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Effects Based Operations Briefing

Staff: Good afternoon. Today we're going to have a briefing from Colonel Gary Crowder, who's up here from the Air Combat Command, who's going to give us an on-the-record briefing on the concept of effects based operations.

Colonel?

Crowder: Good afternoon. I'm Gary Crowder. I currently am the division chief at Air Combat Command and the plans director for Strategy, Concepts and Doctrine. And one of the challenges I know we face when we talk with the media and the types of operations we do is just trying to get to some sort of common understanding of when I say "effects based operation" what is that? Is it -- I mean, rocket science? Is it secret code? Is it something like that?

My boss is Major General Dave Deptula, who worked very closely on the -- integral part of the Gulf War air campaign. And he asked me to not only come up here and talk about EBO a bit, but additionally to talk about some of the work that we're doing both in the Air Force and at Air Combat Command on understanding and mitigating the effects of collateral damage. So I'd like to try to go through both of those, if I could.

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In the first day of Desert Storm, we struck more targets than were struck in all of 1942 and 1943 by 8th Air Force during the combined bomber offensive. And we were able to do that because we took really a radically different approach in terms of how we wanted to prosecute a military operation. And in looking in retrospect, it doesn't seem to be, you know, that cosmic or that innovative, but it really was a rather remarkable series of events and personalities and people in the right place at the right time that brought that campaign together. But it was more than just people, is was the combination of a fortuitous development of different capabilities and technologies -- slide please -- that enabled us to do that.

This is the capabilities that we had of advanced precision and stealth -- gave the Air Force a little bit of a leg up in trying to move into this area of effects based operations as we struggled to figure out how to do those types or exploit those capabilities to the greatest extent possible.

Over the course of the last decade, you have probably heard these terms, the EBO term, more and more often with each of the military services as each of the services has tried to wrestle with walking down this road and trying to develop capabilities to more effectively and efficiently prosecute military operations.

The first piece, obviously, was the combination of stealth and precision. And I'll show you what that implication is for the conduct of air operations.

But the second thing is a different way of thinking about how we do -- or what we want to achieve on the battlefield. Instead of a traditional attritional approach in terms of listing a bunch of targets and then go bombing targets, or finding where the enemy is and killing all the enemy, we really determined that what we wanted to do was in fact to achieve some sort of policy objective, and that you could, in fact, craft

military operations to better achieve those policy operations in a more efficient and effective manner.

This isn't to say that this is all rocket science or that we magically wave wands and turn computer programs on and understand how to win the war. It ain't like that at all. It is a complex business. War is perhaps -- our military campaigns are perhaps the most difficult endeavor in human -- or, in human activity.

And I have been involved in or planned in the last three air operations in Desert Fox and Desert -- or, in Allied Force in the opening months of Enduring Freedom, and all I can tell you about what happens at air operations is how much I don't know. And it requires a great number of people at each of the component headquarters, at the land component, maritime component and air component headquarters, each specialized to pull this off. And what the combination, however, of those new ideas on how to do operations and effects-based operations with precision and stealth, they enabled us to do something that was called parallel warfare. And I'll describe a little bit more in detail what that is in a second.

Slide, please.

First of all, it's important to understand the evolution and -- or precision technologies since the Second World War. In the Second World War, the CEP of a B-17 was about 3,300 feet. And so if you wanted to destroy and have a high probability of destruction of a point target of about 6,500 feet, you'd need about 1,500 airplanes and about 9,000 bombs. That's a lot of stuff. And that's what drove those military operations and the destructiveness of the military air campaigns against both Germany and Japan, is precision is relative when you look at it today versus 1945.

By Vietnam, we had gotten significantly more accurate in the fact that these -- a lot of these aircraft now were doing the operations were fighter bombers, and dropping at a little lower altitude, we were able to be more precise. But still, it took a large number of airplanes to achieve the desired effect.

With the development of the laser-guided bombs, and specifically the laser-guided bombs on aircraft such as the F-111 and the F-117 in Allied -- or, in Desert Storm, we were able to hit two independent targets very precisely with about 10-meter CEP or 10-foot CEP from a single aircraft. When we added additional aircraft, such as the B-2, that capability is now to the point where we can hit multiple targets on a single pass.

And it's important to understand that as we also develop Joint Direct Attack Munitions capability -- these are these GPS-guided weapons -- they also give us the ability for a large number of other aircraft besides just stealth aircraft to hit multiple weapons per targets. Navy F-18s are equipped with JDAM, as well as all the Air Force bombers. The B-1, for example, can carry 24 Joint Direct Attack Munitions in an internal payload that could be used against 24 separate targets.

Slide, please.

Q: What does CEP stand for?

Crowder: Oh, pardon me. Circular error probable. It is the probability that that weapon will -- that 50 percent of the weapons will land inside that line. So, if what I say basically is -- if I say the CEP of a B-17 in World War II was 3,300 feet, that means there was a high likelihood that 50 percent of the bombs dropped landed with inside 3,300 feet. So not very --

Q: Is it a 20-foot circle with a radius of 10 feet or a radius of 20 feet?

Crowder: It's a 10-foot radius. But it's really important as well that what the capability of a Joint Direct Attack Munition has given to us, together with the integration of Global Positioning Systems on our aircraft is we are now able to achieve that near precision. And again, we have to understand that there is a difference between the precision of laser-guided weapons that are described here and the Joint Direct Attack Munition. The Joint Direct Attack Munition is not quite as accurate, although it is much accurate,

we are finding in employment than we anticipated.

But the addition of these capabilities gives us the ability to do a large number, an extremely large volume of fires or effects early in an operation in a very, very short period of time. And it really has been the evolution of about the last 20 years that has -- from the earliest employment of laser-guided bombs in the Vietnam War, through Allied Force, Desert Storm and Enduring Freedom, that has given us this capability.

Slide, please.

It's also important to understand the role that stealth plays. We have an advantage in this conflict, in that the adversary has basically ceded most of his air -- or about two-thirds of the country's air to us early, and so the extremely vicious fights that we had for air superiority -- and even though we didn't lose a very large number of airplanes in Desert Storm and in Allied Force, those were sustained fights for air superiority. We are starting off in a significantly better position as a consequence of the northern and southern no-fly zones, which will enable operations that might not otherwise have been able to commence.

But nevertheless, this is the size of the initial strike packages that went into Basra in January 1991. And if you look at all of the support aircraft that were required for that strike package, you basically had about 41 aircraft with only eight bombers. I mean, we had aircraft to do sweep and escort over the top to protect the air assets from enemy fighters. We had actually used drones to tickle the air defenses and to enable us to more effectively target the enemy surface-to-air missiles. You had a variety of SAM suppression airplanes, F-18s and F-4Gs, and you also had electronic attack planes, the Navy's Prowlers, EA-6Bs. And all of that to get eight bombers to a target. That was the way we had to do operations without stealth aircraft.

Slide, please.

If you look at this --

Q: Multiple aircraft including the eight bombers?

Crowder: Including the eight bombers, yes.

If you look at the difference between the employment of the F- 117s on the first night of the Gulf War, we literally had a significantly greater capability because they required a far fewer amount of support assets. Now, we don't throw 117s up by themselves. They like a lot of other people flying around with them and other stuff to get the volume of the radars down for everybody. But nevertheless, it is an almost independent capability, and its stealth qualities enable us to do a large number of things because we don't require all of the support assets necessary that would be used for this.

It's important to understand as well that the evolution of both the Air Force and the Navy and Marine Corps' combat aircraft will enable us to do even the left package or more conventional strike package with a far small number of support aircraft to bombers, just because we have much more dual-use capability in each of the Air Force's, Navy's and Marines' fighter aircraft as well as our bomber aircraft.

Slide, please.

Q: In the first set of planes that you talked about, that was also Desert Storm, right?

Crowder: That was Desert Storm. And these were both --

Q: And the second?

Crowder: -- these were both Desert Storm.

Q: Right.

Crowder: Okay.

Staff/Q?: It's showing you the difference between.

Q: Same slide, in Desert Storm, the escort package for non- stealth was about 5-to-1.

Crowder: When it --

Q: And you said stealth still required some escorts. What sort of ratio of escorts, one-to-one? Two-to-one?

Crowder: We used a different approach. And I don't want to go into the specific details, but we used an area approach to support assets. The -- because the last thing we want -- that F-117 or B-2 want is a bunch of wingmen out there that everybody can see. But it's important to understand that these were numbers, on the support side, from the first day of the war. As that operation proceeded, the support requirements obviously went down as we were able to erode the enemy air defenses. So again, this is not a -- you know, a magic rule of thumb on how much support to conventional and stealth aircraft. But it is to understand that the stealth does give us some capabilities in addition to the precision and enables us to do a lot more stuff very early in a fight.

Slide, please.

Now kind of to the meat, though I guess somebody had a lot of ideas here, but the old lightbulb chart. The -- everybody is kind of familiar with how a series or a parallel circuit works. In a series circuit, you really talk about -- I mean, as we put lightbulbs on a Christmas tree, you know, one bulb goes out and the whole thing is gone and you have to figure out which bulb was out. But the challenges is is traditional military operations have taken kind of a serial approach, all the way back to time when it was a fact that you didn't have aircraft, so you had to take a linear approach to the battlefield and to defeat the enemy, you know, in turn. But even with air assets, in terms of having to roll back enemy air defense, those types of things limited your ability to go after what you really wanted, because the air defense aren't the targets; the targets are the targets, and you have to go after the air defense to enable you to do other things, because once you can gain air dominance, then our surface combat forces have a significant greater -- a significantly greater degree of flexibility in different things that they can do early in a fight. And so, our ability to go after targets, if we had the ability to go after the entire target set from the -- go after we wanted to instead of the air defenses, then go after the leadership, for example, early, or to go after industrial targets or whatever they may be, then that would actually provide us a significantly greater degree of leverage.

Now, what I'd like to try to do now is walk you through, instead of kind of big to little, I think it makes more sense in this subject to walk you little to big, and to talk to you how we go about doing this.

Slide, please.

This is an example of a target system that might be the integrated air defense target system. And as a consequence of the way those things are laid out, in Desert Storm the traditional approach might have been to slowly roll that system back and to go after elements of the system one at a time. If we had a better way to do business, we might be able to go after that whole integrated air defense system.

Slide, please.

And that's, in fact, what we did in Desert Storm, is we were able to go right to the heart of the air defenses, take out the critical command and control early through creative use of Special Operations forces, Army Apache helicopters. And so we were able to take down the air defense system or to attack

the air defense system as a system. Again, this isn't, you know, a simple answer that I plug all the answers into a computer and it says, hey, this is how you do business. You have to kind of work it and look at each element of that system and figure out what its vulnerable points are. And if you had the ability to do stealth and precision to give you a higher volume of fire, then you could go and attack this system as a system. But again, air defenses aren't the targets, if you had targets. Targets are the targets, or the effects you want to create.

Slide, please.

If you had the ability to not only go after that target system that might be air defenses but also simultaneously go after a target that might be military or political leadership, that might be essential industries or transportation, you could actually now attack the enemy as a system and work towards trying to achieve systemic collapse. I really have to contend here that this is -- and I've said it several times. What we have enabled ourselves to do through development of more complex and a better understanding in intelligence and analysis of adversary systems is we have an improved ability to go after adversary's systems. And I'll talk to you how we might go about doing this.

Slide, please.

In a -- I'm going to use an example here of electrical power. And I use electrical power -- please don't take that into any consideration that it's our intention to go take out electrical power in Iraq. It's just electrical power is an easier system. And, in fact, we used this approach in Kosovo, in the operation -- the war in Yugoslavia. Electrical power is an easier system for us all to understand, because we all understand that they're all linked together and they talk to one another, and they are, in fact, an electrical power grid.

Slide, please.

So if I had a target set -- target system that might be an electrical power grid -- slide, please. That's good. I would list all those targets -- if I used a traditional attritional approach, I would list all those targets on my target list. And then I would go through and sequentially destroy each of those electrical power stations or power substations or generating plants, and when I got to the end of my list, I was complete.

But when the Air Force leadership was planning the Gulf War, they realized that it's not my objective to destroy electrical power stations. What is my objective? Well, electrical power is in fact a critical commodity that ties together air defenses, national leadership and a large number of other things, to enable a cohesive defense of a nation. So my real effect was to affect that, the adversary's ability to command and control forces and react, and one way I could affect that was to neutralize electrical power.

But if I neutralized electrical power by going after every station, it would take up all my assets to neutralize that electrical power. But the reality is, electrical power is in many ways a fairly fragile grid. When you look at what happens when we have a snowstorm and a couple of power lines go down and 30(,000) or 40,000 people are without electrical power -- and so there you do not have to attack each element of that system to make the system not work.

Slide, please.

An effects-based approach might look at that system and say, "If I looked and analyzed the enemy as a system in this particular case, I might only need to have to take out two of those power plants to enable me to go do that."

Slide, please.

In such a way, I would prioritize, then, those targets by the manner in which they would enable me to achieve that effect of neutralizing the adversary's electrical power, and I would only have to -- slide, please -- strike two targets.

Well, there's a good advantage of that. The first advantage is, one, you created a far less amount of destruction on the ground that you have to go and rebuild. Another advantage of that is that I now only have to attack two targets instead of 12. And so those assets that I was using to attack the other 10 I can now use to attack another system. And so this opportunity shows us ways in -- to more effectively tie the specific effects for which we employ force or information on the battle space to military and political objectives.

Slide, please.

But what if there's a problem? What if there's a problem and one of the targets is a no-strike target, because there is no way you can go after that power plant and not create unacceptable civilian casualties? Well, this opportunity -- these analytical tools enable us -- slide, please -- to find alternative methodologies. Maybe if you have to attack two additional targets, you can still neutralize the grid. The disadvantage, obviously, is you have more targets to strike, but the huge advantage is, you have achieved the same effect without creating significant collateral damage or civilian casualties.

And slide, please.

Maybe there's an even easier solution. Maybe you go after power lines instead of power plants. An example is, in Allied Force, there were some -- when we attacked the Yugoslavian electrical power system, there were some targets we simply could not take down to achieve the desired effect. As a consequence, the only way we could do that was to go after some of the power poles, or these 250-foot power towers. Difficult targets, and they're very difficult targets because they're designed to not have -- weapons are designed with principally a blast effect, with mainly a blast effect. Well, power towers are designed not to be blown down, because that's their principal design characteristic. Nevertheless, we were able to neutralize those towers without civilian -- or collateral damage, and neutralize the power system.

So there's a lot of different ways to do this. And oh, by the way, you don't even necessarily have to bomb anything. If you can pay somebody to turn the power grid off, that would be almost as effective. (Laughter.)

And for example, in Desert Storm we frequently found instances where -- after the fact, where electrical power plant operators knew they were going to leave their power plant off because if they turned it on, we'd bomb it. I had an instance -- I flew in the Gulf War out of Turkey. I had an instance on the third night of the war where I flew a low-altitude mission into Turkey -- or into Iraq from the north, and I saw the lights go out in a town all at once. The lights were there, and when approached the town, the lights went off. And so maybe just flying airplanes convinces these guys to turn the power off.

But the point here is, is that we don't have to attack everything, nor do you have to destroy everything. If we understood what the effect we desired on the battlefield, we could then figure out ways of creating that effect more efficiently, more effectively, striking less targets, using less weapons and, quite frankly, mitigating or easing potential concerns for collateral damage and civilian casualties.

Slide, please.

That brings us back to how we got to enable us to do parallel warfare. By examining each one of those systems and understanding what the different target systems enabled us to do and what the specific political effect that we -- and military objective we desired, we were able to attack a far greater amount of those target systems, creating a greater effect on each individual system, and that, in turn, started to collapse the system from the inside.

Again, I really need to caution that we are not talking about, hey, turning a computer on and finding out the answer to war. But it does provide us methodologies to more efficiently and effectively carry out military operations to achieve fairly clearly defined political and military objectives in ways that mitigates

the potential negative side of casualties and collateral damage.

 Slide, please.

 And that actually drives us to one of the principal issues here. The military forces in the Persian Gulf are doing some of the most, quite frankly, sophisticated planning that any military anywhere has ever done. Each of the component commanders and the Central Command planning staff under General Franks, are actually driving us to how in fact we do effects based operations across the military services. A good example of the effects based operations you see going on every day are the leaflet operations. In the '40s or '50s you might have said, Hey, if I -- to defeat the enemy I have to defeat the enemy's army. No, I have to neutralize the enemy's army. And if the enemy's army decides to surrender because I used leaflets and convinced them that there was a better alternative than trying to fight me, then that's somebody I don't have to neutralize. And so there's an advantage here, and what we are trying to do with not only air operations but air and ground operations is really focus on what the desired political and military effect are, and then shape those desired effects on the battlespace.

 But it only really truly works if you understand how each event that you do, everything that you do, how that ties back to the specific military and policy objectives that have been established for the commanders. And we do this fairly robustly in the Air Force. And I don't mean to belittle either of the other -- any of the other services, but Desert Storm caused us to try to think about this. And so we literally come up with a high heaven objective -- what are my tasks that I have to come -- build to achieve that objective, what are the effects that I need to create on the battlespace, and then what are the things that I need to do, what targets I need to hit, things I need to jam, information I need to corrupt on the battlespace to achieve those desired effects. So in many ways every single thing I do has to be shown to tie back to a political objective or I'm going to take it off the list of things to do, because we have too many things that we have to do to do things that are either not appropriate or not in line with the political or military guidance.

 Slide, please.

 But the system that we develop in terms of developing both desired effects, examining capabilities and desired concepts of operation to achieve those effects doesn't work in isolation. The thing about war is it's against two humans. It's a human against a human, and the adversary is thinking, and he's trying to do something against you. And so, every concept of operations or idea, or capability that you have, you must then vet that against what the adversary is going to do, or what you anticipate the adversary is going to do. In doing that, you can evaluate the enemy as target systems, or as systems of systems. And that will help you understand how those different things interrelate and where the vulnerabilities between, perhaps, an integrated air defense system and communications systems might lie to enable you to more effectively prosecute those operations.

 Slide, please.

 From an air perspective, this is how this is wrapped up and brought together on an air tasking order. We look at the CONOPS, we look at the desired effects we want to create on the battlespace, we look at the available assets. And quite frankly, we have one ATO in this war. And everybody's on the ATO, everybody's integrated and working off that single air tasking order so there's common command and control architecture for all the air players that are involved. And so, it's a critical element in -- we think we learned that lesson a little bit the hard way in Operation Allied Force. But then we evaluate the target sets that we need to do, that -- those effects that we need to create on the battlespace, we bring those together into a integrated plan, and the integrated air and ground and maritime plans are, in fact, that. They clearly have separate elements, but these plans have been more integrated than we have ever seen them in the U.S. military history. The -- one could say that we fought side by side as services in Desert Storm, which that would be a fairly close description. But we didn't fight in an integrated manner.

 The Air Force has sent a major general to work at the combined force land component commander's headquarters to enable a significantly greater degree of interaction between air and surface operations to

better integrate these plans. But we build those things together and then you come up with something that looks like an air tasking order or a piece of paper, and you send it out to the troops and they execute. It's not quite that easy, but it's -- it is, quite, frankly, I think a significant achievement on all the men and women who are out in the Persian Gulf at this point in terms of bringing all those different effects from each of the capabilities of each of the services together to achieve the best result possible.

 Slide, please.

 There clearly are going to be opportunities to better do this in the future. We have emerging operational concepts. Joint Forces Command has been tasked to develop and further evaluate these. We have emerging capabilities, both in terms of munitions, in terms of aircraft, in terms of information capabilities, that we simply have scratched the surface on. But what in the end we hope to do with concepts such as effects based operations are to fight more effectively, efficiently and to make conflicts shorter because we can attack the adversary more completely as a system in a shorter period of time as opposed to a sequential series of attritional-type operations.

 Slide.

 Q: I see on the list of concepts there "shock and awe." Could you describe what that means? I mean, what does it represent?

 Crowder: That's probably a really good question. The -- I think it actually gets right back to some of the discussion on effects operations -- effects based operations. You don't win a war by not intimidating an adversary. The -- I think General Franks -- I don't want to put words in his mouth, but I think the effects that we are trying to create is to make it so apparent and so overwhelming at the very outset of potential military operations that the adversary quickly realizes that there is no real alternative here other than to fight and die or to give up. And so, they really are trying to kind of ensure that everybody in Iraq understands what's coming. Because if they understand what's coming in a macrosense, I think that there will be a greater likelihood that they might choose not to fight for the regime.

 Q: So, you think that there will be demonstrations, then, early in --

 Crowder: I -- quite frankly, that's -- what will happen is the great unknown. And the -- we could speculate all we want, and there's a million answers and everybody's probably got an opinion on that. But quite frankly, we really have little clear understanding of exactly what will happen when we step across that line. I think there's going to be a wide variety of different reactions by the Iraqi people and the Iraqi military forces.

 Q: Still on that last effects-based slide, two questions. Could you tell us what rapid halt means, other than clearly actually bringing a war to a halt as soon as possible? And secondly, you talked about new concepts in munitions. I'm not asking you what's going to get employed in this coming conflict, but what are the new kind of concepts that you're (floating out ?)? Clearly, just something that's going bang is kind of primitive at the end of the day.

 Crowder: Right. The -- I'll talk about that, and I've got a couple more slides here on collateral damage and collateral damage mitigation, and I'll actually talk about some of the capabilities that we've brought to the fight.

 Slide, please.

 One of the issues I think that routinely comes up is for folks who are not involved in military operations and have not been involved in the extensive planning is to understand the difficult and really comprehensive process we use to mitigate collateral damage, because Air Combat Command and the United States Air Force, and I personally have been working with the Carr Center for Human Rights from Harvard University. I really -- Michael Ignatieff and Sarah Sewall and their program are a wonderful program. They bring nongovernmental organizations, military officers, policymakers, media into a forum in

which we can discuss these issues and better understand each of our requirements. And in the end, all of our requirements are the same. If we're required to conduct military operations, we would desire to conduct those while minimizing collateral damage and unintended damage.

And so I think we've made great strides in that area over the last several -- over the last decade or so. And I'd just like to kind of show you a little bit of some of what this is. Slide, please.

First, there is -- we all have to understand that there is -- the term "collateral damage" is often misused. From a military sense, collateral damage means or by definition is that damage that can be expected from the reasonable occurrence from attacking a system or attacking a target. For example, if I looked at a target and I examined -- I was going to put a 2,000-pound bomb on it, and windows broke across the street, I can plan for that. And that is collateral damage. It is the anticipated effects created by the employment of force.

That is -- go ahead.

Q: Including civilian deaths or human deaths

Crowder: In collateral damage calculations, we try to make an assessment of human casualties. And you saw, perhaps, a lot of that take place in Allied Force, where targets were struck and timed specifically to minimize the potential for civilian casualties.

Q: Right. I just want to make sure that your definition, the damage includes structures as well as --

Crowder: It includes both structural damage and civilian casualties.

Now that is different from unintended damage, and it is different both philosophically and from a practical manner. Unintended damage is when something goes wrong. Either a fin breaks on a weapon and the weapon goes off course -- and everything we drop is a mechanical device, and as like as we would that these things be perfect, they are in fact not. Mechanical devices that we employ fail. And so we will have some degree of that.

We will also have some degree of intelligence failure. We don't have perfect information. The Al Firdos bunker example or the Chinese Embassy are examples, perhaps, of intelligence failure. But it is what happens when something goes wrong. And it's really important to understand these two distinctions. And it's important because we can do a great deal to plan for and mitigate collateral damage. We can do a great deal to mitigate the potential for unintended damage, but there there is very little we can do to plan for or substantially eliminate unintended damage because it is, by definition, something went wrong.

And so when we understand that difference, when you see something that might occur on a battle space, it's important to understand that that doesn't necessarily mean we're throwing something -- the cart out with the bath water, or baby out with the bath water. We still went through a methodical process. But when it comes to pass that we are forced to or we engage in military operations, both of these types of damage will take place.

Slide, please.

Let me talk a little bit about how we do this. Everything -- first of all, there's not a target that we would strike that is not specifically struck to achieve a desired effect. And so we look at that target and we say, what do we want to do to that target? I want to neutralize or I want to destroy this bunker. And then I examine what munitions I might use to destroy that bunker. Ideally, if you could turn the lights off and make everybody go to sleep, that would be really nice. Unfortunately, some of our capabilities are not quite that advanced, and in many cases, we have to resort to physical destruction.

Slide, please.

When we do that, we do an analysis not only of the target, the size and the capabilities of the munition designed to create the right effect, but we also do an analysis of the surrounding area to understand what the use of that munition on that target might do to structures outside the facility or to create either collateral or -- I mean, civilian casualties or collateral damage.

Slide, please.

If, however, in the course of dropping that bomb, a laser-guided bomb, for example, a fin breaks off the laser-guided bomb and the thing goes spiraling 3,000 feet away from the target, there was really no practical way for me to plan for that. That is not collateral damage; that is unintended damage, and if there are civilians killed, they are unintended civilian casualties. I don't mean to kind of draw a fine legal line between the two, but it's important to understand that as we plan these things, there are a great deal of things we can do to mitigate collateral damage and in fact have potential to mitigate some unintended damage, but these things, again, are mechanical devices and some will fail. And so if somebody has a hope that we're going to go into a conflict and nothing is going to happen in terms of collateral damage, unintended damage or civilian casualties, I think you should absolve yourself of that hope because that probably is not a realistic expectation.

Q: Is bug splat only for kinetic weapons?

Crowder: I think we like to use the term "fast CD," but the -- we do have an improved capability. It is designed principally for kinetic weapons; that is true.

Q: But does it have other abilities to protect the effects of non-kinetic weapons, or is that a different algorithm?

Crowder: I don't know the answer to that, quite frankly.

Q: Could you explain what that is, please?

Crowder: We have developed planning tools that are at our air operation centers to enable us to more effectively project the potential explosion of an armament as it hits a particular structure.

An example: When we were doing operations in Afghanistan, I think that we all need to hire the Afghan workers to build our walls, because we would blow some -- a house up inside a wall, and it seemed like -- that that wall protected all the structures around it. But the reality was -- is when we drew our circle to examine potential collateral damage, we didn't take into consideration that there was another building there, or there was a wall, or that I was hitting one side of the building and the size of the -- and the direction of the explosion that takes place on the ground is in fact not a circle. It's more like a butterfly effect.

And so by using that tool, you can better understand the environment and the immediate neighborhood of where you're dropping that munition, and then you can do an examination of various things that might include changing the size of the weapon; changing when the weapon fuses, to perhaps fuse the weapon underground, to mitigate that explosion even more; or even changing the direction of your attack axis, because if you attack from one way, you might completely mitigate all effects, if things work properly, but if you attack from another, there might be no way.

So it is one of a series of planning tools that we have incorporated into our air operations centers and out on the carriers as well, to examine different alternatives on -- to better employ the right weapon and the right target in the right way.

Slide, please.

As I mentioned before, again, I think this issue of effects-based operation and collateral damage are fairly well -- closely tied together, because the best way to mitigate collateral damage is only strike the

stuff that you need to strike to -- or affect the stuff that you need to affect.

Nevertheless, as we go through, in the simplistic sense, in the macro world, there -- you know, from a targeteer -- Air Force targeteer viewpoint, there are probably 50,000 targets in Iraq, maybe more. But you know, that's only in a development effort. In other words, as we examine a country -- and we know Iraq pretty well -- we look at every bridge, every power station, every military infrastructure, every air defense site, and we catalogue and develop a requirement of what that potential target might look like and what I might have to do to neutralize that target.

Nevertheless, what happens is, as we go through that planning process of defining clearly established political objectives, military objectives, determining the desired effects I want to create and then examine the target sets that I need to attack, I come up out of that 50,000 with some list of targets that I need to examine. Every one of those targets is examined for collateral damage. We first look to ensure that the target is directly tied to an objective. We then ensure that we do -- we know enough about the target so that we can create the desired effect. You don't always know enough about the target, but to the degree that we can, we will try to understand what we need to do to that target to effect it. We choose the right weapon to create the desired effect. We then do a clear examination not only of the collateral damage potential, but also of law of armed conflict potential, and those types of issues, the legal implications of striking that target. And then we do everything we can do in the planning factor in adjusting the weaponeering and providing the tasking to air crews to enable us to most effectively achieve the desired effect with the minimum damage -- minimal potential collateral damage for civilian casualties.

Q: Can I ask a question?

Crowder: Yes.

Q: You talked earlier about you would not bomb a target where there is unacceptable civilian casualties. What is that threshold? What is "acceptable" civilian casualties?

Crowder: If it were that easy and I could tell you that answer, I'd probably be a general. (Laughter.)

But the reality is, is that these are very, very tough decisions that the senior military leadership has to make. There is no magic number that says five is acceptable, six is not. There is no magic way to determine when I do something whether the potential of civilian casualties is five or 10 or 20. We do have some ballpark assessments based on the population of an area, of who might be living in that area, whether it's a residential or commercial area, and the time of day you might strike that. But there is simply no way that I can say there is an easy answer.

But in each case where civilian -- the potential for civilian casualty exists, potential for collateral damage, those targets are all reviewed by the senior commanders.

Q: I understand. But you -- take the example, you're talking about a Baghdad neighborhood, I mean, and you have a population for a particular area, do you say -- does the planner say, "Okay, acceptable is X percent of the population in that area?"

Crowder: I think it's really important to understand that in most instances -- I won't say the majority -- but a large percentage of instances, most of the targets that we are striking are -- actually have very low potential for collateral damage because they're military targets that are generally military installations of that sort.

Nevertheless, there are going to be targets in which a closer evaluation needs to be made and some sort of determination by the commanders in the field of what is an acceptable number, or what we anticipate an acceptable range might be. And there's no one answer. Each target, you look at what the -- for example, if you had a nuclear or a biological weapon sitting on top of a Scud missile that was surrounded by civilians, and that thing had the potential to go off and hit Kuwait or Israel, then I would probably be willing to accept a greater degree of civilian casualties because of the consequences of not acting on that

target. If, on the other hand, it was a Scud missile without a warhead parked in a barn, then I probably wouldn't be willing to take as much risk to go after that target. But in each instance, the commanders will look at what the specific effects are, what they intend to achieve and whether or not that desired effect and military worth is worth that trade-off in terms of potential civilian casualties.

Q: We've been told about 7 to 10 percent of the precision- guided munitions don't hit the target. Is that roughly what you would say?

Crowder: I think that it really depends. And I hope that -- I don't mean to be wishy-washy. We are finding that our -- both our effects and accuracy with Joint Direct Attack Munition was significantly higher than we anticipated in Enduring Freedom in Afghanistan. However, for both laser-guided weapons -- especially laser-guided weapons and Joint Direct Attack Munitions, we have to understand that a large percentage -- perhaps the highest in modern history -- a large percentage of the missions flown were doing something like time-sensitive targeting, and they took off without the target, and somebody gave them that target airborne. As a consequence, that is a little bit higher risk, because there's a lot of other things that can go wrong if I don't know what the picture of the target looks like. Nevertheless, solid preplanning improves our ability to do this.

I can't give you a specific number on a specific weapon. But Joint Direct Attack Munition -- the beauty of that weapon is that once it's gone from the airplane, it's going to where it's going -- actually, the highest percentage of the time it's going to where it's going and I don't have to worry about a pilot trying to keep a laser spot on a target or worrying and maneuvering to do that. So, I can't give you a specific answer. I wish I could, but --

Q: Can you give us some idea of how many were off-target in -- mechanically off-target in Afghanistan?

Crowder: I don't know that number.

Q: Sir, regarding unintended damage, in Afghanistan, there were at least a couple instances where somebody punched in the GPS coordinates and then for one reason or another, it reverted back to not the target but to the location of our guy punching in the numbers. Has that been fixed?

Crowder: Combination of equipment and training. We have to understand that doing CAS out of a B-52 was not anything any of our tactical air control parties or B-52 crews practiced before Afghanistan. Additionally, we -- many of them got that equipment for the first time when they were out in the field. But we have -- the Air Combat Command has spent literally millions of dollars over the last year to get the best possible equipment to our combat controllers in the field so that they have the opportunity not only to have the best equipment but to train with that equipment well prior. So, we have worked on solutions to those challenges, yes.

Q: You're talking here about, in most of these cases, targets that are carefully chosen and studied over periods of time. But as you mentioned, in just about every air war and increasingly so, you're moving -- you have a phase where you move to targets of opportunity and where the amount of time between when a target is selected and when it's hit is getting shorter, and shorter and shorter. So how do you reconcile -- how do you reconcile those two things?

Crowder: Training. And it's important to understand that the collateral damage assessment doesn't stop at an air operations center. Each of our -- each of the -- what we call them is JTACs, Joint Terminal Air Controllers, which are personnel from the Air Force, Army, Navy and Marines who are fully qualified as terminal controllers. In the Air Force we call them ETACs. Generally they're enlisted personnel in the United States Air Force.

As well as our airborne forward air controllers and our ground forward air controllers, each of these men and women have been trained to specifically make collateral damage assessments as they are airborne to try to ensure that they can mitigate that. Is that as good as using cosmic analytical tools back at the air operations center? No, it's not. But, it -- literally, every pilot, when they drop a bomb, or every combat

controller who -- or terminal air controller who's calling a bomb in is trying to make all the right -- make those decisions based upon the availability of the weapon, using the right weapon on the right target. I mean, working in Enduring Freedom, at the operations center it was absolutely amazing to me that after about a month we could have a conversation with the terminal air controller on the ground, an Air Force staff sergeant who might be 25 years old, and we tell him exactly the different types of airplanes that are available to him, and he will then say, all right, I'm using these weapons off this airplane against these targets, the F-18s with their laser-guided bombs are going to be more accurate so I want to use those weapons on these targets. So all of our personnel, most of our air crews and most of our terminal air controllers are trained specifically to make those assessments. Is the airborne assessment as good as a complete analytical assessment in an AOC? No. But I think that these people are about as well trained as we can get them. They are some very, very talented individuals.

Q: Colonel?

Q: Colonel. You said that there -- you said that there are assessments of civilian casualties before a strike. Being so close to war after this initial shock and awe attack on Iraq, can you give us some round figures of civilian casualties that we're going to see?

Crowder: Any number I gave you would be wrong. And it's a simple fact, as we discussed: we simply do not know exactly what's going to happen if we go to war with Iraq. We simply don't know. The war might be a few days; it might be longer; it might be months. We just have no -- I mean, that's the uncertainty of combat. And as a consequence, if I were to say, well, it's going to be X, well, X would be premised upon a scenario that would anticipate the war was X amount of days long and this is how the Iraqis fight -- are going to fight, and we don't know that. And so, I understand why people have been reluctant to say, hey, this is the amount that might -- of civilian casualties and deaths that might occur. But there is simply no way to accurately calculate that number.

Q: Now, a quick follow-up. You said that in the first 24 hours of the Gulf War there was a huge strike, greater than the entire, you know, year of 1943? Is that --

Crowder: '42.

Q: --'42. How comparable will this strike be?

Crowder: An order of magnitude larger, in terms of numbers struck -- targets struck within the first 24 to 48 hours.

Q: On that 50,000 number -- you do have that 50,000 targets in Iraq, the whole broad range, can you give us maybe a percentage of that that you think is gone through and are considered targets --

Crowder: The short answer is, is I don't know the answer to that. But again, as our --

Q: Half of those?

Crowder: Well, our target -- the way our target planners work is, is that we develop -- I mean, a targeteer never met something he didn't like, and so everything's a target. He looks at, "Hmm, there's a nice building. What would I use to destroy that?" (Laughter.)

But in order to do adequate military preparation, as we examine a country in which we might engage in conflict, we go through a lot of different things and look at a lot of different potential things that we might have to neutralize in the course of a military operation.

And the short answer is, I have no idea of what percentage of the overall numbers are being examined.

Q: (Inaudible.)

Q: (Inaudible) -- you'd said an order of magnitude larger. Could you elaborate on that, exactly what is it --

Crowder: Let's look at what we did in the Gulf War. In the Gulf War we had effectively 98 precision-guided munitions, we had 36 F-117s, we had 62 F-111Fs, and then we had a number of E/A-6s on the carriers. Today -- and oh, by the way, most of those aircraft, other than 117s, most of the 111s would go after a single target or maybe two targets.

Today, virtually every aircraft of the -- I think the number is around 600-odd aircraft -- every combat aircraft in theater has the capability of precisely striking multiple targets, and most of them can do it simultaneously. I mean, F-18s can carry a number -- two to three JDAM, depending upon their anticipated targets. As I said, B- 52s can carry 12 JDAM, plus an internal configuration that might be conventional munitions or cluster munitions. B-2s -- most of the airplanes are out there. So if I have about half the number of airplanes, but each of the airplanes is capable of striking multiple targets on a single day -- on a single mission, and in many cases much more than just two or three, then the numbers of desired impact points -- because each target we have to understand is actually a set of desired -- a set of items. For example, a SAM radar site might be the radar itself, as well as each of the missiles, as well as perhaps a command and control facility.

And so when I say an order of magnitude higher, I think we would literally see an order of magnitude higher.

Q: But what -- exactly how much -- when you say an order of magnitude higher, I mean is that --

Crowder: Well, we struck approximately 125 -- well, on the first day of the Gulf War, if you looked at it, we probably included somewhere on the number of 400 to 600 precision-guided weapons -- or 300 to 400 precision-guided weapons. I think that number was going to be significantly higher.

(Cross talk.)

Q: For those of us who didn't major in math, I've heard this term "order of magnitude," but I just frankly don't know what it means. (Cross talk.)

Crowder: It's about 10.

Q: All right.

Q: Well, actually, can you actually -- well, can you break that in a simple sentence? (Laughter.) What exactly -- (inaudible)?

Crowder: Again, I hesitate to go into operational details, but I simply want -- I do not think that our potential adversary has any idea what's coming. The degree and the capabilities that this nation has fielded, together with our coalition partners, over the last 10 years, is -- we would not have believed it possible in 1991. And so I think that the - (cross talk) -- go ahead. (Cross talk.)

Q: No, you finish your sentence. (Cross talk.)

Q: You've said several times that everything you do is supposed to fit into the overall political objective.

Crowder: Correct.

Q: Now in Kosovo, in Afghanistan, in the Gulf War, the objective was clear. There are at least six distinct explanations or goals or objectives that have been advanced by the administration for this conflict. What does that do to your planning, or which one do you pick as the objective?

Crowder: Although I would argue that the objective was clear in Desert Storm, having worked as a battle staff director and director of operations at the ops center in Vicenza, I would contend that the objectives

were not clear in Allied Force.

 I think the senior leadership have defined clear political objectives, and the senior military leadership in theater have derived from that a series of military objectives and tasks.

 Q: What do you take as THE objective?

 Crowder: I'm not in that -- the details of the planning effort, so I do not know how they have prioritized those objectives.

 If I could just go for a couple of seconds here, I want to clean up a couple of charts, and then you can have a free-for-all. (Laughter.)

 Slide, please.

 I just want to throw out -- touched on some of these before -- some -- really myths about collateral damage. I mean, first of all, it cannot be avoided. When you employ military force, collateral damage is going to incur, unintended damage is going to incur, and unfortunately, and as tragic as it might be, civilians who have no business in the operation and who are not targets will be killed in the operation.

 We also must assume that we -- we can't assume that intelligence is perfect. We clearly understand that it's not, and there will be some degrees or lack of complete information on targets that is going to cause us to do things that we would have done differently, had we known more information.

 Weapons don't always work. I'd like to give you a perfect answer on a mathematical percentage, but that simply isn't possible. I mean, historical -- we do have some historical data on weapons effectiveness and accuracy and reliability, but I think that we just have to understand that these are mechanical devices. Mechanical devices will fail on occasion. We have improved the reliability. We have improved the efficiency, with Joint Direct Attack Munitions. We have improved the ease of delivery, to make it far easier for air crews to get that weapon to the right place and then release it, to get it to the target by itself. But still, weapons will in fact malfunction to some degree.

 Not all damage and not all collateral damage is caused by friendly fire. And clearly, our adversaries in the past, Milosevic, Hussein as well, have taken advantage of collateral damage or damage that has been a consequence of adversary fire, And you simply have to ask a question; all those bullets going up into the sky, they come down someplace. And the missiles go up that miss targets; they come down some place and they cause damage as well. So we just have to be cautious about assuming that if something happened, it necessarily was a consequence of direct coalition activity.

 There is a great myth about high altitude and accuracy. The argument that I have to be low-altitude to hit a target is false. It is patently false. Joint Direct Attack Munition actually is far more accurate at high altitude than it is at low altitude, because it has more time to get to the target. Laser-guided munitions, depending upon the weather; if I have cloud decks, then laser-guided munitions can create some problems. But altitude, when you see air crews up at 15,000 or 20,000 feet, in most instances, or even higher, that is not affecting in the vast majority of cases their ability to create the desired effect on a desired target.

 And the other thing I think we need to be cautious about: we're going into an operation, a surface combat operation if we potentially go into Iraq, which we have not seen in a very long time in this country. We have seen and we have developed fairly established and critical procedures to mitigate collateral damage using air operations. And quite frankly, as much as airmen have chafed -- airmen of all the services have chafed under those rules and restrictions, we have learned a very great deal in how to do our jobs better. We have not had as much experience in these issues on the ground.

 And quite frankly, the soldier's and Marine's challenge is a different one. If I'm in an airplane and somebody shoots an M-16 at me or an AK-47, I can fly away. If I'm on the ground, in a house, and

somebody shoots an AK-47 at me from across the street, that's a different story. And so our soldiers and Marines will have a much more difficult challenge ahead of them. But I'm confident that the commanders are doing the right thing, they have helped and prepped their folks to do the right thing. But we have to understand that our experiences we have seen in collateral damage in air operations over the last decade is not the same experience we have in mitigating collateral damage in surface combat operations. So our forces are about as well trained as we can get them, but they do have some challenges just because of the nature of ground combat.

And one last slide.

A point on the good news. I think in collateral damage mitigation, we probably know more about Iraq than we know about America, in many respects in terms of, from a targeting point of view, understanding the different aspects of the --

Q: (Off mike.) (Laughter.)

Q: (Off mike) -- clarify. (Laughter.)

Crowder: Yeah.

Q: (Off mike.) (Laughter.)

Crowder: We also have provided our air crews -- or our personnel who are doing the planning for these military operations a set of tools that have simply not existed before. Some are collateral damage mitigation tools, some are the ability to sit at a single computer.

I had the ability even in Enduring Freedom to sit at a computer and go from a one to a million scale map using a track ball, go all the way down to a one to 250,000 scale map and then five-meter imagery and one-meter imagery, all with a track ball on a computer. And that capability gave a lieutenant that was working for me in collateral damage -- he could come up with a collateral damage assessment in some cases in minutes by just -- by attack P reporting a target at an area just with a set of coordinates.

So, some of these tools -- if you add to that our fly-out capabilities that we have and things like Power Scene, that I think Fox News just showed on TV the other day, which gives the ability for air crews as well as ground forces to go through a mission and rehearse a mission to see what they expect to see.

So, we do have a lot of capabilities. We have improved munitions. As I mentioned, the Joint Direct Attack Munition, many folks said a few years ago it wouldn't work. And we are finding that it is working and it is working better than we ever anticipated. But that is a significant capability in enabling more efficient and effective operations, because now, most of my platforms can go after multiple targets in a single pass.

Sensor Fused Weapon will probably be employed for the first time in this operation. Sensor Fused Weapon is an anti-armor personnel which has a triple-redundant dudding mechanism if, in fact, it fails to find a target that it wants to employ. It's a great capability and actually is a far more accurate munition that can get -- destroy enemy vehicles, enemy armored forces, even if they're widely dispersed.

Q: F-16s, A-10s or what?

Crowder: I believe F-16s and A-10s both carry them, but F- 15E -- the good news about that weapon is that it's a -- the only thing that we changed was the insides. And so it can -- basically, anybody who could carry a -- or, what we call a tactical munitions dispenser or those cluster munition canisters can be carried -- can carry that weapon.

Q: How does it work?

Q: (Inaudible) -- triple-redundancy? (Laughter.)

Crowder: It -- the way the system works is that it will operate at a -- well, we actually have Sensor Fused Weapon with a Wind Corrected Munitions Dispenser, which is the fourth one. Wind Corrected Munitions Dispenser are INS-guided cluster munitions to enable us -- cluster munitions were notoriously unaccurate (sic) from 30,000 or 40,000 feet. But these weapons actually get the weapon to the exact point in space that we want it to open up. When that happens with Sensor Fused Weapon, there are 10 internal canisters inside that weapon, each with four munitions. Those canisters deploy, and they have a parachute that slows the rate of descent of the canister and then those four independent munitions pivot out. And those munitions can then independently seek adversary armored vehicles. But if the weapon fails to detonate in the air and it lands on the ground, after a fairly short period of time, each of the submunitions will disarm itself. And at that point, about the only way to make it go off is a blasting cap.

But those are the types of capabilities that we're fielding. The Navy's improved both their inventories and the capabilities of the Tomahawk since Desert Storm dramatically. And so all of these I think are a fairly good news story.

I talked about air crew training, things like Power Scene. Again, air crews from all of the services have had to live with and understand the issue of collateral damage over the last decade. And it's improved in our training programs, it's improved in our documentation, in how we train those air crews from the ground up as well as, as I mentioned, all of the Joint Terminal Air -- TAC Controllers and all the services who do controlling from surface combat operations.

We have improved weapons assessment and tracking. We now have the ability basically to track every weapon as it's released, or reported back to the air operations center so we can build a detailed map of expenditures post-conflict, which is a really good thing to do if I -- because, in fact, we used this capability in Allied Force. The Germans were going into a destroyed Serbian military camp to set up as their point of operations when they moved the peacekeepers into Kosovo, and we were able to give the Germans a detailed map of expected munitions that we expended and the potential duds that might be in that area. Very helpful if one talks about post-conflict and post-conflict clean-up.

So I -- just to finish up before I throw it back to you, again, I think we've done some tremendous effort in this area. It's not perfect. It's not going to make wars bloodless. But I think that the capabilities that the Air Force has fielded, that the other services have fielded, what we've done in training has also dramatically improved.

Q: Colonel, you discussed --

Q: How about non-kinetic weapons?

Crowder: I'm not sure of the number of non-kinetic weapons we're using, or if we're using non-kinetic weapons. I just am not -- I am not qualified on -- I don't know the specifics of the ones that might be employed.

Q: Colonel, you discussed earlier the advantages that intel, EBO, precision and stealth have made, that those have made it possible to take out command and control of air defenses -- arguably. And that may cause effect quicker and more rapid and more efficient. Arguably, the most rapid and efficient way to take out the enemy is to be able to get to the actual leader and his top advisers. Is it reasonable to think that those advances have given us that capability, a capability on that level?

Crowder: When you start trying to target individuals, the world gets really complicated really fast. And quite frankly, your ability to do something like that is -- especially with an adversary who has specifically made it hard for his own people to target him, it becomes very difficult. But I think -- my point would be, is that because we now have the ability to go after these target systems as a whole, I can now go after what I want to attack as opposed to going after all the air defenses. I mean, I was only attacking the air defenses as a mean to an end. With the ability to rapidly neutralize and collapse air defenses as well as enemy command and control infrastructures, I can now say what is the target and go after those

immediately or as soon as I possibly can.

 Q: I was just a little confused about -- could we just revisit the comparison between '91 and 2003 for a minute.

 Crowder: Mm-hmm.

 Q: Are you comparing PGMs from '91 to 2003, or total tonnage, regardless of whether they're conventional or --

 Crowder: It certainly isn't total tonnage. If one just looks at an examination of the munitions-carrying platforms --

 Q: Right.

 Crowder: -- every bomber we have in the inventory can kill multiple -- in many cases, it least 12-plus targets, 12 to 24 targets, every bomber in the inventory. Every -- or the majority of the Navy's F-18s have the ability of using joint direct attack munitions to kill two, three or four targets in a single mission. Our F-15s and -16s likewise have a similar capability.

 So -- and everybody out there, if you're not dropping PGMs, you're probably not close to the fight. I mean, there are a few airplanes that are a little bit less capable, but the vast majority of the Air Force and Navy's inventories are PGM-capable weapons either through laser-guided munitions or joint direct-attack munition. And so, we have to remember, in the Gulf War, only 9 percent of the munitions dropped were precision-guided. As well, only 2 percent of the sorties -- the 117s flew only 2 percent of the sorties, yet they struck 53 percent of the targets in the target deck.

 And so if we examine that capability, this -- if that capability that was resident or perhaps airplanes that were only 2 percent of the sorties, 36 airplanes, and with the hundreds we have now, my capability is dramatically -- and I cannot underscore that -- it is dramatically improved over the (percent ?) I had in the Gulf War.

 Q: Just for example -- for hypothetical purposes, let's there are 3,000 bombs dropped in Baghdad in 2003 in the first two days. You wouldn't be saying that that meant that there were only 300 dropped of all types in 1991?

 Crowder: No. I'm talking precision-guided munitions.

 Q: That's what I thought.

 Crowder: Yes.

 Q: What about deeply buried targets, underground bunkers, that sort of thing? Are you --

 Crowder: We have good --

 Q: What are your capabilities?

 Crowder: We have good capability there. (Laughter.)

 Q: (Inaudible.)

 Q: What about -- can you talk about the fiber optics networking that Iraq has done and how that complicates your simultaneous --

 Crowder: That's a -- I would prefer not to discuss that subject.

Q: You mentioned providing a picture to the ground force of what had been dropped in an area. How quickly can you provide that? And what do you do if you're envisioning operations which are simultaneous in nature?

Crowder: I don't know the specific details, but the weapons are tracked in this system -- since we don't have right now -- I would like to have a networked weapon that told me where it hit. That would be really a perfect world. And then it gets right back over the datalink architecture into the air operations center, and then two seconds after it hit, I knew what happened. We're still a few years away from that. But I think that they could probably make that assessment fairly quickly.

Most of those assessments initially are going to be done through air crew reporting upon when they come back from MISREP, and then we have to calculate those numbers and try to make those complete assessments.

But again, I think that even over the end of Allied Force, and even over Enduring Freedom, the capabilities and tools we've given to the men and women in the air ops centers, as well as the connectivity and interconnectivity we have between the land and maritime and air components -- commands, has given us a lot greater degree of flexibility where somebody in General MacEwen's (sp) headquarters -- "I need some information" -- and -- (snaps fingers) -- we can get it to them quickly.

Staff: We have time for about two more questions.

Yes, sir?

Q: One on bureaucratics. What's the work split between ACC and Central Command in all of this?

Crowder: ACC is the air component -- or we provide forces through 9th Air Force to Central Command. And we work -- since the majority of our 9th Air Force under General Moseley, is the air component to Central Command. We are there, what we call an Air Force forward -- or the commander of the Air Forces -- General Moseley commands all U.S. Air Force personnel in the region. And we provide complete support to him and his planning and Central Command planning efforts.

So that there's a lot of stuff that takes place at Tampa, but there's also a lot of specific challenges that General Moseley asks for some help on, and then we at Air Combat Command have put together some really, really talented people into some dark rooms and wouldn't let them out until they came up with some solutions. So we are at this point supporting General Moseley and supporting General Franks in anything that they need.

Q: Colonel, you said early in your briefing that we are starting off in a significant better position as a result of the northern and southern no-fly zones. I'm wondering why, and what does that mean in the event of war?

And then secondly, I wanted to ask you from your standpoint, what would you hope to accomplish -- if we go to war -- in the first couple of hours, in the first couple of days?

Crowder: The second question, I'll punt. (Laughter.)

The first question, the strike package I showed you earlier that went into Basra that had the 41 aircraft, that went to Basra. I mean, they were SA-6s and SA-2s and SA-3s and Crotals (ph) and Rolands. And not much of that stuff is alive at Basra anymore. We have -- I mean, having lived over the no-fly zones for the last 12 years, it is a significantly less hostile place than it was in northern and southern Iraq on the opening night of the Gulf War. And that simple fact will make the jobs of our men and women, the air crews that are out there doing this, a whole lot easier. And, and it's important to note, that control of the skies that we will have almost from the outset over the southern and northern regions of the country enable our surface combat forces to exploit more quickly, more effectively, more rapidly.

Q: Colonel, may I ask a summary question, just a sort of a sum-up question basically. You said the enemy doesn't know what's coming. In general terms, could you just sort of give them an idea? (Laughter.) And also --

Crowder: Like where are the troops and can we count them?

Q: -- but also without turning Baghdad into a Dresden?

Crowder: I think we really need to understand that the analogy with Dresden I don't think is really helpful. And the reason is, we were dropping bombs out of airplanes that had -- the accurate ones, the Air Force folks who were doing precision bombing, had CEPs of 3,300 feet. So that type of conflict -- you're not going to see that type of conflict.

In the last Gulf War, even with the accuracy and the limited numbers of assets we had in the last Gulf War, the Iraqi people quickly realized that, you know, it's okay to go about doing business, to some degree, in areas that don't have any military targets around them.

And so we have to understand that what we will engage and the things that we choose to affect on the ground will be specific military targets, and Baghdad will not look like Dresden.

Q: But the White House is warning that Baghdad is not a safe place to be. You're warning us specifically that this is not going to be bloodless. I mean, you are expecting a pretty significant number of civilian casualties, aren't you?

Crowder: Again, the -- that expectation is -- there is nothing that we can do to anticipate that what that number is going to be.

Q: Is it possible to accomplish your military goals without a significant number of civilian casualties --

Crowder: I believe it is, but it really depends on what our adversary does.

Again, I think they're waving the white flag at me. But again, we're all in this together. I mean, some of these military operations we are engaging in are extremely complex. Sometime it's tough for somebody who -- again, I've been in the Air Force for 21 years, and all I know is how much I don't know.

And so to the degree that we can help you understand these issues a little bit better, we'll be more than happy to do so. And again, I think all of our objectives are the same. If we're required to go into conflict, we need to do so as quickly as possible and win as quickly as possible, and then help the American -- Iraqi people free themselves, and do so with a minimal amount of civilian unintended damage and civilian casualties, as well as a minimal amount of casualties on our side as well. So --

Q: Do you guys ever worry that you're overconfident when you sit around and talk about this stuff?

Crowder: If you --

Q: (Off mike.)

Crowder: We have every reason to be confident. We're the finest military in the world.

The --- that said, if we go to war, all bets are off. I mean, the -- if you talked and listened to the press reports that many of you -- providing of these troops that are in the field, they are extremely confident in their business. And we anticipate the -- we can anticipate the unanticipated, we're looking at all the things that can possibly go wrong, but we wouldn't be doing this if we thought we were going to lose.

So -- anyway. So again, I just -- anything that we can do to help you guys out, I'd sure -- I'd be happy to

talk off-line or whatever. We -- anything we can do to help your understanding of how these operations might -- are commencing or the types of things we're doing or the types of equipment we're using, we're on board to help you understand that.

Thank you.

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Headquarters Air Combat Command

Effects-Based Operations

Col Gary Crowder
Chief, Strategy, Concepts and Doctrine
Air Combat Command

This Briefing is Classified:
UNCLASSIFIED

Desert Storm
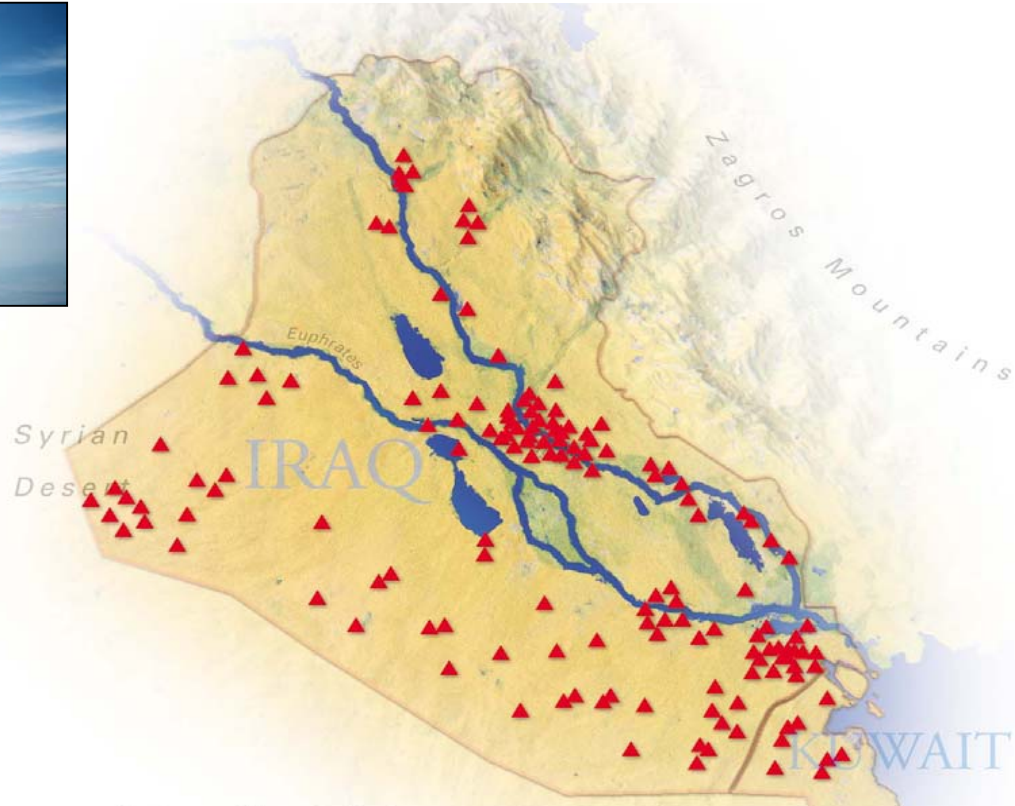
Over 150 target attacks planned in 24 _hours_… more than in the _years_ 1942 and 1943 combined over central Europe in WWII

How Was This Possible?

The maturation of airpower technologies merged with a theory of targeting for systemic effect rather than absolute destruction

Advanced Technologies (Stealth + Precision)

+

New Planning Approach (Effects Based Planning)

=

New Concept of Operations (Parallel War)

Defining Event Of Revolution in Military Affairs (RMA)

Precision Redefines the Concept of Mass

1500 B-17 sorties
9000 bombs (250#)
3300 ft CEP
One 60' x 100' target
WWII

30 F-4 sorties
176 bombs (500#)
400 ft CEP
One Target
Vietnam

1 F-117 sortie
2 bombs (2000#)
10 ft CEP
Two Targets per Sortie
Desert Storm

1 B-2 sortie
16 bombs (2000#)
20 ft CEP
16 Targets per Pass
Available Now

All WX, One AC Many Targets
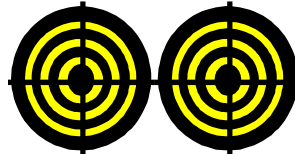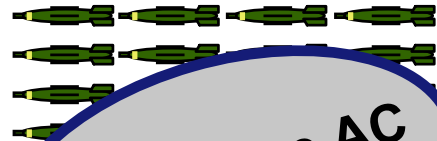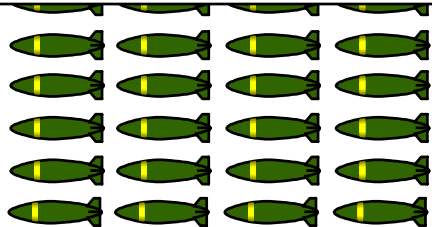
Over five decades, advanced platforms and precision munitions revolutionized the effects of airpower by shortening the time and sorties required to strike a target (or targets!).

The Leverage of Stealth: Non-Stealth vs Stealth Attack

Sweep/Escort F-18s

Defense Suppression
Drones
F-4Gs
F-18s
EA-6Bs

Bomb Droppers
A-6s
Tornados

Bomb Droppers

**41 Aircraft/ 8 Bombers
1 Target—3 Aimpoints**

**20 Aircraft/ 20 Bombers
28 Targets—38 Aimpoints**
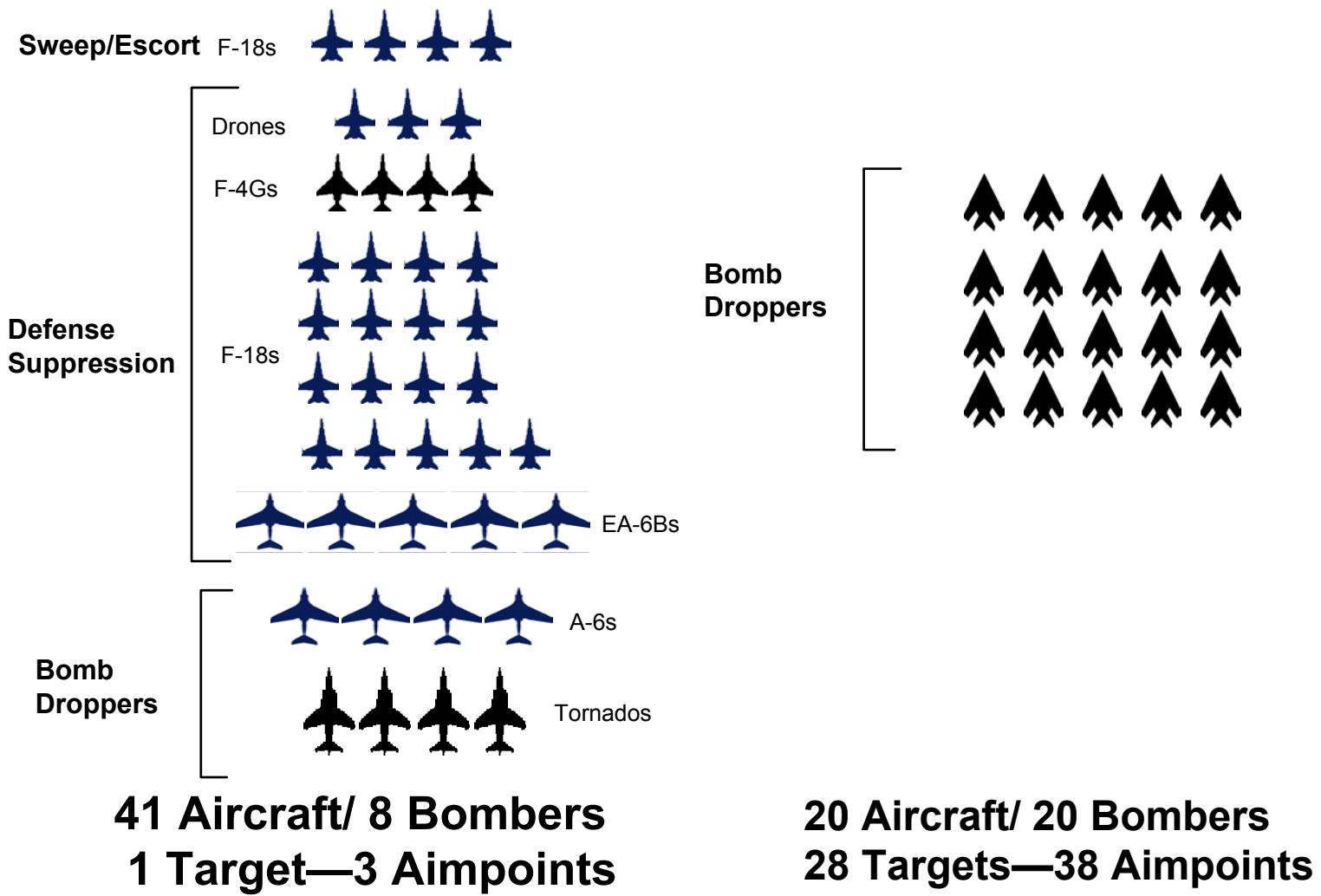
Sequential vs Simultaneous Operations
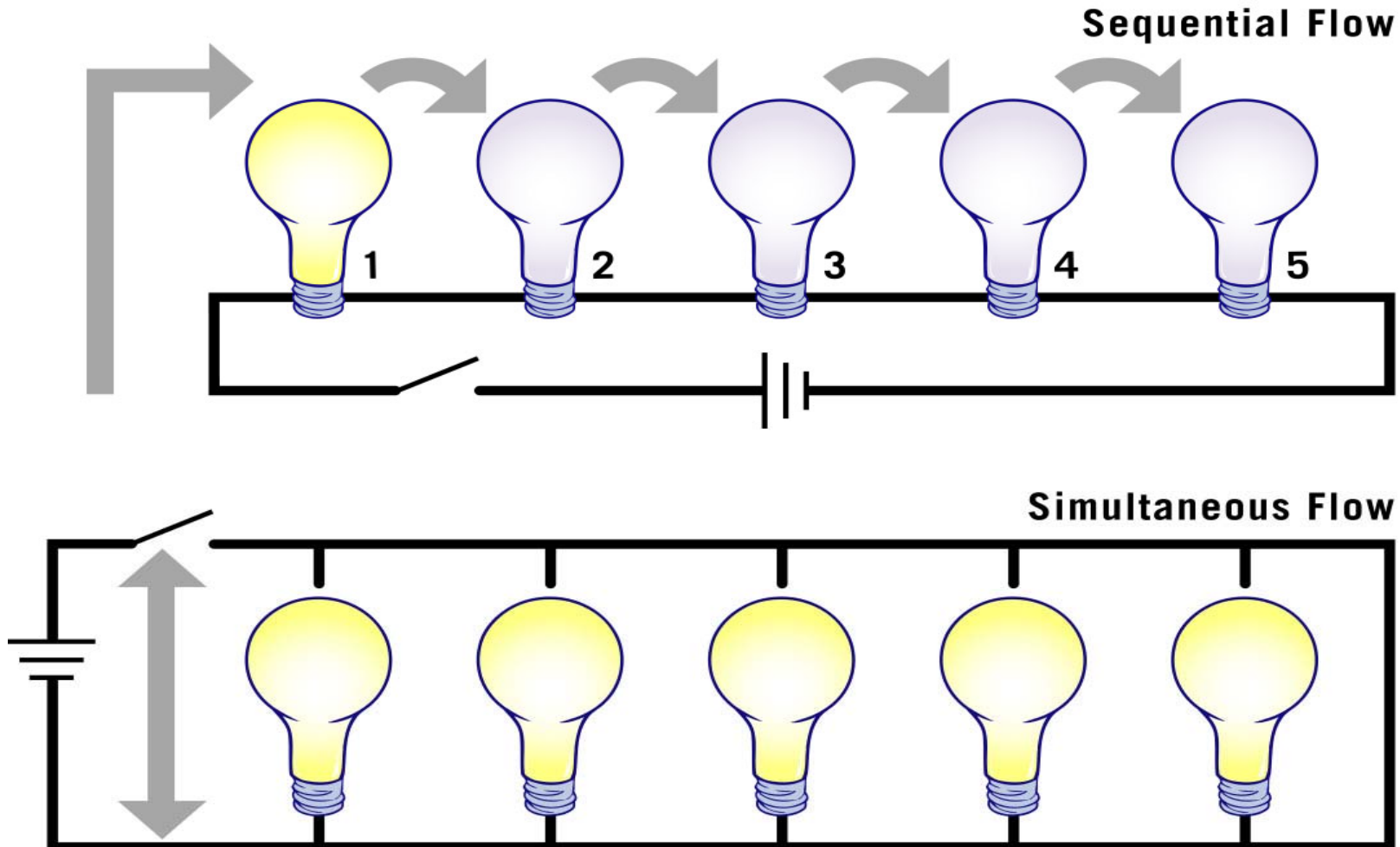
Parallel Warfare and Simultaneous Attack
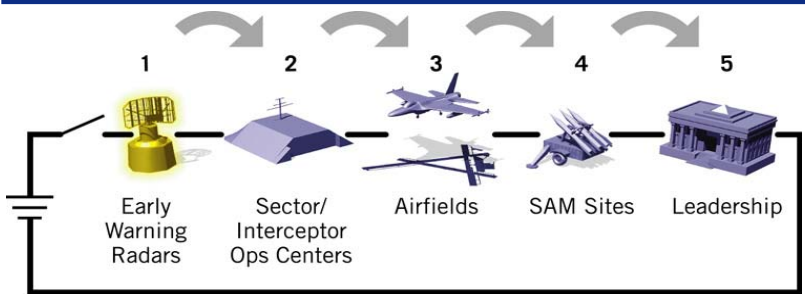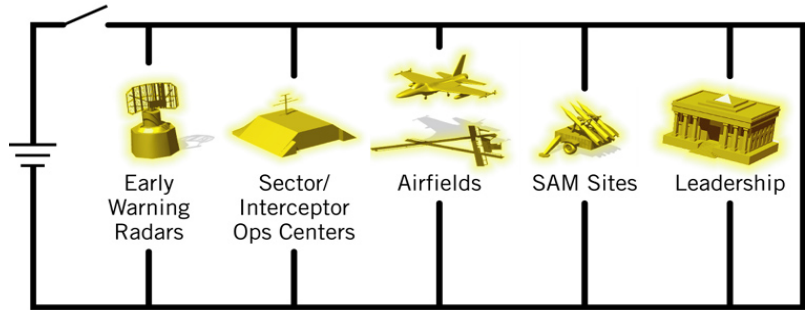
Series Warfare – Sequential Attack

Parallel Warfare – Simultaneous Attack (Weighted Against Air Defense)
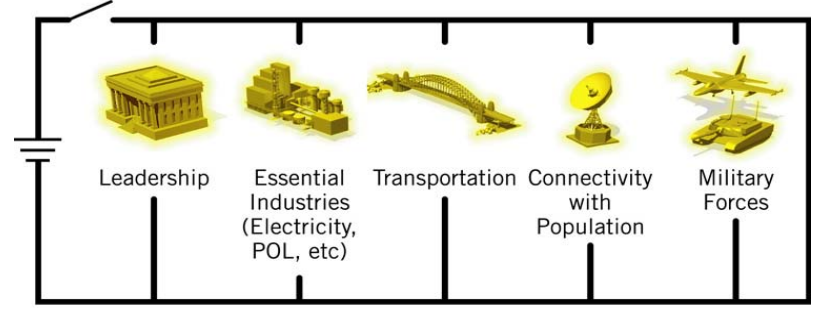
Parallel Warfare – Simultaneous Attack Against All Vital Enemy Systems

SERIES WARFARE - SEQUENTIAL ATTACK

Series attack of each target element in a Target System

PARALLEL WARFARE - SEQUENTIAL ATTACK

Parallel attack of each target element in a Target System

PRALLEL WARFARE - SIMULTANEOUS ATTACK

Parallel attack of each Target System

Attrition vs Effects-based Operations

Priority   **Target**

1. Plant 3
2. Plant 8
3. Plant 9
4. Plant 10
5. Plant 1
6. Plant 4
7. Plant 2
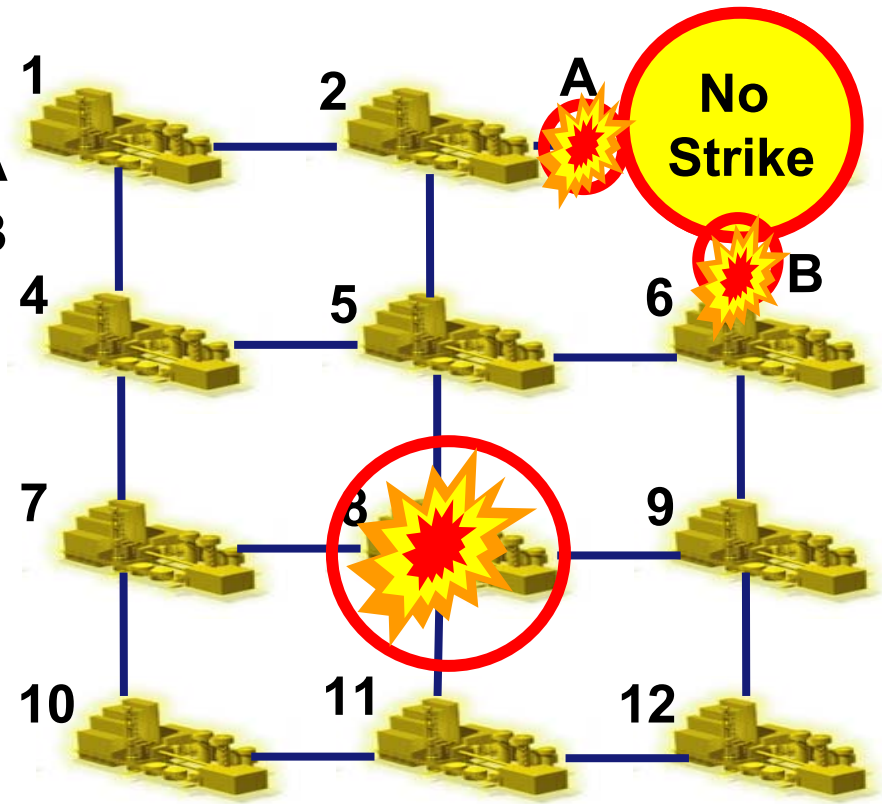8. Plant 6
9. Plant 5
10. Plant 11
11. Plant 12
12. Plant 7

Essential
Industries
(Electricity,
POL, etc)
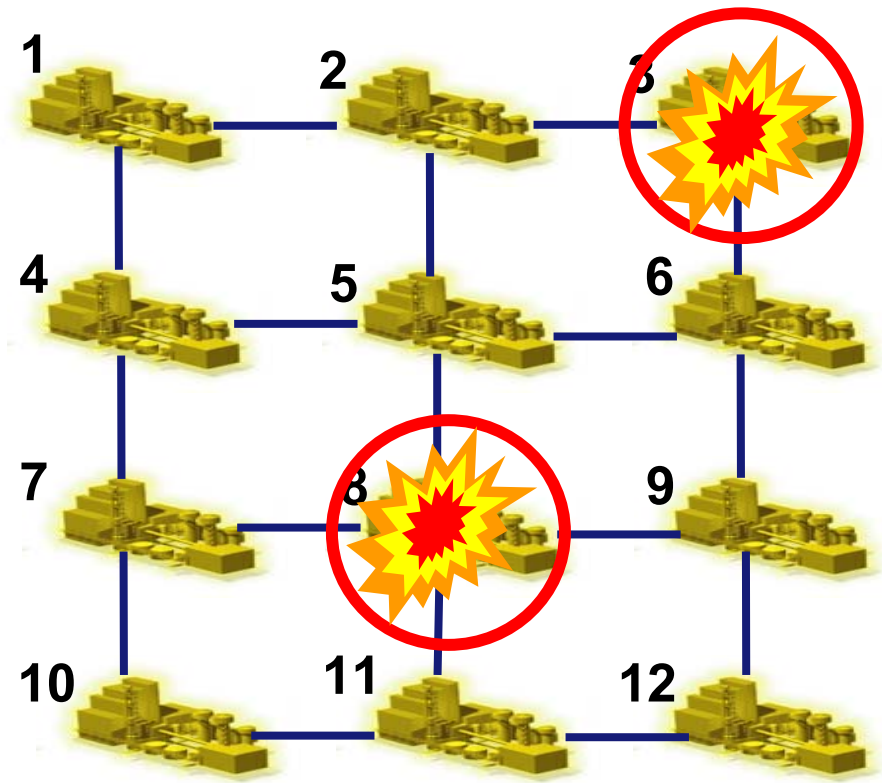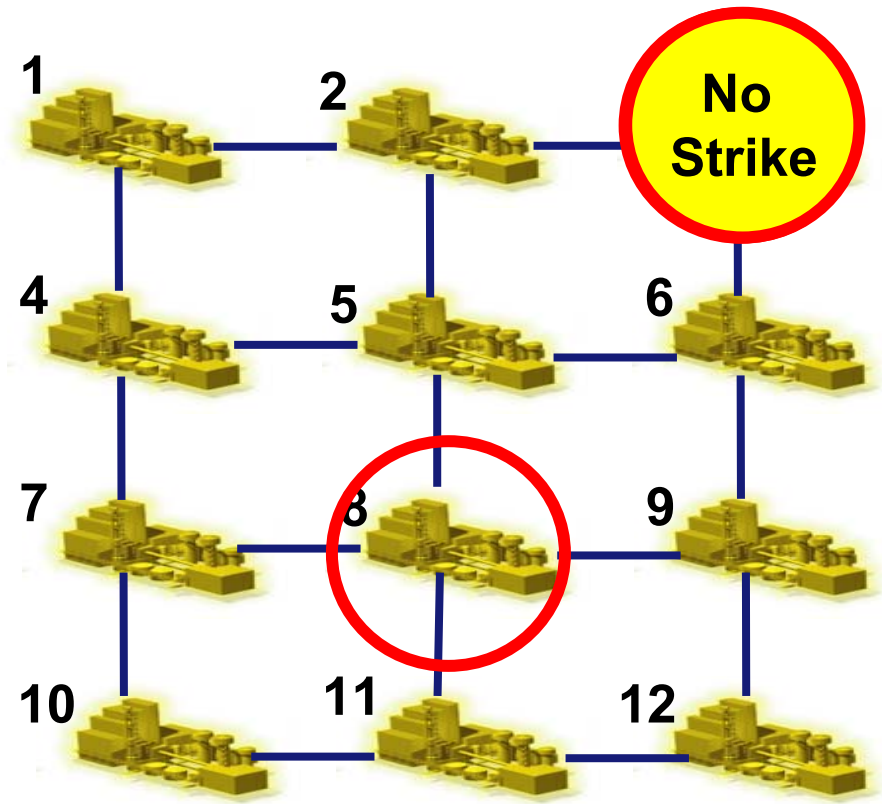
Attrition vs Effects-based Operations

Essential Industries (Electricity, POL, etc)

Priority	Target
1.	Plant 8
2.	Pwr Line A
3.	Pwr Line B
4.	Plant 2
5.	Plant 6
6.	Plant 9
7.	Plant 10
8.	Plant 1
9.	Plant 4
10.	Plant 5
11.	Plant 11
12.	Plant 12
13.	Plant 7
14.	Plant 3 (No Strike)

No Strike

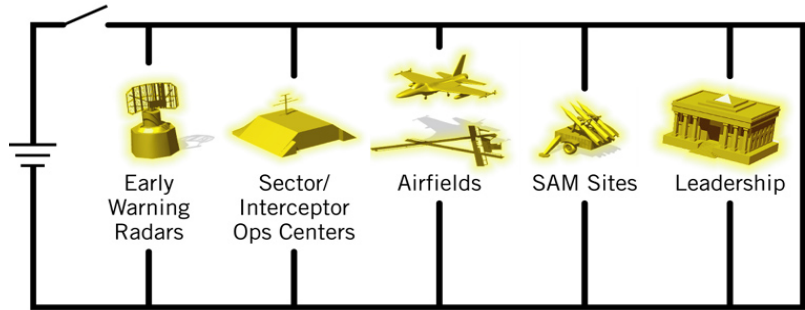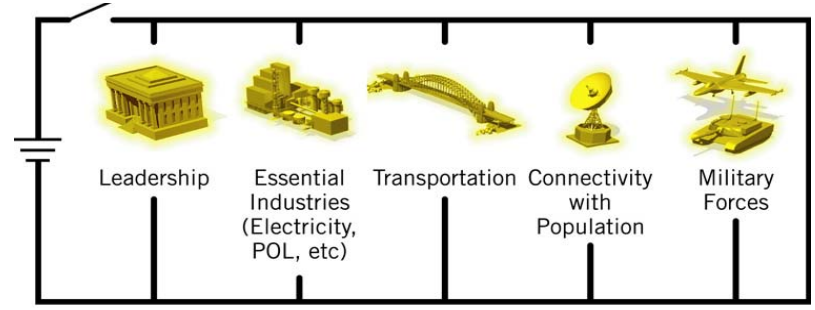# *Parallel Warfare and Simultaneous Attack*

Series Warfare – Sequential Attack

Parallel Warfare – Simultaneous Attack (Weighted Against Air Defense)
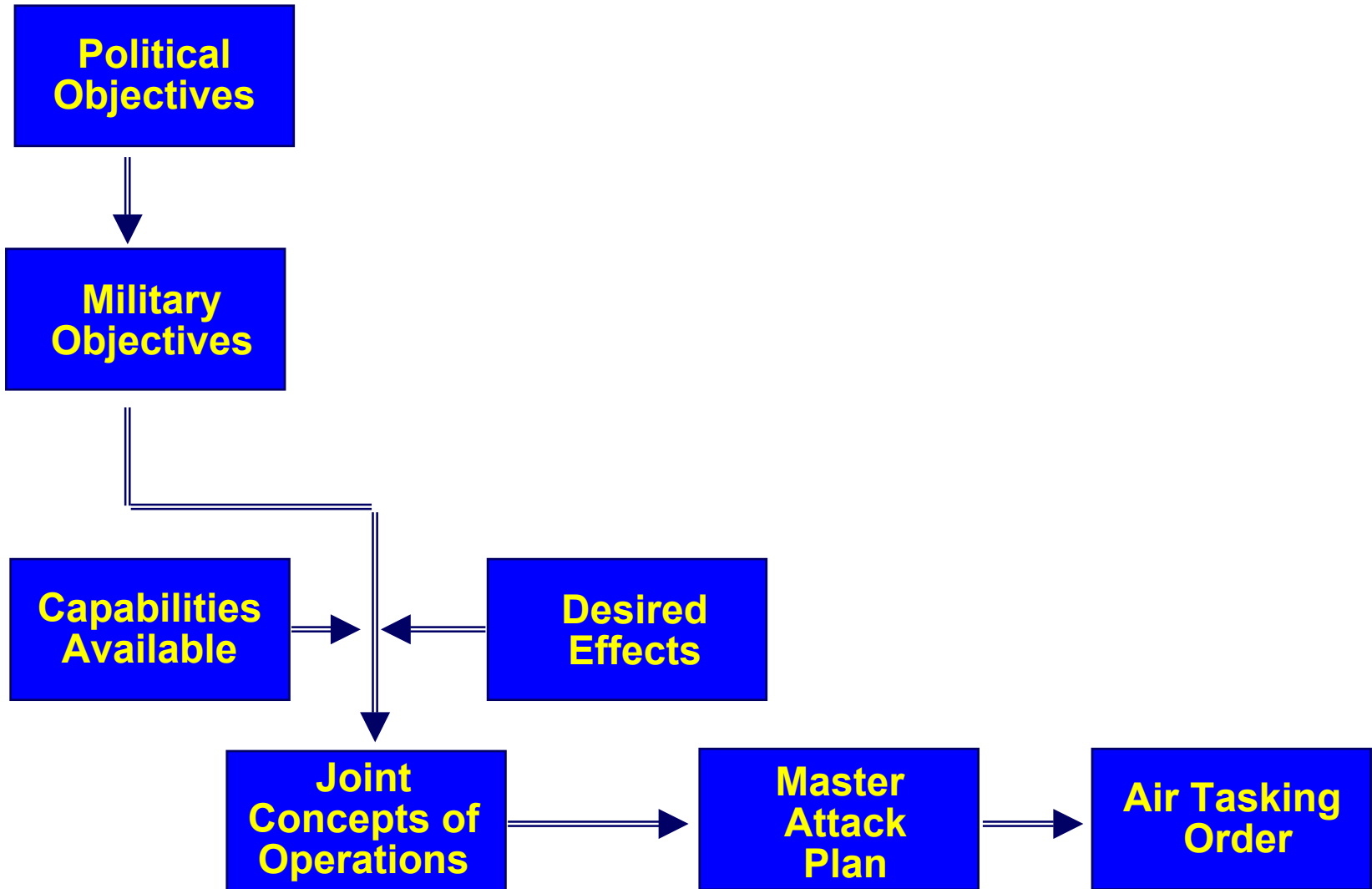

Parallel Warfare – Simultaneous Attack Against All Vital Enemy Systems

SERIES WARFARE - SEQUENTIAL ATTACK

PARALLEL WARFARE - SEQUENTIAL ATTACK

PARALLEL WARFARE - SIMULTANEOUS ATTACK

Key to Effects-Based Planning Success:
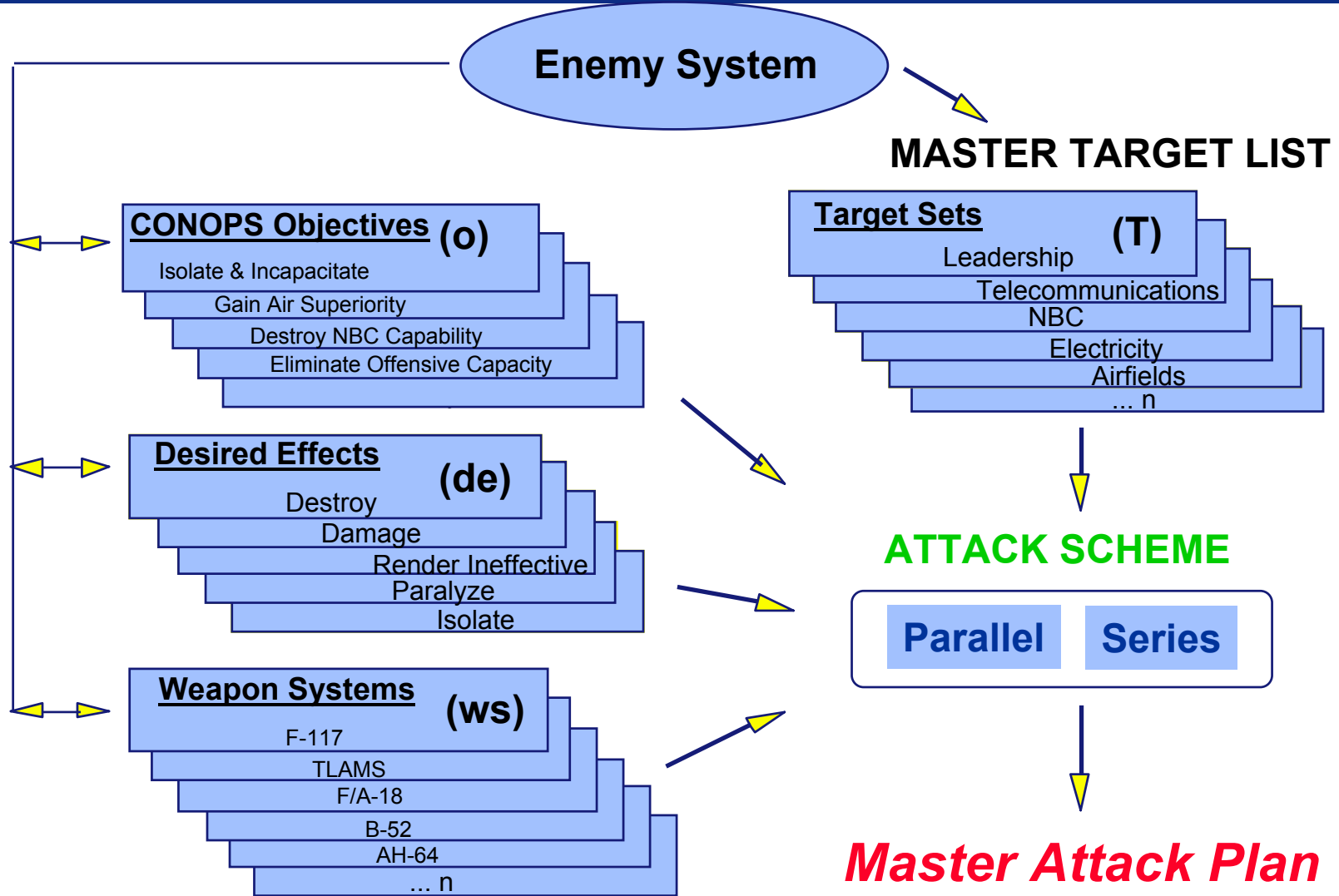## Keep Execution Tasks Tied to Political Objectives

Political Objectives

↓

Military Objectives

Capabilities Available → ← **Desired Effects**

↓

Joint Concepts of Operations → **Master Attack Plan** → **Air Tasking Order**

The Essence of Effects-Based Planning: A Systems of Systems Architecture

Political Objectives

Military Objectives

Strategic Centers of Gravity (Target Systems)

Operational Centers of Gravity (Target Sets)

Tactical Centers of Gravity (Individual Targets)

Capabilities Available

Desired Effects

Joint Concepts of Operations

Master Attack Plan

Air Tasking Order
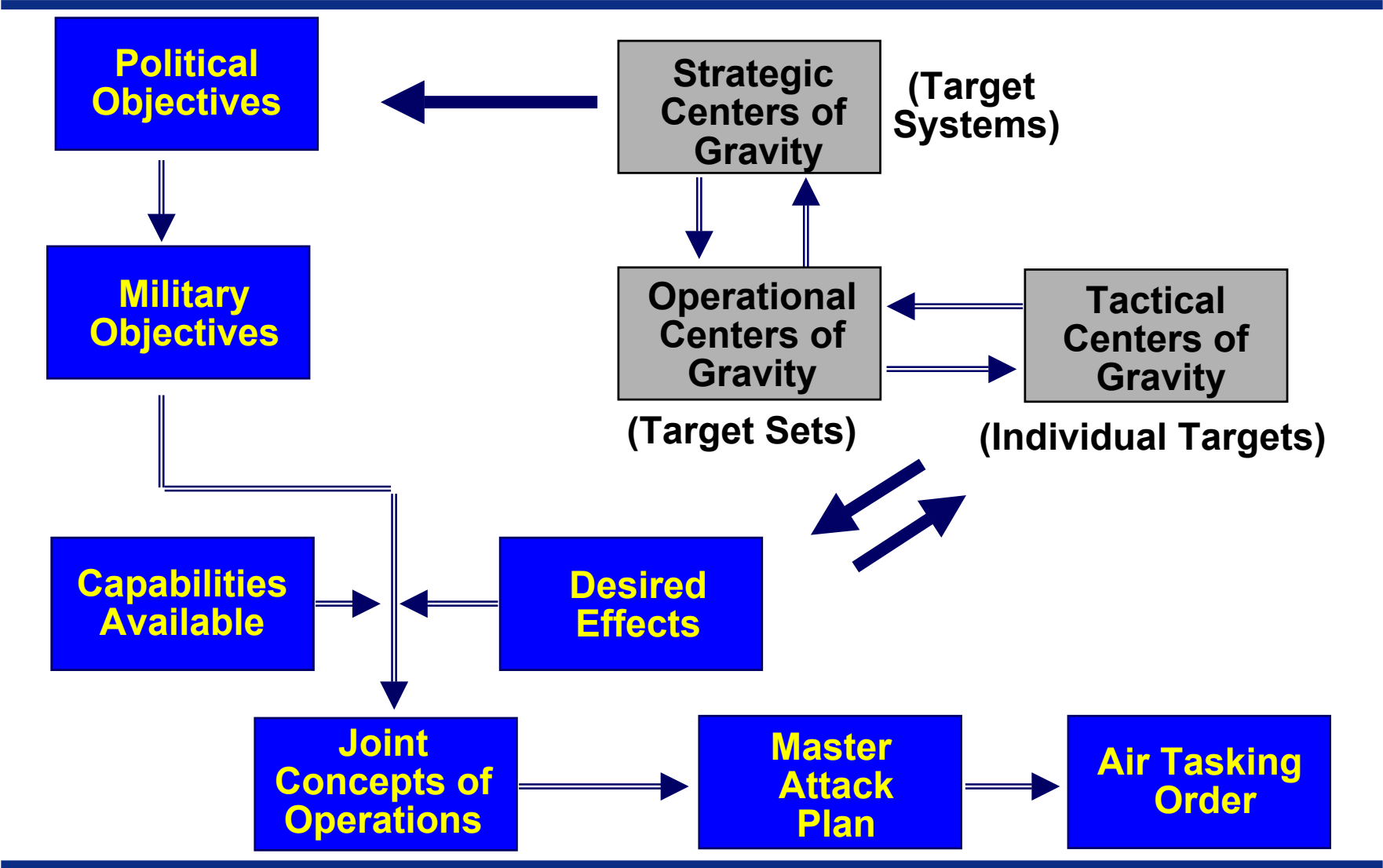
The What & How Of
Master Attack Plan Design

Enemy System

MASTER TARGET LIST

CONOPS Objectives (o)
- Isolate & Incapacitate
- Gain Air Superiority
- Destroy NBC Capability
- Eliminate Offensive Capacity

Target Sets (T)
- Leadership
- Telecommunications
- NBC
- Electricity
- Airfields
- ... n

Desired Effects (de)
- Destroy
- Damage
- Render Ineffective
- Paralyze
- Isolate

ATTACK SCHEME

Parallel	Series

Weapon Systems (ws)
- F-117
- TLAMS
- F/A-18
- B-52
- AH-64
- ... n

Master Attack Plan

16

Effects Based Operations

Aerospace Forces

Concepts:

- *Rapid Aerospace Dominance*
- *Coercive Campaigns*
- *Cyber war and Perception Modification*
- *Rapid Halt*
- *Network Centric Warfare*
- *Shock & Awe*
- *Dominant Maneuver*

New Concepts & Capabilities

Capabilities:

- *Global Coverage*
- *Freedom of Access*
- *Persistent Over-watch*
- *Rapid Reaction*
- *CONUS Reachback*
- *Fewer Forces In Harms Way*

Ground Forces

Maritime Forces

Collateral Damage

- **Collateral Damage: The damage expected to occur to non-military or approved targets in the course of prosecution of valid, approved military targets**
  - **Destruction of windows in a civilian structure located next to a military structure (e.g. barracks, Headquarters Bldg)**
- **Unintended Damage: Damage that occurs as a consequence of weapons or weapons system malfunction, unforeseen second order effects, or as a consequence of other "targeting" errors**
  - **Fin failure on a guided munition**
  - **Hidden ammo bunker underneath a structure**
  - **Intelligence error**
- **Collateral damage can be planned for and mitigated. The potential for unintended damage can be mitigated…but neither fully planned for or anticipated**
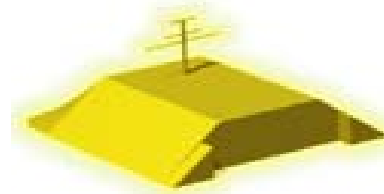
Collateral vs Unintended Damage

Civilian Structure Office Complex
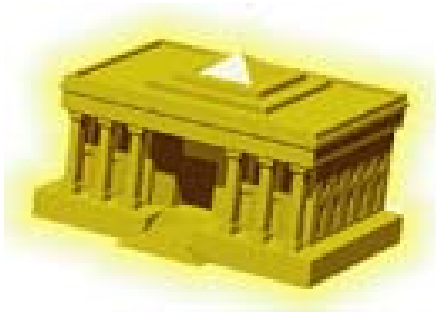
Military Target Bunker

Risk Assessment

Mitigating Collateral Damage: The Role of Military Planning

- **The principal way for military forces to mitigate the potential for collateral damage is develop clear military objectives and tied military actions directly to those objectives**

- **Numerous Steps in the Process**
  - **Objectives and Guidance**
  - **Target Development**
  - **Weaponeering**
  - **Force Application**
  - **Execution Planning and Force Execution**
  - **Combat Assessment**

Myths About Collateral Damage

- **Collateral Damage can be avoided in conflict**
- **Intelligence is perfect**
- **Weapons always work**
- **All damage is caused by friendly forces**
- **High altitude operations decrease weapons accuracy and increase the potential for collateral damage**
- **Collateral damage can be equally mitigated in air and ground operations**

The Good News

- **We know Iraq**
- **Improved planning and assessment tools**
  - **FAST CD, Imagery Data Bases, Electronic Target Folders**
- **Improved munitions**
  - **Joint Direct Attack Munition**
  - **Sensor Fuzed Weapon**
  - **Improved Tomahawk**
  - **Wind Corrected Munitions Dispenser**
- **Improved aircrew training**
- **Improved Weapons Assessment and Tracking**
- **Post Conflict Preparations**