better spent in trying to buy a new one of those same platforms whose military utility today is being called into question.

SLD: What are some of the ways you can shape new capabilities leveraging the new F-35/F-22 "re-norming" baseline?

Corley: Let us back to the global precision attack requirement. When I talked about if you're not credible, and we're beginning to worry about future credibility of even the B-2s and their ability to penetrate anti-access environments, that argues for other capabilities could help us underpin that global precision attack concept of operations. When you're not going to pick a single path, you're going to try to make sure that that remains a viable concept of operations in some ways.

One way might be to enable an existing set of platforms, and those existing sets of platforms could in fact be the launch vehicles for things like MALD, and MALDJ, so one would be to try to stimulate a set of air defences, causing them to question what is in fact real vice what is a non-

real type. If an adversary can't discern what's real from what's not, then they're going to have to target everything. You present a problem to your adversary.

Then of course, you would like to have some sense of whether or not that's working. I remember Greg Gonyea, who flew one of the first 117 in the first night of our Gulf environment. He was the one, who coined the phrase, 'Gee, I hope this stuff works'. You'd like to know whether that is working.

SLD: Could you talk about the synergy between the new tactical aircraft and a new longer-range platform?

Corley: Folks are looking at not just a platform but a "family of systems". This family will need to provide long-range strike that still allows us to be credible to hold targets at risk; the system will need to be able to underpin this concept of dissuade, deter and reassure.

Is it long-range strike the platform, and what does that mean? Is it long-range strike the weapon? Is it long-range strike defined as some conventional prompt global strike asset? That appears to be pretty divergent set of families people are considering.

Long-range strike (the platform) is not just useful in terms of its ability to deliver a current day kinetic weapon against target to hold it at risk; it's also a long-range strike penetrating platform because that allows the sensors to be closer to the areas of interest.

USAF Role in Exercising Sovereign Options in the 21st Century



The Challenge

SLD: Another key consideration is the nature of the likely adversary against which you would build such a target set. You are dealing with adversaries who have enhanced mobility and mobile defence systems. Fleeting targets are a common thing, so you better be able to put ISR over this very fleeting target environment. Once you are confident of the target, then you can reach back to a much broader portfolio of strike capability.

But I have to have penetrating capability in a local and fluid environment. Coupled with that are modern air defences, modern defences, semi-submersible, small ships, different kinds of missiles, anti-access missiles we call them, or just simply S300s; you're shaping a very different and more complicated environment in which to project power and penetrate defenses.

Corley: This makes sense. I think what I also heard a little bit of was the decentralized execution of the thought process, and the decentralized execution, the individual making that decentralized execution decision needs to have a robust way of gaining more confidence in the decision that he or she is going to make.

And sometimes, point solutions yield very bad information into a network. Even if you drill down, you wouldn't want to simply say, I have information that suggests to me this is in fact not a friendly asset. What if that friendly asset had some component on board a platform operating in the maritime, that just was malfunctioning, and you made your decision to attack based purely on the fact that it is not emanating some positive 'I am a friendly blue-force entity'?

I'm going to circle back to the robust nature of these platforms (F-22/F-35). I'm going to come at it from a couple of different approaches. Number one, to the individual decision maker, to the operator, be that operator either remotely operating or physically operating, They're just looking for enhanced credibility of information, and since this war business is inherently a human endeavor, the human beings are looking for it to be aided bits of information, and when I talk about robustness, I like the thought process that something could be pulled out of a system and not cause the ultimate collapse of the system itself.

I do not want to be in a situation whereby if I lose a single entity or a single critical node, I have lost the ability of that system to function and therefore my ability to execute the concept of operations is destroyed.

The Impact of Digital Capabilities

SLD: You don't want the node to be a lynch pin; you want it to be a modular element which is replicable.

Corley: Right. Also in terms of the new norm in some of these platforms like F-35, I like the digital aspect of them as opposed to waiting another eighteen months or two years to get the next OFP operational flight program updated. I'd like to be able to have an ability to update things in a more rapid fashion. I don't want to wait 18 months for an added capability when that added capability is necessitated by what's occurring in front of me today, because the adversary spends a lot of time as well as do we, so I like the digital aspect of being to upgrade the aircraft and its systems rapidly.

I love to have digital interfaces because if I can bring on board a new capability, I would like to be able to bring on board a new weapon and not go through many months' worth of examination of it, designing the next Rapid Prototype (RP), getting the control panel to talk to the central computer, the central computer to display a different weapons engagement zone in terms of a head-up display, and then ultimately try to discern what is sensor suite A telling me, or sensor A telling me via sensor B and trying to resolve the anomalies between them, and then trying to bring those together.

SLD: Another aspect of the digital character of these aircraft is the ability to enhance the reliability and maintainability of the new aircraft.

Corley: How could you ever argue against this digital world which yields more identification of fault if a fault does exist, helps you isolate where that fault is, helps you identify what in fact is going to be necessary to be done for maintenance. It is pooling that information in a careful protected manner, so that appropriate actors can interpret it, manipulate it back to those individuals responsible for the main incidents of support, but also could yield to the individual operator of that vehicle, whatever the impact of the fault happens to be. What are the ramifications? Operators would begin to understand they still have viability in the conduct of a mission that they're currently performing.

F-22 Lessons Learned

SLD: I think that's part of the system, even if it's an excellent platform. What have we learned from the F-22 to date? How has the F-22 affected the overall capability of an air arm to operate both the Air Force and the Navy, what has been the impact of what F-22s we've got out there?

Corley: A lesson learned is that people fail to understand the importance to the joint force of operational freedom of action. They started with the argument over the F-22, when they should have started the argument over how the joint force is enabled by, underpinned by, supported by, is critically enabled by operational freedom of action.

Operational freedom of action can only be delivered inside an air domain through a concert of operations, which is air superiority. That yields what capabilities you need, including the F-22, so as opposed to starting with the F-22, I think the argument that should be started with is the joint force that necessitates, and the maritime, on land, in air, with operational freedom of action. That is just resident inside that capstone concept of joint operations and inside of the JOE, and that is necessary to underpin national security.

That's probably one of the first lessons.

SLD: If we take this to the next step, I think one confusion has been that the F-22 has been viewed as the F-15s successor, and largely as an enhanced classic air superiority fighter. What the F-22 brings to the core warfighting team is an ability to allow the force to move forward, which is your point, but as it does that, it's then available for the tasks of broader combat management.

Corley: Earlier, I talked about the ability to dissuade and deter. I talked about decision superiority; I talked about operational freedom of action; I talked about persistent pressure. In my mind, the capabilities resident inside of an F-22, can actually, through multiple concepts of operation, either air superiority or global precision attack, or battle space awareness, yield contributions in all of those and do it *simultaneously*.

It doesn't just simply go out, kick down the door inside of an anti-access environment, establish, obtain and maintain air superiority, but at the same time it is yielding decision superiority because of the sensors that are on board. That's why in increment 3.1, you have enhancements in terms of geo-locating targets on the ground with the synthetic aperture radar. That's why it's able to pour information off board in this world of increment 3.2 and F-22 to other F-35s, to other B-2s to enable them. That's why you can deploy F-22s to Guam in a continuous package to dissuade and deter. That's why you can use it as a power tool deployed into a regional area. Those are all threads and all stories about the F-22, which have not been told, which I hope people begin to understand the value of so that other assets aren't compromised.

Shift from Sequential to Simultaneous Operations

SLD: We have historically talked about sequential escalation, and that's been rooted in the nature of the structure of the tools we have. What's interesting about the nature of the new tools, whether it is F-22, F-35, or Aegis is that I can deploy this kit and it's not an escalation; it's a deployment. I could be using it for defense, I could be doing it for security ops, I could be doing it for strike, I could be working with allies, in a certain sense, and you have not committed yourself to specific mission focus. It's very, very important from that we enhance these multi-nation tools with the flexibility they provide.

The simultaneous quality of being able to strike, to provide data on targets distributed to assets in other regions, doing some air battle management, able to work in a distributive environment, operating in a distributive environment simultaneously is what's new, in my view.

Corley: Excellent point. In earlier decades when we bought more of one new type of capability in a given month than does the United States Air Force buy in total during this entire year. That buying power also allowed the purchase of specialized assets. Those environments of additional dollars allowed you to buy very specialised platforms in sizeable quantities; platforms that were focussed solely on a specific capability. Specialized capability like air superiority, or specialised air surface capability like an F-117. Those fiscal and industrial environments don't exist today, and we now, because of the birth of technology and the age of the digital world, and the enhanced sensors, and kill chains associated with weapons, and enhancements in terms of survivability with the new aircraft need to pursue another path. This path is to build upon the F-22/F-35 foundation.