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"Revolution in Military Affairs Conference"

Report on Conference Conducted at The Strategic Assessment Center 12-13 November 1996

by

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"Revolution in Military Affairs Conference"

Workshop conducted at the Airlie Center, Warrenton, VA
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Executive Summary

For the past several years, the Department of Defense has been studying the potential development of a Revolution in Military Affairs. Initiated in the Office of Net Assessment, the study effort has expanded considerably and now includes other offices in OSD, in the Joint Staff, elements within all the Services, as well as portions of the private sector and members of academia. Given the diverse nature of the analytical efforts underway, the Director of Net Assessment wanted to know the answer to two major questions: Where is the Department now in the Study of the RMA? Where ought it to go in the future?

To help answer those questions, the Strategic Assessment Center of the SAIC was contracted to hold a conference with representation from all agencies with major study efforts underway, and a follow-up session that included the flag officers from each Service and other individuals as appropriate. The Conference was held at the Airlie Center on 12-13 November with a follow-up meeting on 20 December in the Office of Net Assessment.

There seemed to be two major areas of agreement among the participants. First, participants felt that a great deal of progress had been made in exploring new operational and organizational concepts and that it was time to test some of the notions that had been developed. The Marine Corps and the Army have already embarked on major experimentation programs. Both services noted the differences between the experiments to which their services had already committed and true RMA-experiments. In the follow-up session at OSD/NA, there was some discussion of how Net Assessment could assist in the experimentation phase.

The second element of consensus among participants was that, while a great deal of progress had been made in studying the RMA, there were several areas that needed additional attention. Among these were:

Analysis and Methodology

The two key issues in methodology are the establishment of new Measures of Effectiveness (MOE) and the modeling/simulation problem. After Steve Rosen emphasized the importance of new MOE's in his presentation, there was very little discussion -- other than to note how little progress we had made in developing MOE's for a revolutionary military. There appeared to be a consensus among participants that the study effort needed additional emphasis in this area.

Similarly, there was very little discussion of modeling and simulation -- except a note by the USMC on genetic algorithms and Artificial Life. The problem is that there have been very few innovative ideas about modeling and simulations that would help the analyst. The danger is not so much the absence of tools to aid RMA analysts, but that they will be forced to use inappropriate tools and will hence draw fundamentally wrong conclusions.

Imagine the situation if, for example, the Army or the Navy had to use models deriving from WWI to plan WWII.

Small Wars, OOTW and the RMA
This is one of the criticisms that have long been made of the RMA study efforts. The argument is simple: if fighting in small wars and participating in OOTW are going to be the major missions of military forces in the future, we ought to be focusing more RMA effort on them.

The impact of today's policies, strategies and treaties on tomorrow's capabilities.
Those in the workshop who were particularly interested in the development of space were the most concerned with this issue. As policymakers negotiate treaties that they believe will serve the nation well for the next 10 years, they may be ignoring their impact on military forces over the next 20 years. Similarly, we seem to be in the process of establishing policies, standardization agreements, etc. in the information domain without thinking through their implications for information warfare and national security.

The impact of the RMA on alliances
Although many of our potential allies do not yet have a grasp on the implications of the RMA, others are beginning to work on it -- even though they are unsure of its implications for them. The British, the French, the Germans and the Japanese all seem to be taking different approaches. Exactly how the US will coordinate with its allies in the coming years is an issue that has not been adequately addressed.

Twentieth Century War with Twenty-First Century O&O Concepts
Some participants suggested that we might be developing operational concepts that are more suited to achieving the political objectives of the late 20th Century than they are for the early Twenty-First Century. If the world is on the verge of a revolution analogous to the industrial revolution, wars of the future may be fought over entirely different sets of objectives. If the political-social-economic environment changes radically, will not the nature of military conflict itself change?

Implications of a world with widespread RMA capabilities.
Eliot Cohen noted that the group never really came to grips with the theme of Mike Vickers' presentation. Will the future world be one in which wars are inconclusive? How does a nation react to such an environment? Does attrition warfare just take on a different face? Can warfare be conducted at all? If so, how? What are the implications of this new military environment for the Twenty-First century analog of "mobilization?"

The danger of adopting the RMA before its time.
Technologies with military applications will continue to evolve and other military revolutions will take place even after the US takes advantage of the current technologies. If the US military determines that dominant battlespace awareness, precision strike, information, space or any other technology or combination of technologies provides the

basis for the next RMA, they better be right. With the speed of technological change, it could be catastrophic to place the nation's faith in one set of operational concepts only to be outflanked by an adversary who waits either for the underlying technology to mature -- allowing him to develop even newer and better concepts -- or to adopt a different set of operational concepts that exploit an entirely different set of technologies.

The High-Tech Western Oriented Approach

There was some concern that RMA analysts had spent most of our time focusing on what a critic might call a "High Tech-Western-oriented Approach" to the RMA, and not spent enough time addressing alternative approaches to warfare in the future. In particular, some participants were concerned that we needed to explore asymmetric strategies that other nations might pursue to offset revolutionary US capabilities. In the follow-up session at OSD/NA, there was some discussion of developing a Red Team capability that went beyond the high-tech approach and adopted novel, non-technology based methods of fighting the Blue forces.

Section I:
Presentation and Discussion

Introduction: Mr. Andrew Marshall

A history of the RMA and its impact on the future.

Mr. Marshall explained to participants that the goal of the conference is to assess where we are in the analysis of the RMA and to determine where we need to go next. He expressed a belief that the present level of understanding the RMA echoes the 1920s, when several new military concepts and operational capabilities were just beginning to be explored and understood. Two prime examples of the situation that existed in the 1920's are the advent of naval air power and the employment of the tank. Initially, it was believed that aircraft would be used mainly for extended reconnaissance operations. The thought of sinking a naval vessel with air power was largely dismissed. At the same time, the true value of the tank, its ability to quickly penetrate enemy lines and disrupt Centers of Gravity behind the front line, was obscured in favor of a new method of fighting trench warfare. However, these two systems and their related operational concepts, the potential of which was initially misunderstood, eventually revolutionized warfare by creating armored warfare and carrier aviation.

In a similar way, the systems and operational concepts of the next RMA are seen but not yet fully understood. The various studies conducted to date have generated several hypotheses on the conduct of warfare in the future, but have reached no definite conclusions. Therefore, Mr. Marshall stated, it would be beneficial to begin transitioning to experimental units, in order to get "real life" training and exposure to new, innovative ideas.

Mr. Marshall went on to offer his view of how he feels the RMA will impact the Armed Forces. As opposed to the RMA of the 1920s and '30s, which only created "new arms," of various Services -- meaning that the basic operations of the military remained the same, while a revolutionary system or operational concept was added – the RMA of the coming years could require a fundamental revision of the way we understand warfare. The entire operation, organization, and perhaps even purpose, of the military may change as a result of the coming RMA. In order to take full advantage of the promise of these changes in military affairs, it will be necessary for the "officer corps to come to believe that there is a better way to operate." By addressing this issue, it will be possible to answer the question, "Where will technology take us?"

Dr. Eliot Cohen: Four Perspectives on the RMA

Four competing views of the RMA.

Dr. Cohen began his introduction to the conference by describing four competing views of the RMA. These he called: 1) The Owens Clone (named after the former VCJCS, ADM Bill Owens), 2) The Uncertain Revolutionary, 3) The Gulf War Veteran, and 4) The Skeptic. Holders of these views, Cohen argued, are distinguished by their answers to four specific questions. Dr. Cohen was careful to note that his group did not include a "mad scientist" who believes in a technology-driven RMA where military advances can barely keep pace with the progress of technology.

The four questions Cohen believed important were: 1) Is there an RMA? What is its character? 2) What drives warfare? 3) What are the policy challenges facing the development of the RMA? 4) What are the greatest threats to the development of the RMA? Following are the answers each perspective has for each question.

#1 "The Owens Clone: Build the System of Systems"

The RMA is a radical departure from traditional warfare.

1. Yes, there is an RMA. Its threshold has already been passed, and the RMA is based on information technology. It will be a radical departure from traditional warfare.

2. Warfare has, until now, been a giant waste of motion and energy. Despite vast advances in weapons accuracy, lethality, improved logistics and communications, warfare is rife with misses, poor knowledge, insufficient or unacceptable logistics. The advent of radical, revolutionary information technologies will allow us to change this and improve the efficiency of war.

3. A proper information and systems architecture is needed so as to best reduce "wasted motion." Force structures must be reduced in order to free up capital to enable the creation of such an architecture, but new technologies will not be critical for the exploitation of the RMA.

4. The greatest threat to the full realization of the RMA is service parochialism and bureaucratic inertia. Only by addressing this threat and forcing innovation and adaptation will the U.S. be able to remain the world's pre-eminent military power.

#2 "The Uncertain Revolutionary: Let a Hundred Flowers Bloom"

This RMA is one in a continuing series of RMAs.

1. Yes, there is an RMA, but it is merely one in a series of continually unfolding RMAs.

2. This RMA will be driven by a mixture of technology, innovative organizations and concepts of operations.

3. Experimentation and innovation will be central to understanding this RMA, and must be encouraged. In the early stages of the RMA, it is necessary to be very broad in the outlook, meaning that many ideas will fail.

4. The main threat to the current RMA is the diffusion of technology and the rise of a peer military competitor.

#3 "The Gulf War Veteran: Been There, Done That"

The RMA is already under way.

1. Yes, there is an RMA, but it is already well underway. It was first identified in the 1980s, was first tested in the Gulf War, and will be continue to unfold throughout the coming years.

2. In this version of the RMA, the driving force behind warfare is personnel, which is much more important than technology. All of the newest, most sophisticated weapons platforms won't make a difference if there is not a highly capable crew to man and maintain them. Therefore, the driving force behind warfare is recruitment and training procedures.

3. The greatest policy challenge is maintaining a large and extremely capable force structure while continuing to develop new technologies. As this is the current activity of the U.S. military, it seems likely that America will continue to be the premier military power in the world.

4. The greatest threat to this vision of the RMA is asymmetric responses, such as terror attacks or use of weapons of mass destruction (WMD). As long as the U.S. is militarily dominant, it is unlikely that any enemy will choose to fight toe-to-toe.

#4 "The Skeptic: What Revolution?"

There is no RMA.

1. In this view, there is no RMA. Rather, the history of warfare is slow and evolutionary, with no radical discontinuities in its progression.

2. This skeptic believes that human nature, not technology, drives warfare. Therefore, unless there is a large-scale transformation of human nature, there can be no RMA.

3. Given that human nature is the main force behind war, the primary concern of the American military should be to preserve the "warrior spirit" in the face of massive and swift technological change. It would be very easy for the U.S. armed forces to grow reliant on their high-tech weapons and lose their desire and courage. If this happens, then even the most advanced weapons will be unable to preserve the American military advantage.

4. Given the belief that warfare is driven by human nature, the greatest threat to this viewpoint is being too clever in the pursuit of the "RMA," By creating new operational concepts around new technologies, it will be too easy to move away from the essence of war and create an ineffective force.

	Is there an RMA?	What Drives Warfare?	Policy Challenges?	Greatest Threats?
Owens Clone	Yes	Revolutionary Information Technologies	Reduce Force Structure	Service Parochialism, Bureaucratic Inertia
Uncertain Revolutionary	Yes	Technology, Organization, Operations	Experimentation, Innovation	Diffusion of Technology, Peer Competitor
Gulf War Veteran	Yes	Recruitment, Training	Developing New Technology	Asymmetric Responses
Skeptic	No	Human Nature	Preserving Warrior Spirit	Being Too Clever

Consequences:

The "Owens Clone" would enact radical force structure cuts and perform organizational "surgery" in an effort to make current and future technologies better work together. The "Uncertain Revolutionary" would create experimental units in order to test ideas, concepts and systems in the field, and would make major operational changes and push for educational reform. The "Gulf War Vet" would more or less maintain an even keel. He would try to maintain the present force structure, while making the preservation of readiness a top priority. Finally, the "Skeptic" would push

In this view, small wars, OOTW, and peace-keeping missions will become the new primary missions for armed forces. Thus, there may not be an RMA, but rather an entirely new concept of war emerging in the future.

Dr. Stephen Rosen: Military Innovation

What is an RMA? Why is it so hard to implement? How does it occur?

Dr. Rosen began his talk on the nature of organizational innovation by asking the questions: What is it? Why is it so hard to do? and Why and how does it happen?

To answer the first question, it is important to note that organizational innovation is <u>not</u> technological innovation. In fact, it addresses one of the major impediments to successful technological innovation -- the common response of organizations to use new technologies in old manners to accomplish old tasks, which thwarts and prevents real innovation. Real innovation must involve fundamental changes in processes.

An RMA requires professionals to admit everything they know is outdated.

Innovation is extremely difficult because it requires professionals to admit that everything they know is out-moded, obsolete and possibly irrelevant, and that someone else knows more and has better methods. This is a very disturbing thought, and is hard for many people to admit. Therefore, successful innovation requires acceptance to new skills.

Furthermore, Dr. Rosen noted that continuous innovation should <u>not</u> be an objective, as it is too disruptive. Time is needed to understand and assimilate the new ideas and products into the organization. Thus, innovation is best when it is episodic, and separated by periods of normal business operation.

Military innovation, Dr. Rosen claimed, is completely different than commercial innovation, because the military is not a business. There is no active competitor for business or profits, no need to buy or sell a product, and hence, no signals of pending success or looming failure. Moreover, since the military is always thinking about the future (i.e. who will be the next enemy and how will he fight?) it is extremely difficult to innovate, as it can never be known exactly what will be needed. All of this inhibits radical changes in military forces.

Additionally, the fact that all senior officers in the military come up through the ranks, introduces another barrier to military innovation. With no lateral entry of senior people, the military is unable to infuse its ranks with fresh thoughts or radically different opinions from the outside, as corporate businesses are. The situation can become a vicious circle where innovation is stifled as those who are capable of introducing new

methods or ideas are either filtered out of the Service, or are trained in the old manner by the old thinkers.

The military cannot afford to make mistakes.

Finally, the military cannot afford to make any mistakes, as the cost of doing so is the lives of its soldiers, and possibly the security of the nation. This lack of a margin for error creates great prudence, caution, and conservatism within the military, which further serves to inhibit radical and creative innovations.

And yet, in the face of all of the impediments mentioned above, militaries have managed to innovate successfully. How has this happened? If one starts with the assumption that most senior officers will adopt revolutionary ideas when presented with them, then the question becomes, What must happen analytically and politically for innovation to occur?

Innovation must be spurred by long-term interests and needs.

One example of political/military innovation can be seen in the evolution of the United States Marine Corps (USMC) from a force that only fought in small campaigns and served as diplomatic guards in the early 20th century, to one that became the primary amphibious force of the United States' military. During the interwar years, defending the Philippine Islands was problematic. Defending the Islands required forward basing for the US Navy. Seizing locations for bases would be a major military requirement. As the American military realized it would have to take and keep bases in the Pacific, the need for amphibious forces became evident, and a new role for the USMC was born. Thus, as fundamental strategic elements were identified over a long period of time, innovation became possible. This outlines one important tenet of successful innovation: it must be spurred by long-term interests and needs, and must not be simply the pet project of one particular politician or officer.

The case of carrier warfare provides a good example of the process of technological innovation, in which the nature of the security environment is re-shaped by the introduction of one particular technology. After the first carriers were built, it was unclear what their roles would be in the U.S. Navy. To better understand the employment of carriers in the future, the Navy conducted a number of wargames and simulations in which analysts asked questions about a future in which carrier capabilities improved significantly. In particular, they were interested in the question, "What would happen if a carrier could launch 200 aircraft simultaneously?" While such a rate was far beyond the capabilities of carriers at the time, it enabled people to examine and think about new ways to use the system. This turned out to be the key in creating and integrating carrier warfare.

New MoEs are critical.

Rosen noted that, in this particular example, the use of simulation led to creative exercises at sea, which in turn led to the creation of new Measures of Effectiveness (MoEs). More generally, Rosen discussed the importance of not trying to measure innovation with old MoEs, for doing so will return poor results. This is evident when looking at the early days of armored warfare. While the tank was not very good at killing enemy soldiers in World War I (the old MoE during trench warfare was based on attrition -- the more enemy soldiers killed, the better the odds of storming the trench), it was very good at penetrating enemy lines and disrupting C2 operations. This became the new MoE for armored warfare. New MoEs such as this one will define real-world tasks for systems and new operational concepts emerging from innovation.

Dr. Rosen pointed out the need for the military to introduce fresh thinkers at the bottom of the promotable structure with experience in both new innovations and the old processes. For example, despite their desire to become a separate service, the decision was made to keep naval aviators within the old traditional ship-heavy structure of the navy. The Service did, however, create a new promotion pathway, which combined old experience with new insights, and led to a single, stable organizational framework. In addition, because the aviators remained in the traditional structure, they were more respected, and perhaps better able to introduce their innovations, than if they had been working outside the naval framework. However, this process does then, in general, force innovation to follow the timeline of promotion, which from lieutenant to general is about 20-25 years.

There are two main tracks for innovation, Dr. Rosen claimed. One is incremental innovation, which is driven by gradual reactions to the changing world and builds a new force step-by-step. While this is generally the safer means of innovation, if the real world suddenly moves in a completely different direction, then problems arise. It was noted that U.S. forces are currently moving towards greater emphasis on OOTW, such as those in Bosnia and Haiti, which do not involve the RMA. If this is not what the future of warfare will eventually look like, what will happen to the American military? Will it be capable of competing in the future environment?

The second track for innovation is wartime innovation, which requires a strong and flexible officer corps, willing to take chances and risk lives. While this is a much faster method than incremental innovation, it is made much more difficult by the absence of accurate and clear information. Also, as there is no luxury of time (since there is a war going on and soldiers are dying), it can be difficult to properly integrate the innovative concept or system into an already engaged military.

Discussion:

Mr. Hoffman noted that there was a remarkable parallel between Dr. Cohen's RMA perspectives and the concepts of innovation. The Owens Clone would be one who saw innovation occurring from the top down, the Uncertain Revolutionary would see innovation as being pushed from the bottom up, the Gulf War Vet would conclude that innovation had already occurred, and was now being absorbed into the military, and the Skeptic would merely see current technological advances as being steps in the gradual evolution of warfare.

Changing processes and procedures are not enough.

Mr. Pickett pointed out that changing process and procedural issues are not enough. Even with these changes, IBM failed with personal computers. It is imperative, he said, for processes and procedures to mesh with one another. He also suggested that the class of skills will have to change.

Mr. Sterner attacked the personnel policy. He pointed out that downsizing makes innovation more difficult. Senior officers who are comfortable with the Service are less likely to leave than are junior officers.

Dangers of innovation lie in the germination phase.

General Scales commented that the dangers of innovation lie not in experimentation phase, but in the germination phase, where too many ideas are killed before they can ever be tested. The seeds of ideas, he claimed, do start with senior officers, who are able to develop younger officers interested in the innovative ideas. He went on to outline two major problems with innovation. One is what to do with the equipment that is around today. It is hard to throw away billions of dollars of working equipment in order to finance innovation for the future, and as long as old systems are present within the military, bureaucratic inertia will make it hard to move away from using them. The second problem is how to graft new systems and organizational concepts onto the old ones. It will never be possible to completely replace old things with new ones in one fell swoop, so it will be necessary to integrate and work together with old and new systems.

Jeff McKitrick: The RMA Study To Date

RMA is a product of integrated systems or "systems of systems."

Mr. McKitrick began his briefing by stating that he did not believe that the current RMA was being driven by technological breakthrough, like the RMA created by the advent of nuclear weapons. However, there are

developments on the horizon that, even by themselves, could lead to major changes in military affairs. Two possibilities he noted were, technology areas like biotechnology and developments in creating alternative energy power sources.

In addition, the current RMA is not a result of combining systems, which merely takes two existing capabilities and combines them to get an improved effect. Rather, this RMA is a product of what can be termed as integrated systems, or "systems of systems." By interconnecting several different warfare areas, such as Long-Range Precision Strike, Information Warfare, Space Warfare and Dominating Maneuver, revolutionary capabilities will arise in the intersections.

Long-Range Precision Strike, for example, can be viewed as the ability to locate high-value, time-sensitive fixed and mobile targets and to destroy them with a high degree of confidence within operationally and strategically significant timelines while minimizing collateral damage, friendly fire casualties, and enemy counterstrikes. Long-range precision strike will have near real-time responsiveness of sensor-to-shooter systems, which permits maneuvers of fires and effects (not forces) over intercontinental ranges; and allows direct and simultaneous attacks on multiple enemy strategic and operational decisive points. As Air Force Chief of Staff General Ron Fogleman pointed out in a speech to the Air Force Association's Air Warfare Symposium in February 1995, by 2020, U.S. forces "may be able to engage 1,500 targets in the first hour, if not the first minutes of conflict." If the U.S. is able to engage 1,500 targets in an hour, this would be nearly a 2,500-fold increase over what was accomplished in Operation Desert Storm in 1991.

The RMA is the integration of Information Warfare, Precision Strike, Dominating Maneuver and Space Warfare.

According to Mr. McKitrick, Information Warfare can be viewed as a duel between decision processes to achieve an actionable military advantage. Information warfare will enable dominant battlespace awareness by denying the enemy critical knowledge while helping to secure friendly information flow. One of the key issues is the vulnerability of command, control, and communications, and intelligence systems; the question is how to attack the enemy's system while protecting our own. Some authorities estimate that nearly ninety-seven percent of DoD computers are well-protected against cyber attack—the remaining three percent will allow access to sixty-five percent of DoD computer systems. Information warfare will also further blur the line at which war begins—"Pre-Hostility Hostilities."

Dominating Maneuver was characterized as "the positioning of forces to attack decisive points, defeat the enemy center of gravity, and accomplish campaign objectives." Specifically, dominating maneuver seeks to disrupt

the enemy's cohesion and cause rapid collapse by directly attacking operational/strategic centers of gravity. It relies upon the ability to move one's own forces faster than the enemy can move his, perhaps across inter-continental distances. By 2020, more capable forces could well be order of magnitude smaller and easier/quicker to deploy than today.

Space Warfare was defined in the near term as "exploitation of the space environment to support full-spectrum, near-real-time, global military operations." In the future, "space warfare will add to the near-term capabilities and the conduct of to military operations to achieve objectives in the space environment." We will be able to conduct war in space and from space. Specifically, space-based offensive and defensive operations could include seizure/control of key assets such as He3 on the moon, or strategically important orbits, or the destruction of critical earth and space-based targets. Future capabilities like space transport may also make possible the movement of critical forces and equipment from CONUS to a theater in timeframes orders of magnitude faster than with current sea and air transport. Space-based strike systems could enhance long-range precision strike capability.

Discussion:

The RMAs role in OOTW.

Mr. Morrow asked whether or not the warfare areas identified by Mr. McKitrick had utility outside of traditional warfare. The rise in the prevalence of OOTW and peacekeeping operations, for example, indicates a need to consider other non-military threats, and how the RMA will impact such operations. Mr. McKitrick responded that while he intuitively felt the RMA would be able to deal with such "low intensity" operations, the RMA had not yet been studied adequately.

Mr. Vesser added that improvements in logistics will help deal with OOTW and other non-traditional military operations. Mr. McKitrick agreed, stating that not everything military is part of the RMA.

Dr. Cohen then asked whether or not the RMA was only about state versus state conflicts. Mr. McKitrick responded that the RMA deals with international war, but that there will indeed be new competitors. He was, however, uncertain of the RMA's ability to deal with them.

What might future war look like? What new strategies might emerge?

Mike Vickers: Warfare in 2020

Mr. Vickers began his briefing by posing two questions to the group: What might future warfare look like? What new strategies might emerge?

Three principal "competitions" will likely determine the shape of warfare throughout the first quarter of the next century. One form of competition is "anti-access" versus new forms of power projection. While the U.S. is a power projection military, potential competitors are working to deny the U.S. access to territory, space, information systems, etc. Another form of competition is hider versus finder. This tension will most likely produce a future battlespace in which deep-strike systems dominate. Some nations are likely to respond, however, by developing new techniques of concealment and movement. Lastly, standoff attack versus active defense appears to be an area of competition. The persistence and expansion of stealth, the proliferation of large numbers of missiles, and the extended loitering capability of emerging combat systems threaten to reduce the effectiveness of active defenses.

Next, Mr. Vickers pointed out several dynamic transformations in warfare that are the driving the RMA. Specifically, he mentioned long-range precision strike, the coordination of "systems of systems," unmanned systems, stealth, and information and space warfare as the driving forces behind the RMA that will change the doctrine of warfare. This revolution could transform war in the air, on land and at sea, and bring war fully into two new dimensions—space and the information spectrum. Air warfare could become dominated by unmanned systems, ground combat could become highly distributed and non-linear, many naval operations could be driven sub-surface, and space and the information domain could emerge as independent theaters of operation.

Several new combat systems and organizations could rise to prominence as a result of this revolution: weaponized unmanned aerial vehicles (UAV) and UAV strike tenders; arsenal ships; remote, autonomous long-range missile pods; exoskeleton-equipped armored infantry; counterspace and space-to-ground strike forces; and independent information warfare organizations.

Despite all these changes, nuclear weapons are likely to continue to be important. In the future, they may serve as deterrents to a wide variety of actions, ensuring that political objectives and the goals of "conventional" warfare remain limited.

Military operations will expand spatially and compress temporally.

Several implications of these new systems and operations will be evident. For instance, military operations will be become dramatically expanded spatially and compressed temporally. Military operations will be quicker; however, they will not necessarily lead to short war. Theaters of operations could lose much of their strategic autonomy. Information will become more important than protecting territory. Moreover, the

possession of nuclear weapons may offer nations a strategic sanctuary that will make them immune from attack.

Several new systems and organizations will arise as a result of these changes in warfare. For example, multidimensional long-range precision strike forces, anti-navy forces, network-based close combat forces, stealthy mobility forces, space control forces, and information warfare forces are a few of the changes that will affect the conduct of war.

Altogether, two new military strategies will emerge: (1) stand-off attack/anti-access and (2) distributed, extended range operations.

Discussion:

In an RMA environment, we need a new way to think about objectives.

In response to Mr. Vicker's presentation, Mr. Vesser pointed out that the answers to two questions was crucial: Why we are going to war and what are the political results we are trying to achieve. In an RMA-environment, he argued, we need a new way to think about our objectives. We need to create effects in other warfare areas. We are now seeing a decrease in the destructiveness with non-lethal warfare.

Mr. Shulsky wondered about the idea of a strategic sanctuary and the effect it would have on future warfare. If military operations are moving towards increased use of LRPS and IW, then how can a strategic sanctuary be guaranteed if it will be possible to strike throughout an enemy's center of gravity from the onset of hostilities? Dr. Cohen added that this seems to make warfare longer and less easy to resolve.

Mr. Downey remarked that Mr. Vickers seems not to have given sufficient attention to the effect of choice on future military operations. Unconstrained potential is impossible, as choices in both the fiscal and operational spheres will prevent complete realization of the RMA. A critical debate deals with the issue of what gives you advantages over your enemy versus what must be traded away.

Mr. Pickett noted that the key to exploiting the RMA lies in the architecture that will be created. It is important to figure out many ways of accomplishing the same task, so the enemy will be unable to easily counter one system or operational concept.

Mr. Cohen returned to his earlier point by asking whether or not future war was likely to be indecisive. Mr. Vickers answered that it certainly could be in his conception. Mr. Pickett added that it seemed as if decisiveness will be much harder to achieve in the theater as the battlefield becomes increasingly depopulated and dispersed.

Section II:
Service Briefings

Erv Lessel: Joint Vision 2010

Colonel Lessel began his presentation on Joint Vision 2010 (JV 2010) by discussing the reasoning behind selecting the year 2010. He said that 2010 was a year close enough that discussion would be able to impact on current planning, but far enough away that it would be able to stay out of the inter-service "food fight." The purpose of JV 2010 is to increase the military's ability to conduct joint operations, and to perform multi-national operations.

Technology and information superiority drive the military.

Two trends were identified as being major drivers of the future military environment. The first was huge leaps in technological capabilities. The second was an increase in information superiority. Both of these are seen as enablers of many different aspects of the unfolding RMA, such as extended ranges and improved lethality. The critical step is to devise a new concept of operations, based on the above trends, out of the old (current) ConOps. This would include concepts such as maneuver warfare, logistic protection, and force protection. A new ConOps would contain such ideas as Dominant Maneuver, Precision Engagement, Focused Logistics, and Full-Dimensional Protection. None of these categories are stand-alone, but rather are inter-linked, depending heavily on one another, and their integration yields what is known as Full Spectrum Dominance.

Colonel Lessel then outlined what is meant by the four warfare areas outlined in JV 2010. Dominant Maneuver and Precision Engagement are closely related: both involve getting the right forces to the right place at the right time, whether the forces are cruise missiles, an infantry battalion, or a carrier battlegroup. Full-Dimension Protection is fairly straight-forward: it encompasses all defensive forces and concepts from personal body armor to theater missile defense systems. Focused Logistics will reduce the military's need to maintain large stockpiles of supplies or protect extended supply lines, as supplies will be delivered to exactly where they are needed, when they are needed. When all of these warfare areas are combined, the result will be Full-Spectrum Dominance, which will enable major warfighting, OOTW, special operations, and every other conceivable military operation.

Six critical considerations were then laid out, which though traditionally stove-piped, must be integrated in the new military environment. The

considerations are people, leadership, doctrine, materiel, organization, and education and training.

The goal of JV2010 is to field forces by the year 2010 that are persuasive in peace, decisive in war, and pre-eminent in conflict.

The goal of JV 2010 is to field forces by the year 2010 that are persuasive in peace, decisive in war, and pre-eminent in conflict. The Commander's Guidance offers a common direction and a template of how these forces will best be able to fight, and ties the common direction into the development of new capabilities.

Discussion:

Mr. Vickers pointed out that while the New ConOps suggest certain things about warfare with smaller countries, he asked, what is said about war with a peer competitor? Colonel Lessel answered that the template provided in JV 2010 ensured that the U.S. will integrate its various military capabilities, and he expressed doubt that a competitor would be able to do the same.

Mr. Hoffman stated that depending on where we stand in the development of the RMA, it might not be a good thing to integrate the abilities of the different services -- that differing responses to the emerging strategic environment might offer a certain robustness which is lacking in a military that pursues an integrated response. General Scales countered, saying that with the demise of the central threat posed by the Soviet Union in the Cold War, the days of operational concepts and plans determining force structure and missions are gone. In their place is a new focus on ideas and concepts.

Mr. Picket noted that while JV 2010 does not address a long-range vision, when contrasted with current doctrine, it appears extremely long-view. Its guiding concepts make it applicable long beyond 2010.

Mr. Lay asked how JV 2010 will shape current policy. If it does indeed have an impact on procurement schedules and force planning, it will become a similar document to the "Bottom-Up Review."

Mr. Morrow stated that competition is not inherently antithetical to jointness. Rather, discussion of different roles for different services will in fact help define the joint direction of the military.

Dr. Rosen claimed that what is needed to capitalize on the unfolding RMA is a period before any conflict erupts with spirited debate that produces winners and losers. Only this will help the military innovate. Mr. Shulsky added that implementation of the RMA will depend on much experimentation, the pondering of crazy ideas and much simulation.

Without this, it will be top-down innovation, which is rarely innovative at all.

Mr. Downey noted that JV 2010 seemed to be an extension of the National Security Act of 1947. He claimed that he didn't see the connection between the concept of jointness and the RMA. Dr. Blackwell responded by stating that JV 2010 cannot be judged in reference to the RMA, as JV 2010 is more evolutionary than revolutionary. Will an evolutionary framework impede the RMA, he wondered? No, as it will not shape programmatic discussions. Rather, JV 2010 provides a framework for debate, which will lend legitimacy to service competition.

Colonel Starry observed that there will indeed be a time for winners and losers in the process of innovation, but that JV 2010 glosses over the difference between the services.

Mr. Pickett asked what sort of vision would exist without JV 2010? Everybody seems to be complaining about a lack of jointness in military operations, without asking whether or not it will be possible to fight a joint war in the RMA. The drive to the fundamental questions of the nature of future war is an important one.

An operational MoE is needed to rate the ability to project power in order to influence a conflict.

Dr. Rosen closed the discussion by asserting that there are different levels of effectiveness for different ideas and concepts. The Joint Staff is doing well to get a framework for the competition of ideas, but still lacks new MoEs by which to judge the new ideas. An operational MoE is needed to rate the ability to project power in order to influence a conflict. Strategic MoEs are needed as well. Why are we building forces to fight wars? How do forces fight wars? It is the answers to these questions that good MoEs can help identify.

Mr. Vesser asked how we can get continuous revolution when we are concerned with day-to-day concepts? How do ideas get inserted? We should focus on ideas and concepts. His primary criticism was that Vision 2010 was too broad. We know what we will have in 2010 but how do we teach our leaders and how do we change organizational structure?

Contradictions in JV2010.

Dr. Cohen pointed out what he thought were major contradictions in JV 2010.

1. Joint Vision 2010 should focus on jointness between the services; however, it spurs competition instead.
2. Joint Vision 2010 states that it can be decisive in war; however, war is possibly indecisive under future geopolitical conditions.
3. Joint Vision 2010 states an orderly implementation process; however, there are periods of radical change that cannot always be anticipated.

4. Joint Vision 2010 is not a long-range doctrine but how we want to be in 2010; however, developing doctrine is a long process.

Eliot Cohen: Yesterday Revisited

A fifth perspective on the RMA.

In response to the first day's discussion of the four American perspectives on the RMA, a fifth category was developed entitled "Starship Trooper." The "Starship Trooper" perspective deals with the RMA similarly to the "mad scientist" or futurist discussed by the participants. He believes that the RMA is still a long way off in the future, and that it will rest almost entirely on new technologies, such as space-based systems, biotechnology, directed energy, or information warfare. However, he is not yet sure which one (or ones) will be most dominant. Since war is dominated by technology, innovation will most likely come from outside of the military, from such places as commercial laboratories. Since R&D strategies will determine the success of the RMA, the greatest policy challenge is getting funding for tomorrow's systems today, while the main threat lies in continued reliance on yesterday's obsolete systems.

Some key questions that developed and remain unanswered from the first day's discussion were: Does the strategic environment make a difference? Do we think we will encounter a peer? May decision elude us? Does RMA have a lesser included case? Is RMA "the war after the next war?"

In regards to how much change we can expect, we looked at three important issues:

- Personnel—different trajectories?
- Jointness—sturdy framework or wet blanket?
- New measures of effectiveness—can the system accept them?

Discussion:

A major competitor versus a peer competitor.

In regards to a peer competitor, General Scales suggested that our next enemy would be a "major competitor." "Peer" implies that the enemy is equal. It would be possible for another nation to challenge the U.S. in one or more technological niches, such as stealth, cruise missiles, or IW. In an RMA, we may not realize the enemy has strategic capabilities or the potential to be a threat. The difference will be how others apply their commercial technology. We should think about a "peer" competitor having similar capabilities but implementing them in a different way. Mr. Pickett agreed that we should not coin a "full-spectrum" peer.

Commander Spain warned that while the RMA is on-going and not fully understood, it may be extremely difficult to recognize advances or

The diffusion of

revolutions in a nation's warfighting ability, as the relation between technological breakthroughs or innovations and military power could be misinterpreted.

Mr. Lay noted the diffusion of commercial technology across international borders will make it possible for a World War II type of peer competitor to arise, where a nation that is not the U.S.'s equal in GNP, population or geographic size will be able to build a formidable military.

Mr. Downey agreed, saying that America should indeed consider the emergence of a peer competitor. It will be possible, especially given the rapid advances and wide-spread availability of high-technology, to achieve similar military effects without copying the architecture or structure of the U.S. A competitor will have the option of taking many different roads, and it will be difficult for the U.S. to recognize all of them in time.

Mr. Pickett returned to a question that had been raised the day before: will future war be less decisive than it has been traditionally? He added that the effects of innovation in World War I effectively resulted in a stalemate until these effects could be properly understood and integrated into the existing military struggle. So, while wars a long way away might be concluded quickly, until the RMA is complete, conflicts might prove to be long and possibly fruitless. General Scales agreed, but claimed that such a result was not inevitable. The U.S. must pick its wars even more carefully in the future, and only get into conflict over real national interests. Secondly, America must be sure to include some sort of "capping function" that will ensure the ability to achieve a desired end-state. While General Scales did not purport to know what that capping function might be, he believed it essential to begin trying to find one.

Mr. Hoffman warned that the U.S. must be careful when it comes to conflicts that don't fit the RMA paradigm. This thought was echoed by Commander Spain, who added that the RMA might only work in certain prescribed conditions. These comments led Dr. Cohen to wonder whether the RMA can deal with lesser states of conflict, or if it is primarily only for state versus state actions.

Dr. Cohen then moved to the question of how much change can be expected in the near future. In his opinion, three things were likely to be affected quickly. Personnel tracks would be likely to change to reflect new military skills emphasized by the RMA, jointness will most certainly increase (although it remains unclear if this is a sturdy framework, or a wet blanket that will smother innovation), and new MoEs will be adopted.

General Robert Scales: Army After Next (AAN)

Effecting major changes in the Army's operations

General Scales began his briefing on the Army After Next by looking at the ways in which the Army has changed in the past. In general, effecting major changes in the Army's operations has taken about 15 years, and has proved to be an extremely evolutionary process or identifying patterns and cycles of warfare, and projecting them into the future. Once this has been done, the Army can begin adapting to meet the view of the future.

Meanwhile, the Art of War is also changing, as the lethality or geometry of the battlefield has greatly increased. Long Range Precision Strike has created instant parallel warfare, as the entire territory of a nation is open for attack at the outbreak of hostilities. Also, the killing zone, once limited to the range of cannons or muskets, has now become extremely large, as extended range PGMs now have ranges of hundreds and thousands of miles.

However, while American military might has become largely unmatched, the threat remains, especially as an enemy does not necessarily have to match U.S. capabilities, but only counter them. The U.S. has shown its hand in regards to its future military operations, with stealth and LRPS at the forefront of American military technologies. In addition, the American armed forces have shown a tremendous desire to avoid casualties, both friendly and enemy. Thus, a pattern emerges in which the U.S. attempts to limit damage with precision strikes and bring a swift end to the fighting to minimize casualties. Therefore, it is possible to assume that future war will exhibit many of the opposite characteristics, as hostile nations look for ways to counter and repel American might.

General Scales then moved to discussing the concepts that make the basis of the Army After Next (AAN) program. The keys are strategic mobility, swift victory with low human costs, a shield of knowledge protecting friendly information, the use of Dominant Maneuver and Precision Engagement to collapse the enemy's will, and Focused Logistics to break away from the long logistic trains in order to better strike at the enemy at a greater distance. If the AAN can successfully adopt all of these concepts, then it will be able to dominate the future battlefield.

The implementation of the critical concepts will require certain important technologies. High Speed Strategic Lift will give the AAN the mobility it needs without dependence on foreign basing. Situational Awareness will give a clearer picture of the battlefield, allowing for greater precision in strikes and reduced casualties. Cellular Communications will give the AAN unbreakable, near-instantaneous communications across the battlefield, and improvements to the space and unmanned ISR systems will provide an "Unblinking Eye" of 24 hour surveillance. These

technologies will give the AAN unparalleled ability to fight conflicts of various intensity across the spectrum of warfare.

Discussion:

AAN will be a power projection force and act as a deterrent.

Dr. Cohen asked whether this conception of the AAN meant that the key to the future of warfare was mobilization, to which General Scales responded that the AAN is envisioned as the "tip of the spear." The AAN will give the American military the ability to project a credible conventional deterrence anywhere in the world, while other forces will retain the ability to expand the conflict as needed. Mr. Pickett added that the future Army is intended to be a 2-tier force. The AAN will project power, while reserves will be available to augment the force as needed.

Mr. Hoffman addressed the question of reserve forces by claiming that they will be imperative in case the U.S. has misperceived the nature of warfare. In addition, reserves serve as an important link between the Army and the public, providing important connections to the "real world."

Mr. Ansley noted that the AAN appeared as if it would require a much more intellectually superior force than the present one, and wasn't sure if the U.S. would be willing to pay for the recruitment and training needed to create such a force. General Scales answered, saying that improved technology will create better training methods, allowing for the Army to adapt to the new technologies. Also, General Scales said that he expects a much different leader-to-led ratio.

Mr. Vesser asked about the vertical dimensions of the AAN, particularly regarding space warfare. General Scales responded the joint warfare will be accepted by the AAN, especially in space, where the Air Force has a clear lead in technology, operational concepts and established presence.

The organizational structure of the AAN had not yet been determined.

Mr. Morrow, noting that today's armed forces are probably at their maximum size and would only be reduced, wondered what the organizational structure of the AAN might look like. General Scales admitted that the organizational structure of the AAN had not yet been determined. When Mr. Lay asked about the likely size of the AAN, General Scales said that had not yet been determined either.

Mr. Downey asked about the nature of the balance between Dominant Maneuver and Long-Range Precision Strike. He asked whether it would be a ratio or percentage of assets, or another means of division entirely. He went on to ask about why jointness would not be a problem for the AAN. General Scales answered by saying that there would be a symbiosis between Dominant Maneuver and LRPS, and not a strict division or

percentages. Rather, a balance of capabilities, as determined by the given situation would be needed to prevent stalemates and/or butchery. As for joint warfare, General Scales commented that the strengths of jointness lies in the intersection of capabilities. As all of the armed services improve their abilities, joint warfare will not only become easier, but more capable.

Admiral John Craine: The Navy and the RMA

Current Naval innovations.

Stating that the Navy, as well as all of the other Armed Services, must overcome the fear of failure in order to innovate, Admiral Craine went on to list several of the current innovations within the Navy. He described sensor-to-shooter C4ISR, cooperative engagement techniques, TMD, improved naval fires (longer ranges, brilliant submunitions, penetrators), arsenal ships, and modular ship/sub/aircraft design to utilize standard components to reduce the logistical burden. However, Admiral Craine was careful to note that utility is in capabilities and not in specific platforms.

These current Navy innovations are being studied and developed at educational and research facilities such as the Naval Studies Board (NSB), Naval Research Advisory Council (NRAC), Naval Post Graduate School (NPS), Naval War College, CNO's Executive Panel (CEP), and Office of Naval Research (ONR). Other innovative activities include wargames (technology initiatives, maritime RMA wargames, strategic concepts), "Futurist" briefings, advanced technology demonstrations, naval technology insertion program, S&T affordability program, and at sea battle lab.

The most serious challenge to these current naval modifications are resource constraints.

However, the most serious challenge to these current naval modifications are resource constraints. Specifically, escalating support and infrastructure costs may inhibit future modernization plans. Also, there are limited resources available for experimentation, demonstration, and prototyping. Many funds are already being used for modernization or recapitalization initiatives such as BRAC implementation, completion of BUR Force Structure reductions, and regionalization of maintenance and installation management.

Discussion:

Around 70% of platforms in use today will be used in 2020.

Mr. Russell asked about the current vision of future naval conflict. Admiral Craine stated that the Navy is currently gaming that very concept. However, they are confident that around 70% of platforms in use today will be used in 2020. The big question is how to adapt them to meet future requirements.

The small, unforeseen threats will be the greatest ones in the future warfighting environment.

Dr. Cohen remarked that during the Cold War, the Navy focused on the Soviet Union, which had a large, blue-water navy, which now no longer exists outside of the U.S. What then, he asked, does the Navy see as the main threats that will arise in the future? Admiral Craine answered that Asia, and specifically China, are seen as the most likely future competitors. Thus, the U.S. Navy needs to concentrate on asymmetric threats, as no Asian nation will have a large navy. The small, unforeseen threats will be the greatest ones in the future warfighting environment.

Commander Spain added that the Navy's focus will shift to projecting power from the sea to land, as there will be no competitor on the sea. Any future adversary will likely be more regional, and rely on asymmetric responses to American actions. Sea/area denial, a likely tactic of any future enemy, does not require a large, sea-going navy.

Mr. Shulsky asked whether the threat of a hostile blue-water navy is truly gone. Admiral Craine claimed that none is seen for at least 20 to 30 years. After that, it is possible that one may re-emerge.

Future threats to the Navy.

Mr. Vesser expressed concern over several other types of threats, such as threats from space, and from an enemy using robotics and/or stealth. He also asked whether the Law of the Sea Treaty was emerging as being unfavorable to U.S. interests. Admiral Craine said that the Navy is indeed concerned with space threats, primarily threats to American space access and system protection. Stealth is a concern as well, as the nature of the ocean makes it inherently harder to try to find ships at sea. Mr. Cohen followed up on this, with a question about whether or not ships will be easier to find in the future, given the improvements in space sensing capabilities. Admiral Craine answered that while space sensors are indeed improving, concurrent improvements in signature reduction, combined with the concealing nature of the ocean will continue to make it difficult to locate ships at sea.

Naval forces will rely on rapid maneuver.

Mr. McKitrick, noting that the Army has an organizing principle—speed, asked whether or not the Navy does as well. Also, he asked how the Navy addresses the issue of speed and forward basing, both of which seem to be difficult for the Navy to overcome. Admiral Craine answered that naval

forces will rely on rapid maneuver, especially as battles will likely be on the periphery of American forward basing. However, he recognized that the Navy will have to look for other means of deployment. It is unclear whether or not naval forces are fast enough respond to threats, or if they will need to continue to rely on pre-positioned materiels. However, the Navy does not need to rely on forward basing or other country support as the Air Force or Army does.

Mr. McKitrick followed up by asking about how to protect the pre-positioned materiel, to which Admiral Craine put forward to concept of an underwater arsenal ship, able to resupply naval forces as well.

The validity of experimentation comes from real tests, conducted by the people who would actually have to use a new system.

Dr. Blackwell noted that blending innovation with actual missions must be putting a tremendous burden on the ships' crews, as their work loads and lengths of tours is increasing. He asked whether any consideration had been given to creating a dedicated experimental force, tasked to give "real-world" trials to innovative naval concepts. Admiral Craine answered that there are no assets remaining to create such a force. He added that while it was an increased burden on the crews, innovations are emerging and getting good tests. Dr. Blackwell followed up, asking whether the Navy would ultimately prefer to keep experimentation within the active fleet, to which Admiral Craine said yes. The validity of experimentation, he claimed, comes from real tests, conducted by the people who would actually have to use a new system. Colonel Craddock added that Delta One (measures of change) arises when operators can experience a change in capabilities offered by one system. Delta Two comes when operators devise new and innovative ways to use the new system. These two measures can only come from tests by actual, active duty crews.

Mr. Vesser wondered whether the Navy's emphasis on hiding would affect its ability and will to bring the fight to the enemy when needed. War is very psychological and hiders tend to stay hidden. Over-instilling a hider mentality may reduce aggressiveness, Mr. Vesser claimed, to which Captain FitzSimonds responded that hiding is not cowardice. Admiral Craine agreed, saying that the purpose of hiding is not to avoid combat, but to improve one's position to fight and win.

In regards to the role that speed will play in the future, Admiral Craine said that rapid maneuver above the surface and undersea arsenal ships will be most effective. Admiral Craine concluded by saying that the Navy needs better games, improved models, and more money to invest in its fleet.

General Donald Peterson: The Air Force and the RMA

General Peterson began his briefing by outlining a few technologies that he believed would emerge in the coming years. Among them he listed improved PGMs, stealth and C4ISR technologies, the AirBorne Laser, and the possibility of a hyper-technology breakthrough. Additionally, he mentioned innovative approaches taken by the Air Force that would facilitate the development of such technological breakthroughs. For example, increased reliance on dual-use technologies, such as the new EELV being developed for military and commercial uses, will improve procurement times and lower costs by coupling military and business production. Increased privatization and joint training will also improve the Air Force's ability to innovate as well. Other innovative initiatives such as acquisition streamlining, responsive logistics, and information superiority will also enhance the Air Force's role in the RMA.

Air Force long range planning has been at work in studies such as the CSAF/LR effort, Air University's "2025 Project", and the AF Scientific Advisory Board. Other long range studies include: RAND ("Shaping the Role of Air Power"), "CORONA" Fall Issue Papers, Air Force Vision, and Air Force Long Range Plan—Backcast. Specifically, the battle lab initiatives from the CORONA Fall 1996 study highlights AF Command and Control, AF Information Warfare, Unmanned Air Vehicle, Air Expeditionary Force, Space, and Force Protection as a vision for the future. Important operational concepts developed are sensor-to-shooter, AEF, and Systems of Systems.

With air superiority, land and sea forces can achieve operational advantage throughout the theater of operations.

The Air Force's goal in the RMA is to obtain air superiority as an incalculable force multiplier. With air superiority, land and sea forces can achieve operational advantage throughout the theater of operations. For example, in DESERT STORM, the Air Force successfully leveraged technologies around the periphery of an RMA. A revolutionary operational concept that resulted from DESERT STORM was (Stealth x PGM) ^{C4ISR}. The value of human capital will also play a major role in the RMA.

Discussion:

Mr. Morrow asked whether CINCSPACE was likely to be a joint position. If not, how do the Army and Navy fit into spacewar and/or IW? General Peterson answered by stating that the Air Force does indeed support a joint CINCSPACE, as it would lead to a good synergy between the forces.

Mr. Etherton asked if the Air Force Vision was going to have any effect on shifting Science and Technology policies. Probably not, was the answer from General Peterson.

General Keith Holcomb: The USMC and the RMA

Future targets and competitors for the USMC.

General Holcomb started by reviewing the Marine Corps position within the RMA. U.S. future targets may be conventional targets such as aircraft, navy vessels, or tanks. Or perhaps our future targets will be guerrilla fighters or information systems. He also noted that labels can greatly inhibit change and innovation. The label of "competitor" carries the connotation, for many Americans, of a game or sporting event, and lacks the meaning meant when speaking of an enemy striving to destroy or annihilate you. Perhaps, General Holcomb suggested, the label should be "Destroyer" or "Annihilator" instead, bringing the more accurate connotations of violence and destruction. Finally, he mentioned that although we may have knowledge, we must know how to interpret it for it to be useful.

The U.S. might be made more vulnerable by assuming the continued dominance of offense over defense.

General Holcomb also suggested that the U.S. might be made more vulnerable by assuming the continued dominance of offense over defense. For example, in the U.S. Civil War and WWI, the U.S. assumed offense was the strategic objective; however, defense was the strategic reality.

In terms of current RMA projects, the Marine Corps is conducting "Hunter Warrior" which focuses on the digitization of the battlefield, the extension of the naval battlefield, operations in non-contiguous battlefields, small unit operations, employment of digitized/robust C41, and linking overhead sensors to tactical commander. Some projected RMA activities include the extension of the naval expeditionary, littoral, and urban warrior.

Future adversaries might adopt a response to the RMA that was not technological in nature.

General Holcomb also discussed the possibility that future adversaries might adopt a response to the RMA that was not technological in nature. As an example, he cited the possibility that some Middle Eastern countries might adopt a military revolution that was culturally or socially based. He expressed some concern that we had not taken this type of opponent into consideration in our RMA analyses.

Discussion:

Mr. Pickett asked what the center of gravity's might look like in the 21st century. General Holcomb suggested that rather than infrastructure or material things, an enemy's CoGs might be ideas, knowledge and people. Mr. Vesser added that CoGs are likely to change rapidly as new

capabilities and systems enter military service. New battlefields will open up with the introduction of new platforms, and this will create new CoGs.

The Marine Corps was experimenting with new techniques of simulation based on genetic algorithms and artificial life.

In response to a question on modeling and simulation, General Holcomb noted that the Marine Corps was experimenting with new techniques of simulation based on genetic algorithms and artificial life.

Dr. Eliot Cohen: Wrap Up

In his wrap-up, Dr. Cohen mentioned several issues that the conference had not addressed adequately. Among these were:

- Specific Personnel Issues
- Actual MOEs
- Attrition warfare and the possibility of mobilization -- and what these mean in an RMA context
- A Future World of Inconclusive Warfare
- Different Approaches the Services take
- Role of our Allies

Andrew Marshall: Closing Remarks

Some key observations:

- We should devote more time to what future war might look like.
- MOE's are a big issue to explore.
- Opponents are better examined in wargames where they can be viewed in greater detail.
- There is not enough attention on allies. We need a strategic set of allies—especially if our future enemy is Asia, specifically China.

Section III:

ANNEX A

Four Perspectives on the RMA

Four Perspectives on the Revolution in Military Affairs

Dr. Eliot Cohen

Paul H. Nitze School of Advanced International Studies

Johns Hopkins University

12 November 1996

The Revolution in Military Affairs: Intellectual Origins

- Soviet writings in the late 1970's and 1980's -- "The Military Technical Revolution"
- The Gulf War
- Admiral Owens and the "System of Systems"

Four American Views

The Owens Clone
The Uncertain Revolutionary
The Gulf War Vet
The Skeptic

Note: no mad scientists

Questions

- Is there a revolution?
- What drives warfare?
- What are the policy challenges?
- What are the greatest threats?

#1 The Owens Clone
"Build the System of Systems"

- a single revolution resulting from the information technologies
- most of warfare has been wasted motion because of uncertainty
- we need the right architecture, and we need to cut force structure to free up funds
- "the enemy is us" -- service parochialism and bureaucratic inertia

#2 The Uncertain Revolutionary "Let a hundred flowers bloom"

- One in a series of revolutions
- Revolutionary change occurs from a mixture of technology, organization, and operational concepts
- Challenges are experimentation and innovation
- Threats are (1) diffusion of technology; (2) peer competitor

#3 The Gulf War Veteran
"Been there, done that"

- The revolution occurred in the 1980s
- Recruitment and training make all the difference
- Challenge is developing new technology while keeping a large force structure
- Threats are asymmetric responses (terror, weapons of mass destruction)

#4 The Skeptic
"What revolution?"

- The history of warfare is a history of evolution
- Human nature, not technology, drives warfare
- The challenge is keeping the warrior spirit alive in the face of social change
- The danger of being too clever

Consequences

Owens Clone: radical cuts in force structure and organizational surgery; make the current technologies work together;

Uncertain Revolutionary: experimentation; organizational and educational reform;

Gulf War Veteran: protect force structure, readiness above all;

Skeptic: balanced spending, but focus on personnel policy.

ANNEX B

Yesterday Revisited

Yesterday Revisited

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13 November 1996

Issues raised & dodged

- Starship Trooper
- War for what?
- How much change can we expect?

#5 Starship Trooper
"Death from above... a bug... a beam... a byte..."

- the revolution is decades in the future, and rests on new technology (space, biotech, directed energy, infowar, etc.)
- technology dominates war
- innovation comes from the outside
- the challenge: inserting the R&D wedge
- the threat: the weight of the familiar

War for what?

- Does the strategic environment make a difference?
- Do we think we will encounter a peer?
- May decision elude us?
- Does RMA have a lesser included case?
- Is RMA "the war after the next war?"

How much change can we expect?

- Personnel -- different trajectories?
- Jointness -- sturdy framework or wet blanket?
- New measures of effectiveness -- can the system accept them?

ANNEX C

The Unfolding RMA

The Unfolding Revolution in Military Affairs

Jeff McKitrick

6 November 1996

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Skeptics' Views of Previous RMAs (1)

- In 1924, Winston Churchill suggested that:
  - "Might not a bomb, no bigger than an orange, be found to possess a secret power...to concentrate the force of a thousand tons of cordite and blast a township at a stroke?"
  - "...flying machines guided automatically by wireless or other rays" could someday overwhelm hostile cities..."
  - "...blight to destroy crops, anthrax to slay horses and cattle, plague to poison not armies only but whole districts" would be developed
- R. Ernest Dupuy and George Fielding Eliot ridiculed these ideas: "...his statements are—viewed in the cold impartial light of proven fact—sheer nonsense." (Of New and Fearsome Weapons, 1937)

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Skeptics' Views (2)

- "It is highly unlikely that an airplane, or fleet of them, could ever successfully sink a fleet of naval vessels under battle conditions"
  - Former Assistant Secretary of the Navy Franklin Roosevelt, 1922

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Skeptics' Views (3)

"I feel confident that it will not be done for a very long period of time…I think we can leave that out of our thinking"

- Vannevar Bush, Director of the Office of Scientific Research and Development, 1945, Concerning the possibility of developing an intercontinental (3000 mile range) missile able to carry a nuclear warhead and accurate enough to hit a city

Past Projections

- A 1937 Congressional committee forecast on technological developments likely within the next 10 to 25 years failed to anticipate nuclear energy, antibiotics, radar and jet propulsion, among other technologies.

A Revolution in Military Affairs

"A Revolution in Military Affairs is a major change in the nature of warfare brought about by the innovative application of new technologies which, combined with dramatic changes in military doctrine and operational and organizational concepts, fundamentally alters the character and conduct of military operations."

Office of Net Assessment

Office of the Secretary of Defense

Role of Systems

Single System

- A single technological breakthrough (*e.g.*, nuclear weapons) can drive a military revolution

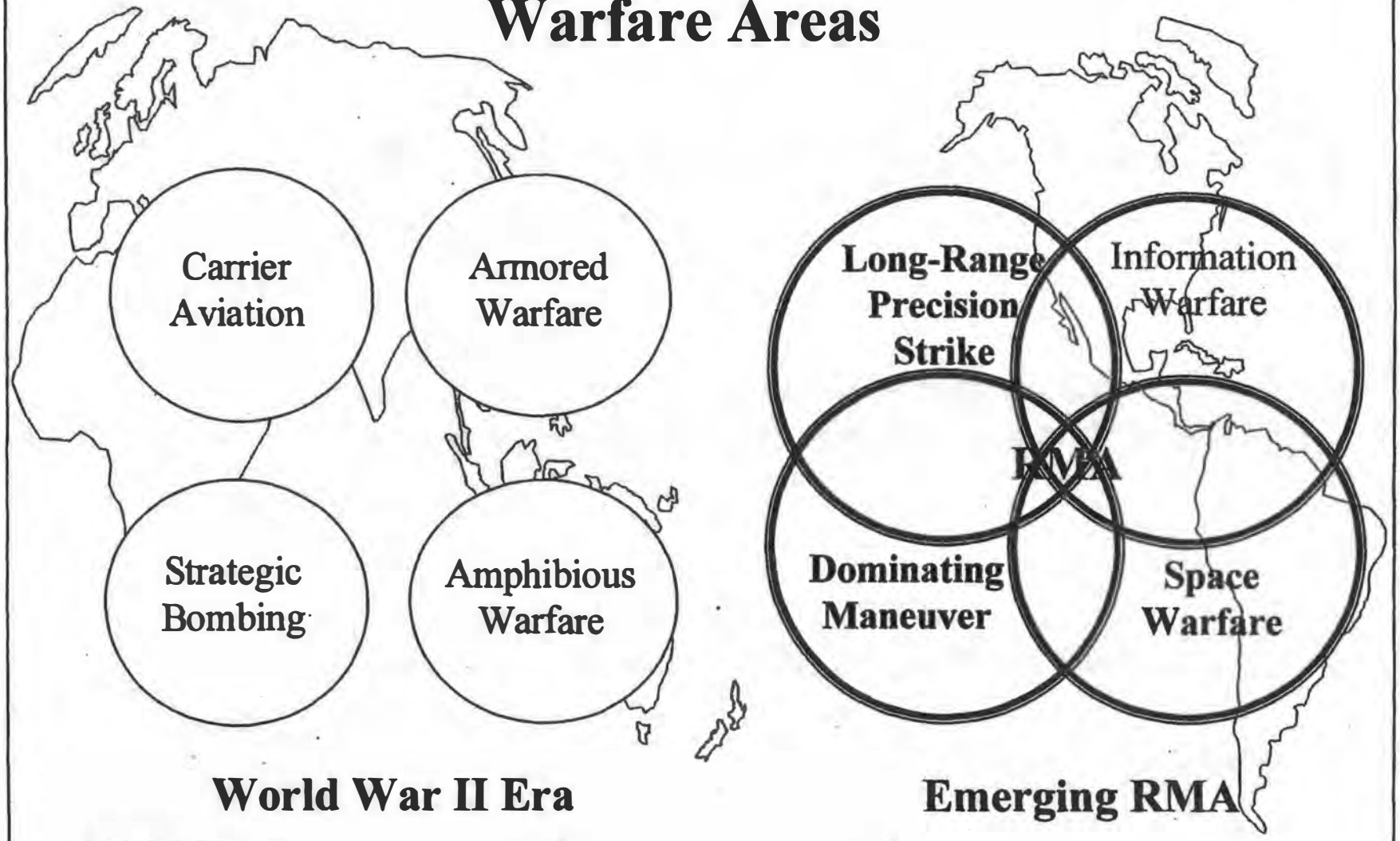
Combined Systems

- The military revolution is derived by combining military systems in new ways to achieve revolutionary military effect (*e.g.*, Blitzkrieg)

Integrated Systems

- In the unfolding RMA, systems of systems are likely drivers

Warfare Areas



World War II Era

Emerging RMA

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Long- Range Precision Strike (1)

"The ability to locate high-value, time-sensitive fixed and mobile targets and to destroy them with a high degree of confidence within operationally and strategically significant timelines while minimizing collateral damage, friendly fire casualties, and enemy counterstrikes"

Long-Range Precision Strike

- **Provides near real-time responsiveness of sensor-to-shooter systems**
- **Maneuvers fires and effects (not forces) over intercontinental ranges**
- **Allows direct and simultaneous attacks on multiple enemy strategic and operational decisive points**

Long-Range Precision Strike (2)

U.S. target prosecution has increased exponentially:

- **1943 - U.S. 8th Air Force prosecuted 50 strategic targets in one year**
- **1991 - The combined Air Forces attacked 150 strategic targets in the *first 24 hours* of Operation Desert Storm (a 1,000-fold increase over 1943's figures)**
- **2020 - U.S. forces "may be able to engage 1,500 targets in the first hour, if not the first *minutes*, of a conflict..." * (if one hour, nearly a 2,500-fold increase over 1991)**

***Air Force Chief of Staff General Ron Fogleman in a speech to the Air Force Association's Air Warfare Symposium, Feb 95**

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Information Warfare

"A duel between decision processes to achieve an actionable military advantage."

Information Warfare

- **Enables dominant battlespace awareness by denying the enemy critical knowledge while helping to secure friendly information flow**
- **Provides both new capabilities and vulnerabilities**
- **Will be fought in both the military and civilian arenas**
- **97% of DoD computers well protected against cyber attack--remaining three percent allow access to 65% of DoD computer systems (DISA)**
- **Will further blur the line at which war begins - "Pre-Hostility Hostilities"**

Dominating Maneuver

"The positioning of forces to attack decisive points, defeat the enemy center of gravity, and accomplish campaign objectives"

Dominating Maneuver

- **Seeks to disrupt the enemy's cohesion and cause rapid collapse by directly attacking operational/strategic centers of gravity**
- **Relies upon the ability to move own forces faster than the enemy can move his, perhaps across strategic distances**
- **In 2020, more capable forces could well be smaller and easier/quicker to deploy to the right place at the right time**
- **Historical examples: Inchon; Slim's Burma campaign; Norway - May 1940**

Ground Operations

CONCLUSIONS:

- **Ground forces will not maneuver only to directly engage the enemy. They also will maneuver in order to force the enemy to move so that the enemy may be engaged with long range fires.**
- **The amount of territory that can be successfully defended from attack without having to physically occupy it will increase from tens of kilometers to hundreds of kilometers.**
- **Force protection during operations is a key concern for the commander; this is especially true during the vulnerable deployment phases.**
- **Regardless of the effectiveness of long-range fires, ultimately ground forces may have to seize contested territory and destroy enemy forces.**
- **Survivability is achieved with passive protection systems, detection avoidance (e.g. stealth), by disabling or defending against enemy systems, and/or by speed and movement**

Ground Operations

PROPOSITIONS:

- **Ground forces may need to be smaller by a factor of two or three in order to enhance survivability.**
- **In order to reduce in size, ground forces may have to reduce organic support elements, (i.e. fire support) relying instead on support from other forces, possibly from out of the theater.**
- **Ground forces may need to be much more mobile, able to cover hundreds of kilometers in hours, in order to survive and operate effectively.**
- **Temporal massing of fires may in many cases supplant spatial massing of forces.**

Space Warfare

Near Term -- ***"Exploitation of the space environment to support full-spectrum, near-real-time, global military operations"***

Future -- ***Near Term + "Military operations conducted to achieve objectives in the space environment"***

- **Medium for power projection**
  - **–Rapidly move CONUS-based forces into an Area Of Responsibility**
  - **–CONUS-based, long-range precision strike capability**
- **War in/from Space**
  - **–Space-based offensive and defensive operations**
    - **•"Seizure/control" of key assets (He_3/orbits)**
    - **•Destruction of critical targets (space- and Earth-based)**
  - **–Manned space military presence (*e.g.*, space station)**

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Air Operations

CONCLUSIONS:

- **Projecting tactical air forces into a theater of operations will require first employing (and possibly deploying) defensive systems to establish a defendable deployment area.**
- **Survivability of air forces will be achieved by avoiding detection, through stealth and the disabling or defending against enemy long-range anti-air systems.**

PROPOSITIONS:

- **Certain high-value, high-lethality target sets—such as WMD and their delivery systems—may be attacked more effectively with air systems (air, land, sea, and space-based).**
- **Long-range, unmanned, precision-guided air systems might be able to effectively prosecute targets that previously could only be attacked with manned, close air support aircraft.**

Revolution in Logistics Essential to RMA

- **Fundamental shifts needed in logistics capabilities**
  - **Multidimensional delivery of supply**
    - **Prepackaged, modularized pods**
    - **Discardable delivery systems**
    - **Tailored delivery -- when & where needed by user**
  - **Increased use of directed-energy weapons to reduce ammunition requirements**
  - **Extensive use of robotics for material handling**
  - **Telemaintenance & telemedicine to reduce logistics footprint**
  - **Bioproduction & bioregeneration of parts & supplies to reduce stockpiles**
  - **Forces no longer needed would be extracted immediately**

Command and Control

CONCLUSIONS:

- **Fewer human decisions will be possible/desirable at lower levels of command; decisions at higher levels will be more critical**
  - **more decisions can be made more quickly**
  - **shorter cycle times will require rapidity (either human or automated)**
  - **thus the mix of human and automated decisions will change (less human intervention)**
  - **but more automated decisions require more initial prioritization and "rule-setting" by higher commands**
  - **shorter sensor-to-shooter times will demand more distributed C2 for execution, much of it automated**

ANNEX D

Theater Warfare in 2020

Theater Warfare in 2020

Michael G. Vickers
Nitze School of Advanced International Studies
Center for Strategic and Budgetary Assessments

Presentation Issues

- How could the conduct of war be transformed?
- What could combat in a post-military revolution regime look like?
- What new military strategies could emerge to exploit this change?

Post-WWII Theater Warfare

- Air Superiority
- Armored Warfare
- Naval Air Power

Core Strategic Competitions

- Anti-access vs. new forms of power projection
- Hider vs. finder
- Standoff attack vs. active defense

Transformational Dynamics

- Progression of long-range precision strike capabilities beginning with the ability to destroy/deny fixed facilities and attaining the ability to decisively attack distributed, mobile land targets and surface naval targets
- Increasing ability to coordinate the actions of widely dispersed and dissimilar units, establishing the "system of systems" as the dominant military architecture of the new era
- Increasing substitution of unmanned for manned systems

Transformational Dynamics
(continued)

- Increasing robustness (multi-aspect) and breadth (multidimensional and multi-functional) of stealth
- Emergence of independent and integrated information warfare and space warfare capabilities

The Emergence of Multidimensional Warfare

- Unmanned system-dominated, stealthy air operations
- Distributed, non-linear ground operations
- Land and space-based defense of the sea/Submersible power projection
- Space warfare (counterspace operations and space-to-ground attack)
- Independent and integrated information warfare

The Military Revolution and Theater Warfare

- Military operations will likely become dramatically expanded spatially and compressed temporally
- Dramatic increases in tempo and reach, however, will not necessarily lead to short wars
- Theaters of operations could lose much of their strategic autonomy
- The proliferation of "smart" long-range missiles and developments in signature reduction will likely shift the balance in favor of offensive systems

The Military Revolution and Theater Warfare

(continued)

- The lethality of multidimensional warfare could "empty" the battlefield, with unmanned systems assuming many of the functions previously performed by manned systems
- Operational and tactical maneuvers on information "terrain" could become central to maneuver on physical terrain; There could be a paradigm shift from physical to information protection
- Military operations will increasingly have to be planned in terms of time and not space
- Dimensional control could become far more difficult to attain

New Systems/Organizations

- Multidimensional long-range precision strike forces:
  - Stealthy intercontinental bombers/UAV strike tenders
  - Arsenal ships
  - DSBs/Remote missile pods
  - TAVs/Space-to-ground attack satellites
- Anti-navy forces

New Systems/Organizations
(continued)

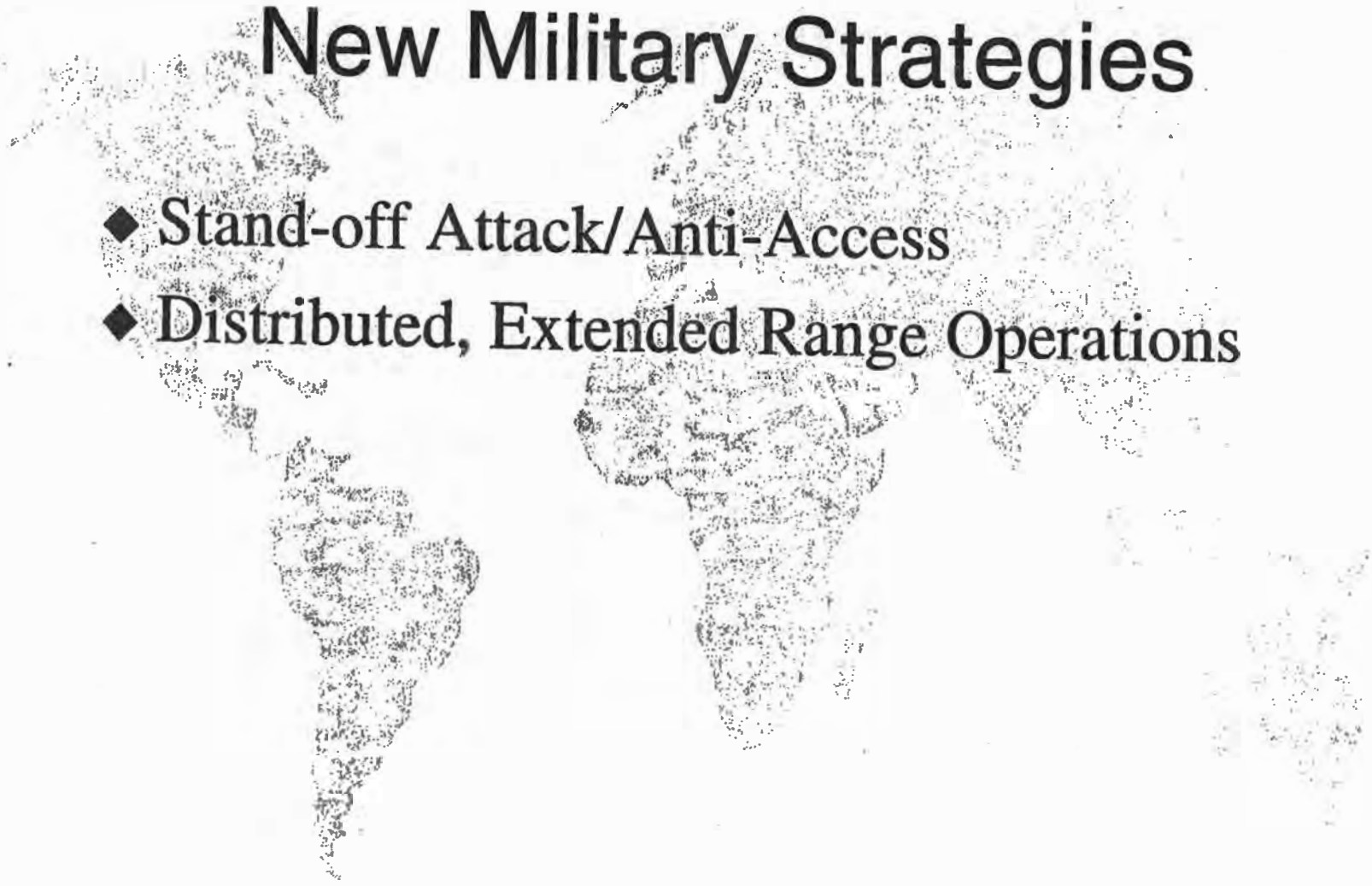
- Network-based close combat forces:
  - Stealthy, loitering air platforms
  - CARs/Exoskeleton-equipped armored infan ry
  - Undersea assault forces
- Stealthy mobility forces
- Space control forces
- Information warfare forces

Network-Based Warfare

- Network of networks design
- Variable internal and external coupling
- "Self-organized" and autonomous operations
- "Micro" joint task forces
- Organizational units as force providers
- High command as strategic planner/network manager

New Military Strategies

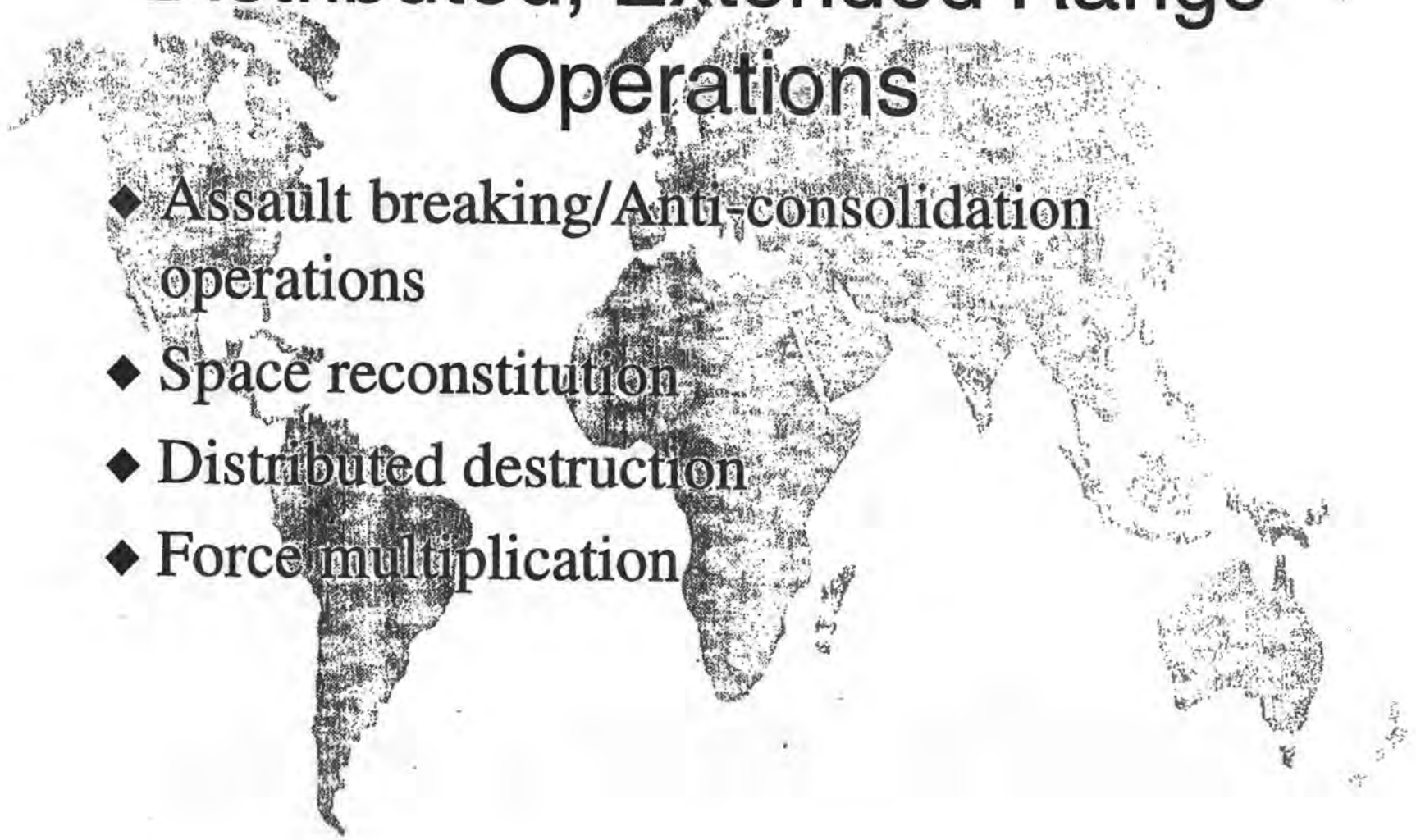
- Stand-off Attack/Anti-Access
- Distributed, Extended Range Operations



Stand-off Attack/Anti-Access

- Space "Pearl Harbor"
- Strikes from strategic sanctuary
- Air-land-sea seizure of key nodes
- Anti-access barrier extension
- Signature magnification

Distributed, Extended Range Operations



- Assault breaking/Anti-consolidation operations
- Space reconstitution
- Distributed destruction
- Force multiplication

Sources of Operational Advantage

- Strategic/force asymmetries
- Relative transparency/Asset survivability
- Operational coordination differentials
- Mobility and range differentials
- Quantity of resources

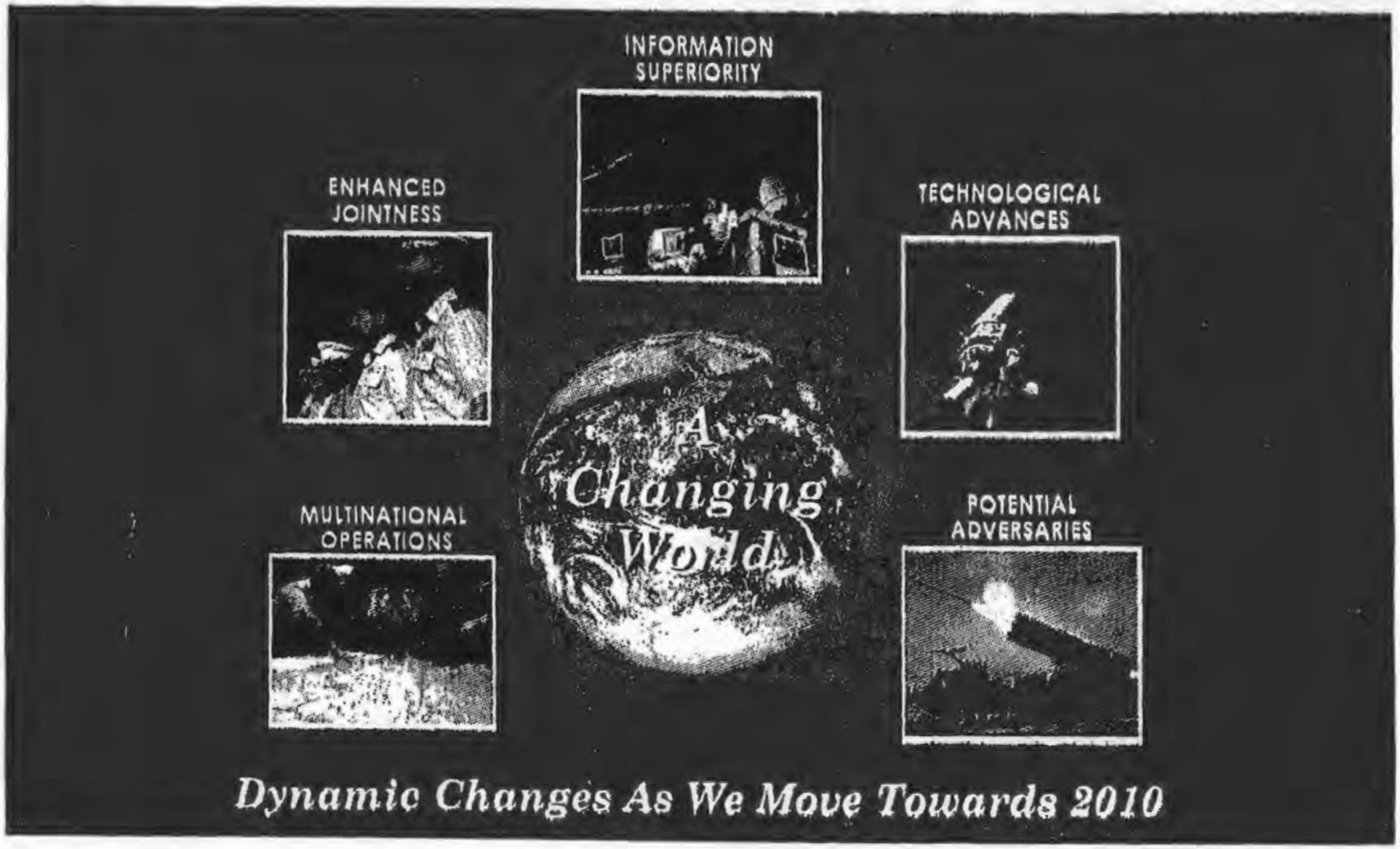
ANNEX E

Implementing Joint Vision 2010

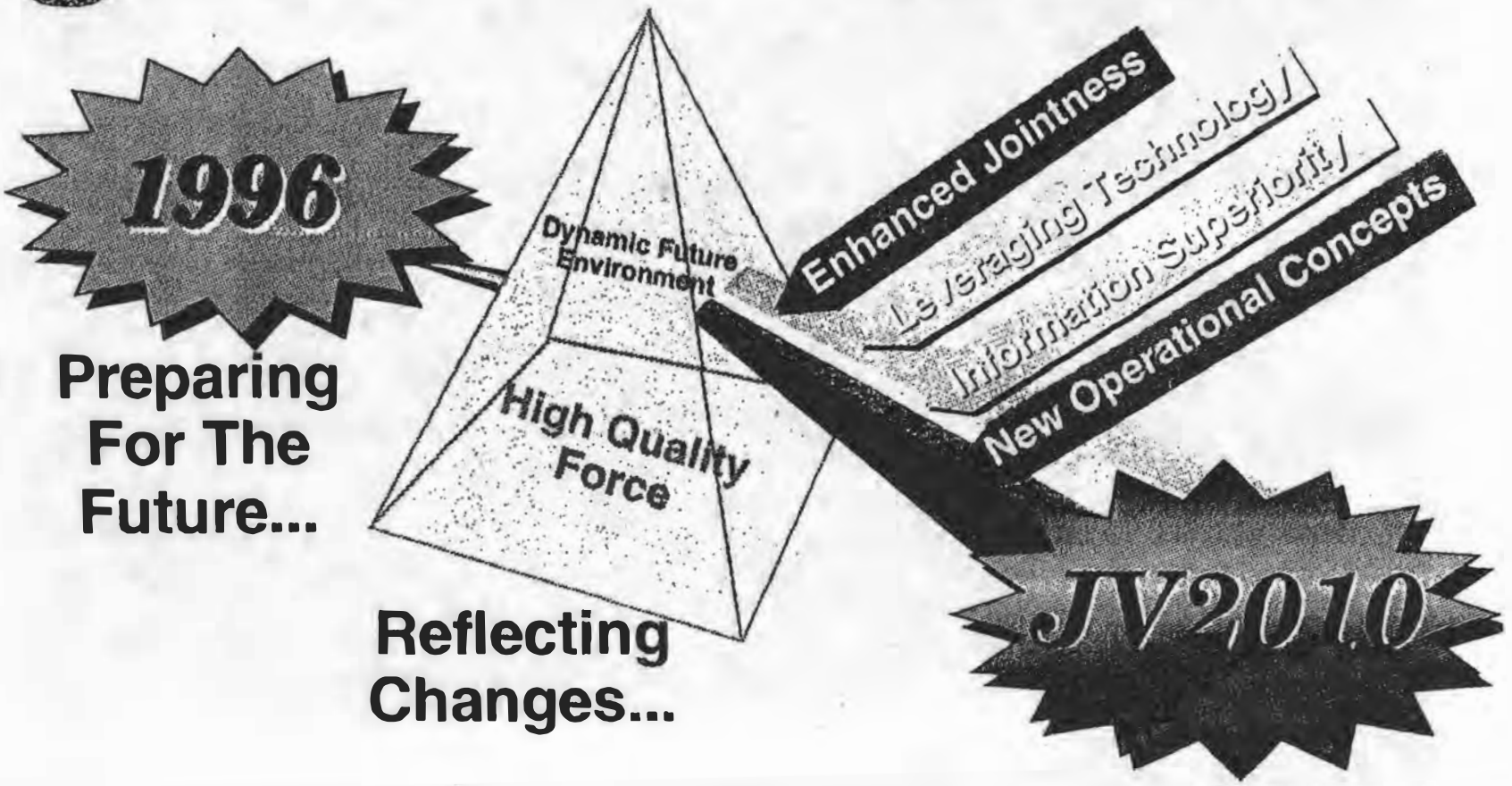
Lt Col Erv Lessel

Joint Staff J-7

Dynamic Future Environment



Building A Vision For The Future



Technology for 2010 Forces

Trends

- ✔ Greater Weapons Precision Capabilities
- ✔ Greater Invisibility & Detectability
- ✔ Improved Systems Integration Between Sensors, Platforms, Logistical Support Centers, & Command Organizations
- ✔ Broad Range of Weapons Effects
- ✔ Potential to Achieve Dominant Battlespace Awareness

Implications

- *Provides An Order of Magnitude Improvement In Lethality*
  - Increased Requirement & Capability For Stealth, Mobility & Dispersion Within the Battlespace
  - Greater Emphasis on Command & Leadership Skills

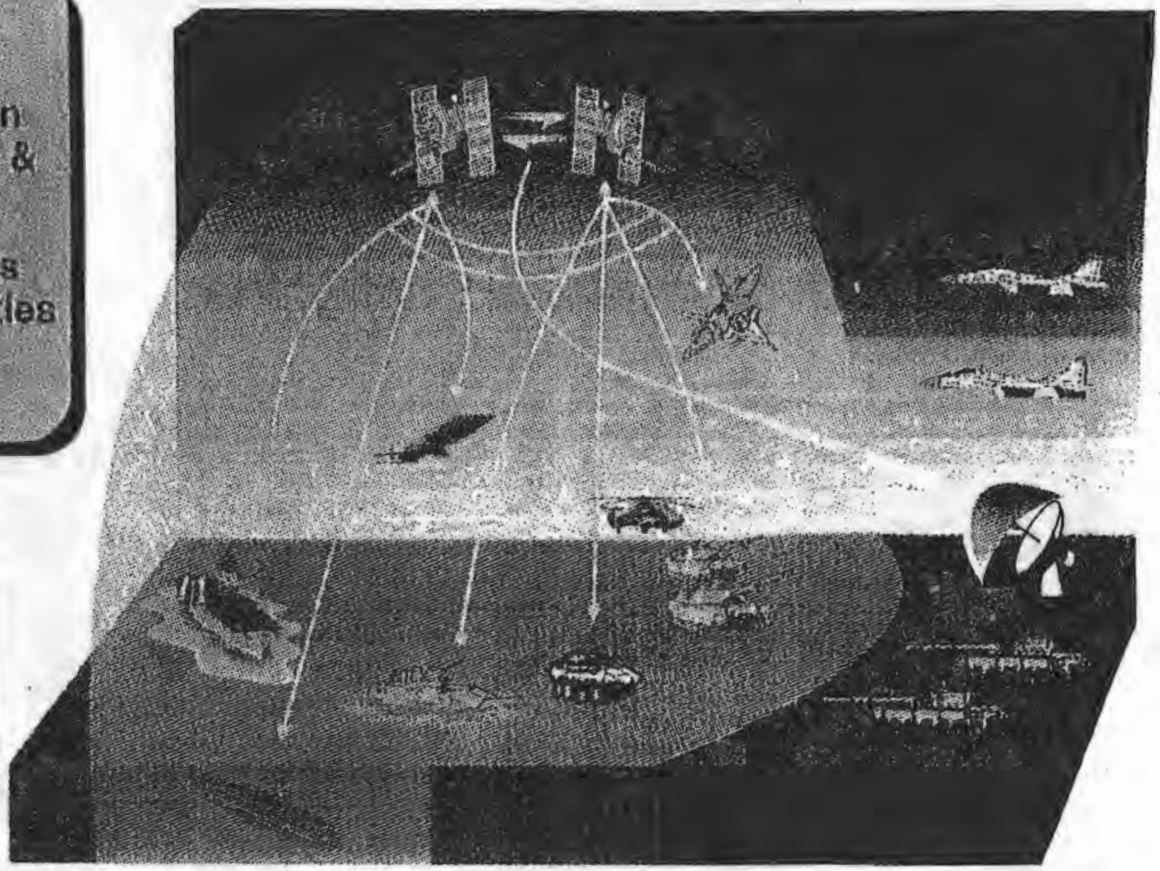
Information Superiority

Requires

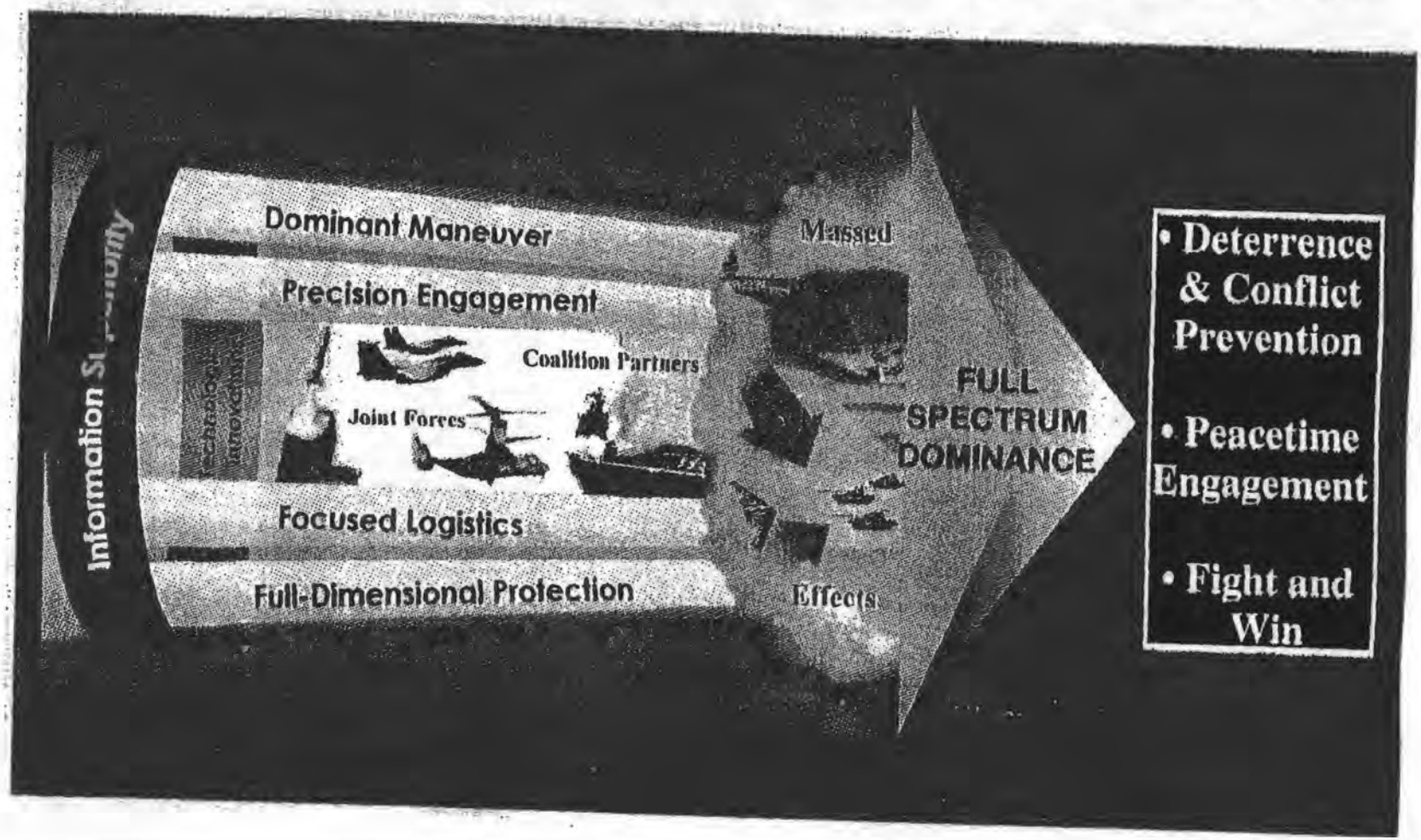
- Seamless Architecture & Systems Integration
- Responsive Information Collection, Processing & Dissemination
- Prioritize Requirements & Assign Responsibilities
- Offensive & Defensive Information Warfare

Results In:

- Enhanced Command & Control
- Precise Knowledge of Friendly Locations
- Fused, All-Source Intelligence



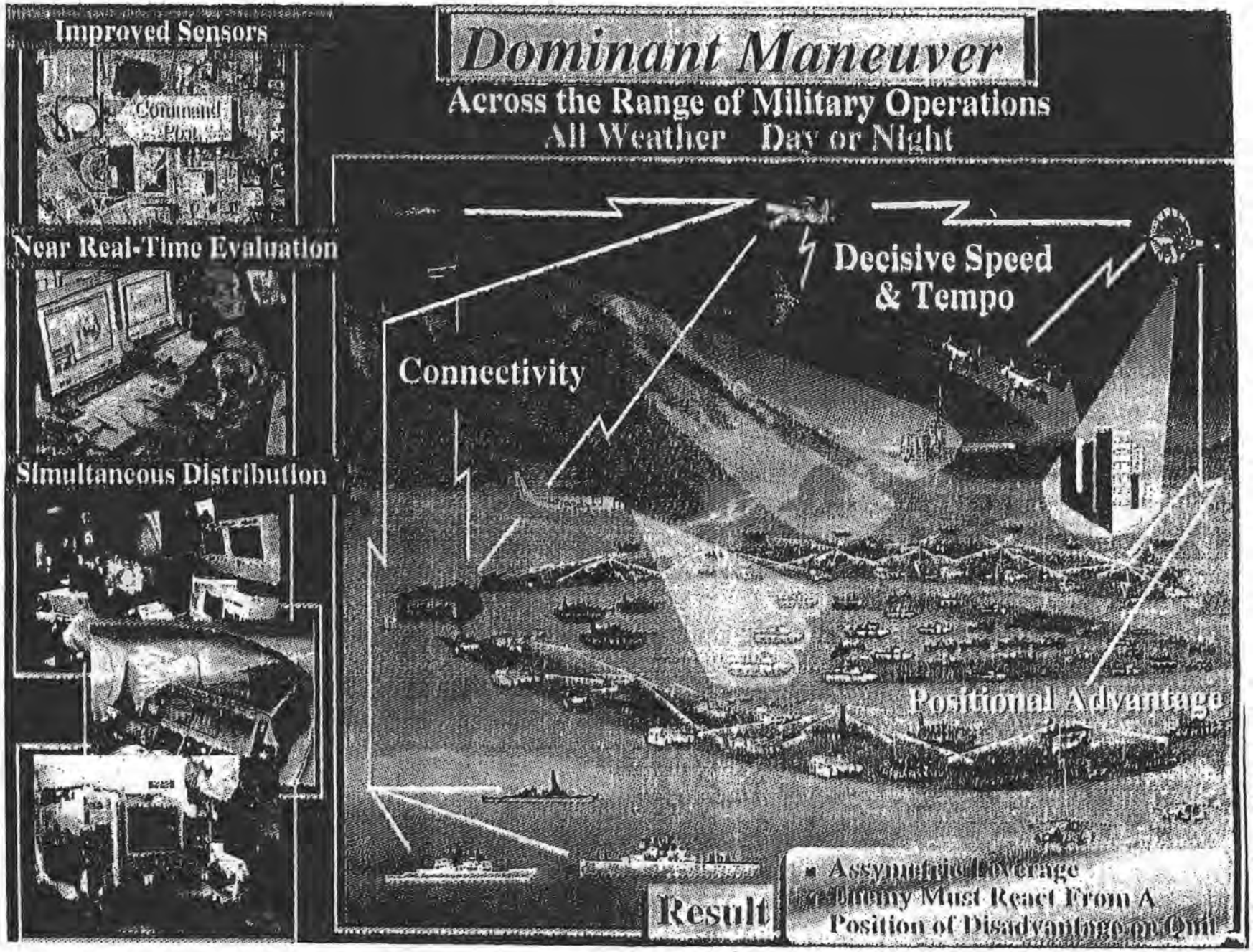
Emerging Operational Concepts

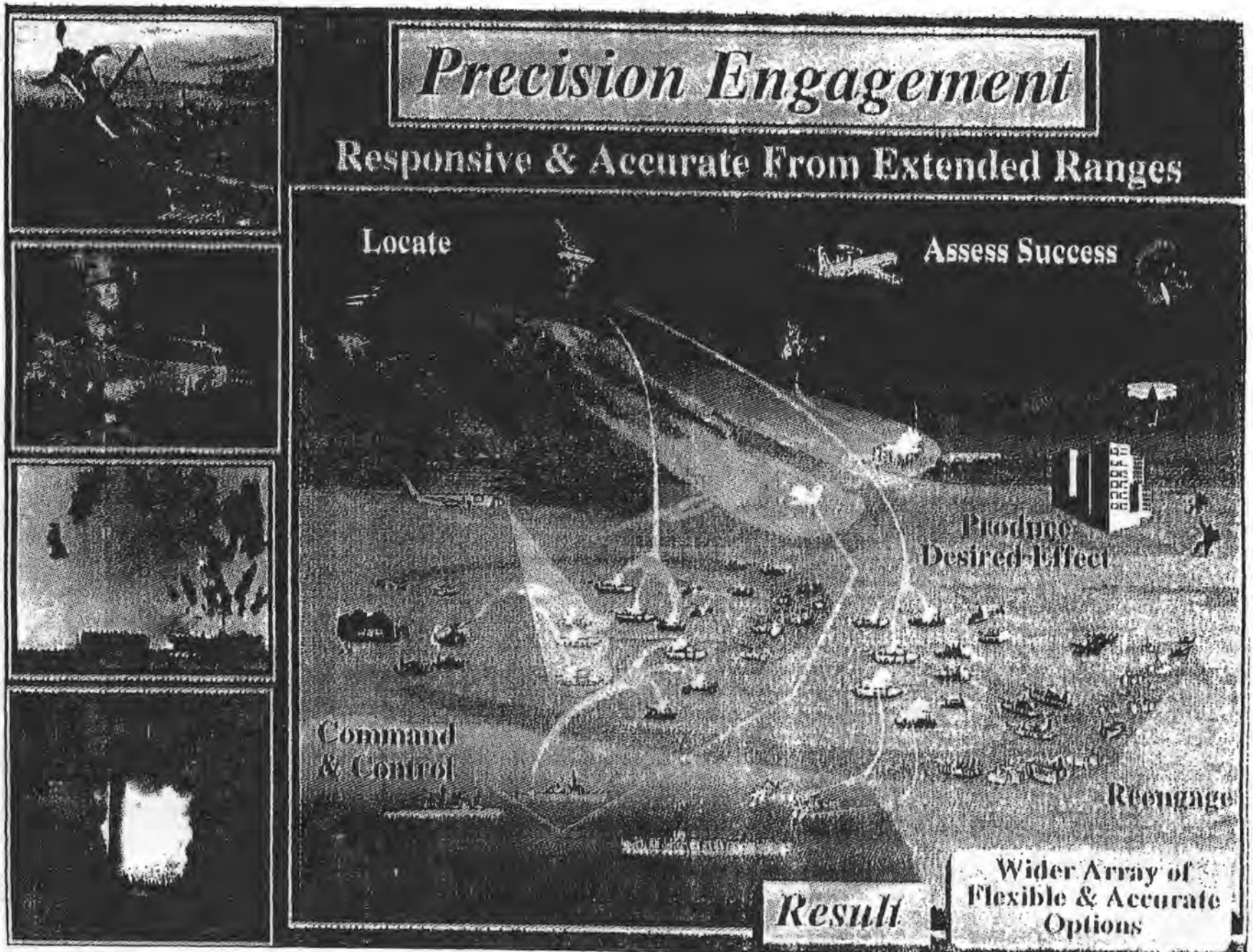


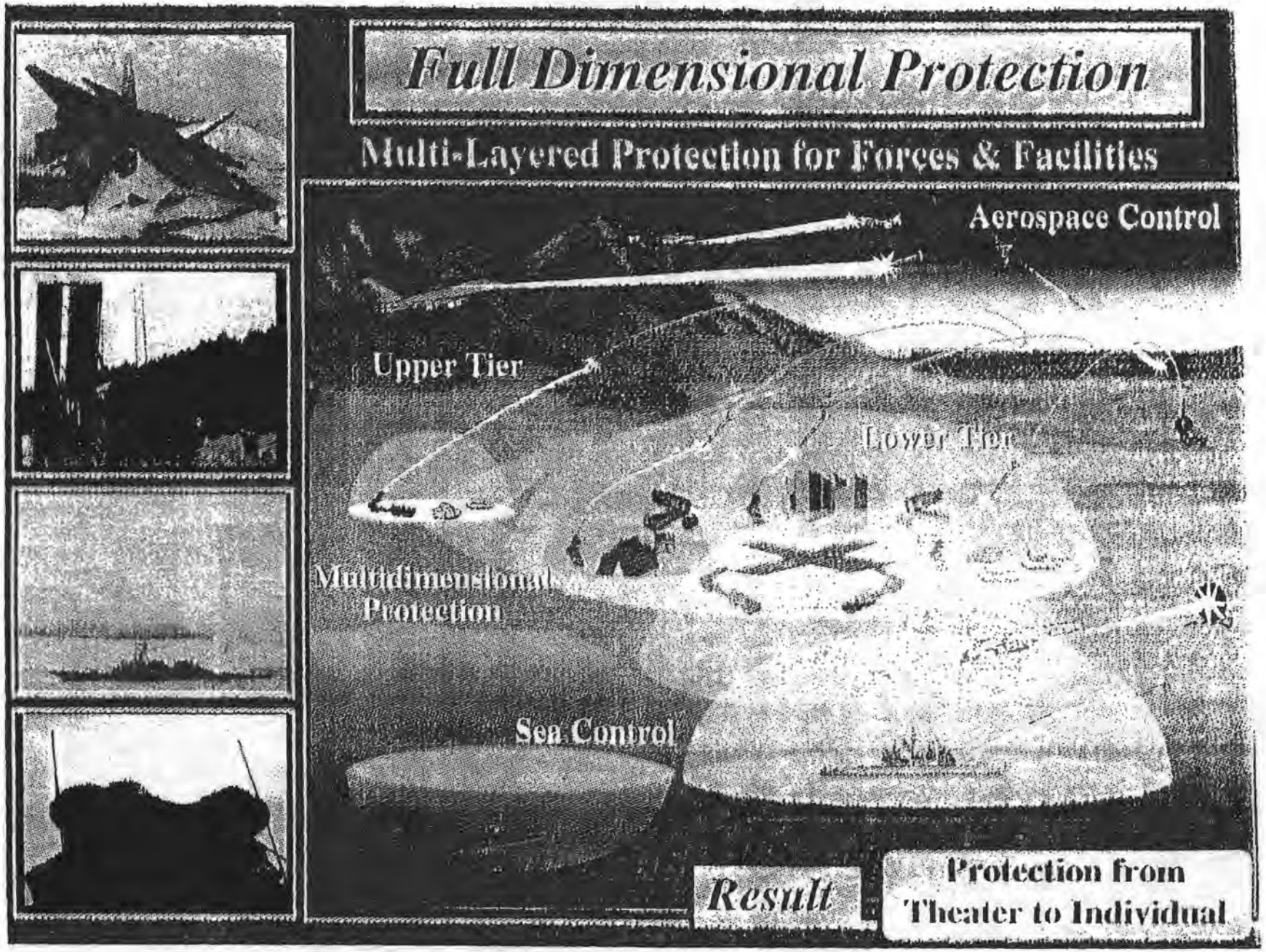
CJCS Vision Statement

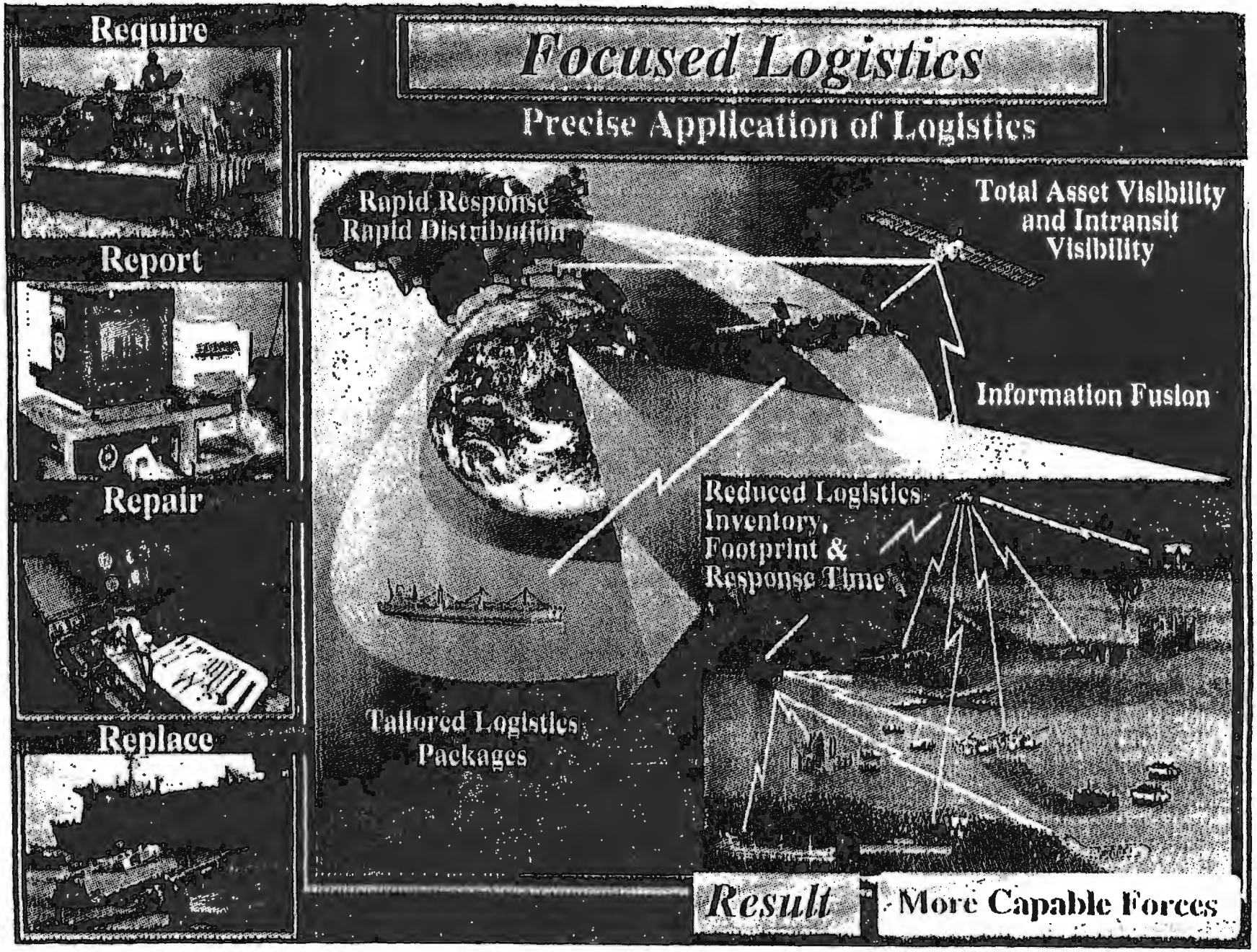
America's Military Preparing for Tomorrow
Quality People
Trained, Equipped, & Ready for Joint Operations

Persuasive in Peace--Decisive in War:
Preeminent in Any Form of Conflict

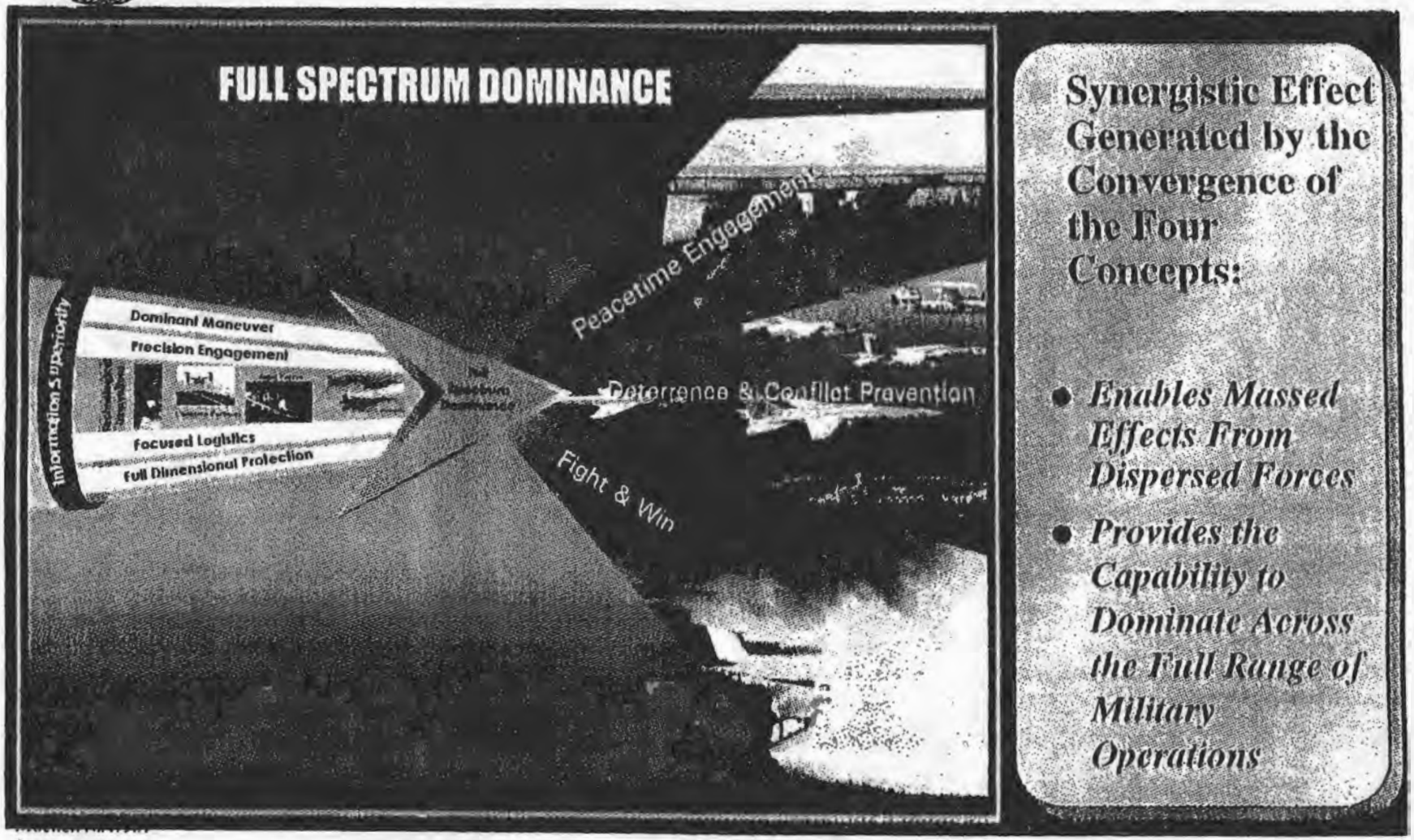

Improved Sensors
Command Post
Near Real-Time Evaluation
Simultaneous Distribution
Dominant Maneuver
Across the Range of Military Operations
All Weather Day or Night
Decisive Speed & Tempo
Connectivity
Positional Advantage
Result
Asymmetric Leverage
Enemy Must React From A Position of Disadvantage or Quit


Precision Engagement
Responsive & Accurate From Extended Ranges
Locate
Assess Success
Produce Desired Effect
Command & Control
Reengage
Result
Wider Array of Flexible & Accurate Options


Full Dimensional Protection
Multi-Layered Protection for Forces & Facilities
Aerospace Control
Upper Tier
Lower Tier
Multidimensional Protection
Sea Control
Result
Protection from Theater to Individual


Require
Report
Repair
Replace
Focused Logistics
Precise Application of Logistics
Rapid Response
Rapid Distribution
Total Asset Visibility
and Intransit
Visibility
Information Fusion
Reduced Logistics
Inventory,
Footprint &
Response Time
Tailored Logistics
Packages
Result
More Capable Forces

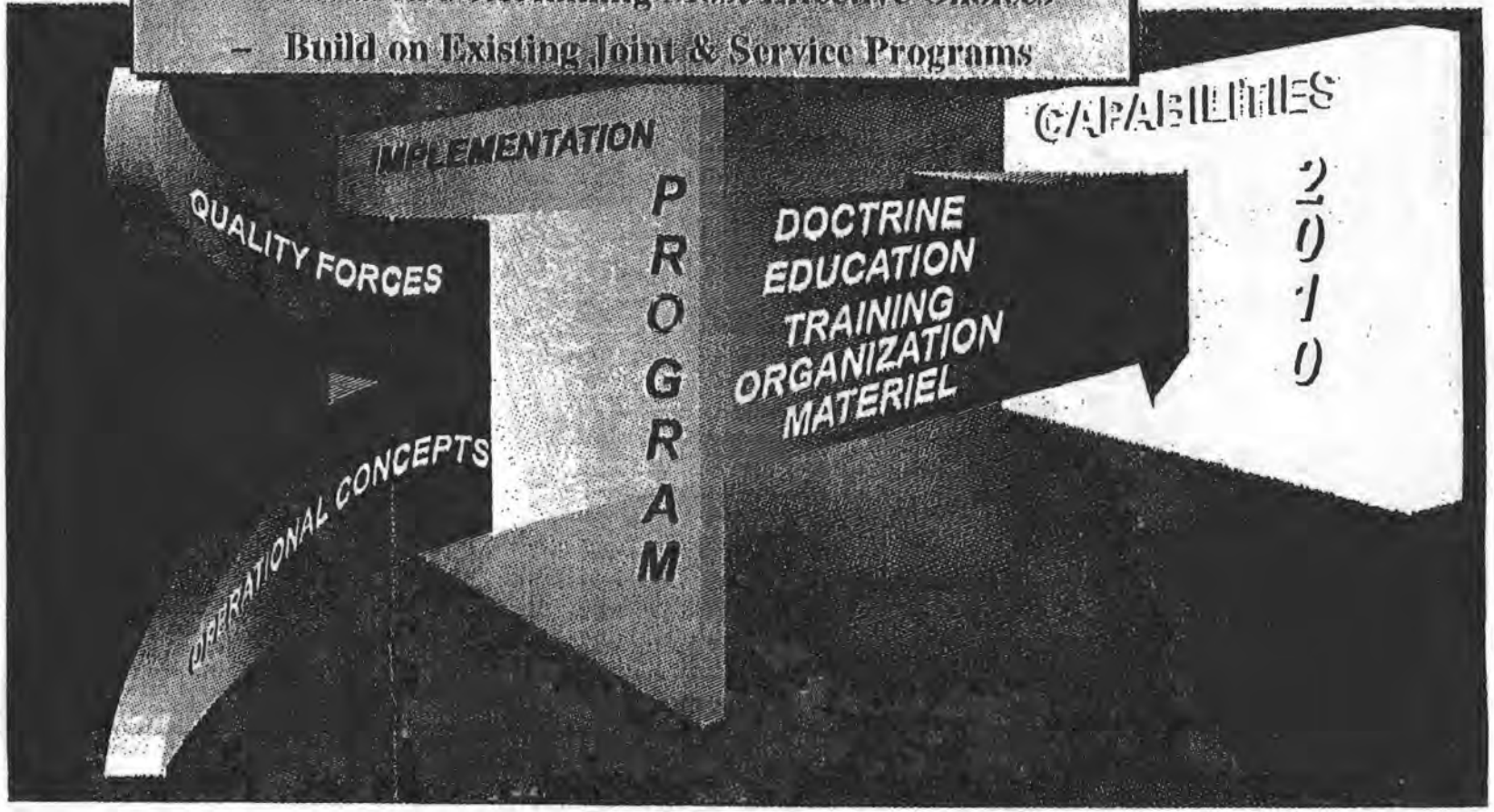
Full Spectrum Dominance



Critical Considerations

Implementation: From Concepts to Capabilities

- **Decrease Risks by Robust Implementation & Assessment Program**
  - **Assist in Determining Most Effective Choices**
  - **Build on Existing Joint & Service Programs**



Goal

Fielding joint warfighting capabilities in 2010 that are...

- **Persuasive in Peace**
- **Decisive in War**
- **Preeminent in any form of conflict**

- **Doctrine in place**
- **Forces and HQs organized, equipped and trained**
- **Leaders developed and educated**
- **War plans reflect new warfighting modes**

JV2010 Gives Us "Commander's Guidance"

"...a common direction for our Services in developing their unique capabilities..."

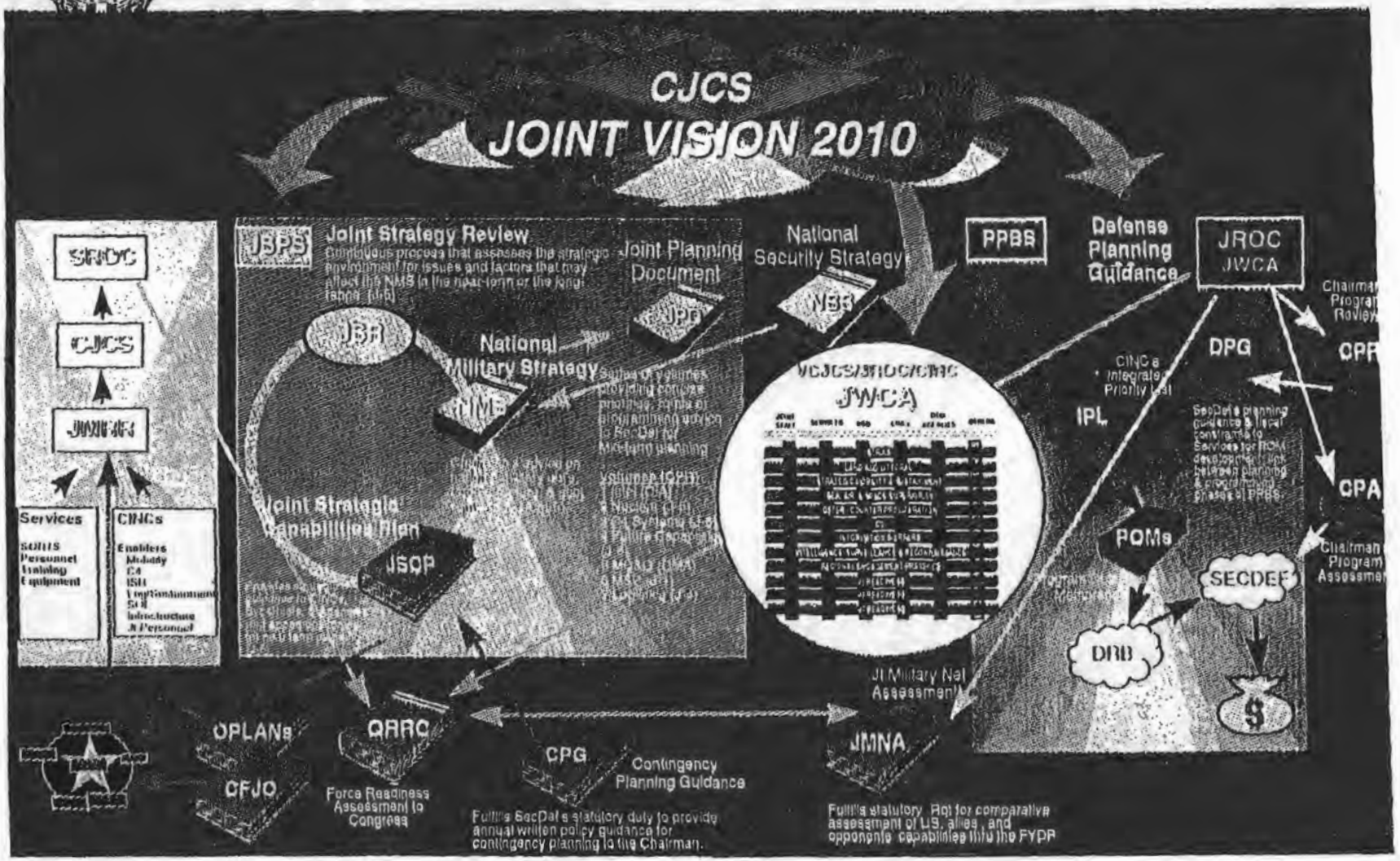
- Unifying, integrating theme
- "Measure of Merit" for Service programs
- Benchmark for supporting activities

- Template for a future joint warfighting concept
- Joint framework for Service warfighting visions/concepts

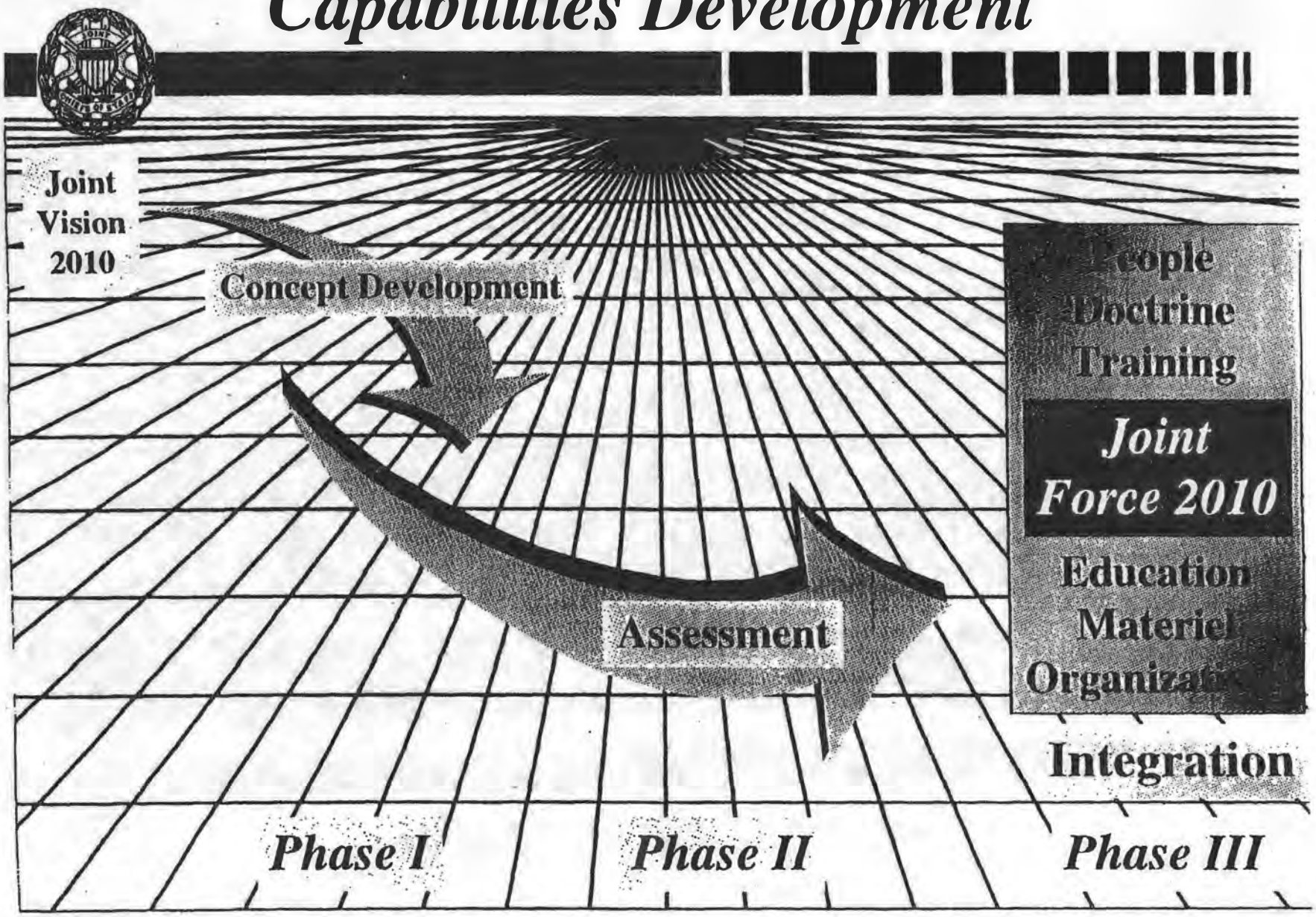
"...the conceptual template...to achieve new levels of effectiveness in joint warfighting."

Two Primary Efforts

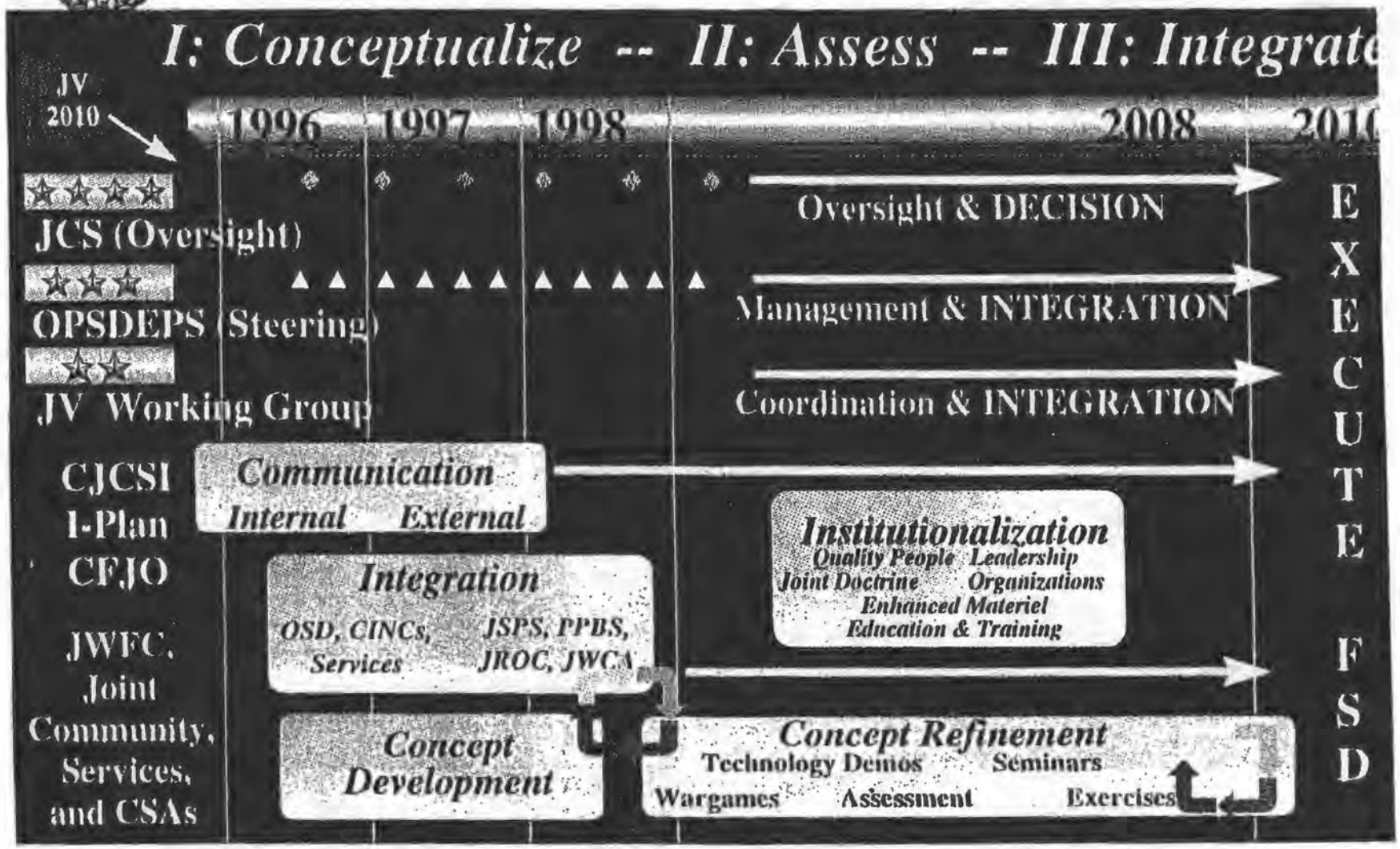
Strategic Guidance



Capabilities Development



Project Management



Bottom Line

Joint Vision 2010 Creates the Template To:

- Focus the Strengths of the Individual Services To Exploit the Full Array of Available Capabilities
- Guide the Evolution of Joint Doctrine, Education, & Training
- Achieve More Seamless & Coherent Joint Operations
- Recognize the Fundamental Importance of High Quality People & Strong Leaders

"The nature of modern warfare demands that we fight as a joint team. This was important yesterday, it is essential today, and it will be even more imperative tomorrow. Joint Vision 2010 provides an operationally based template for the evolution of the Armed Forces for a challenging and uncertain future. It must become a benchmark for Service and Unified Command visions."

John M. Shalikashvili
Chairman
of the Joint Chiefs of Staff

ANNEX F

The Army After Next Project

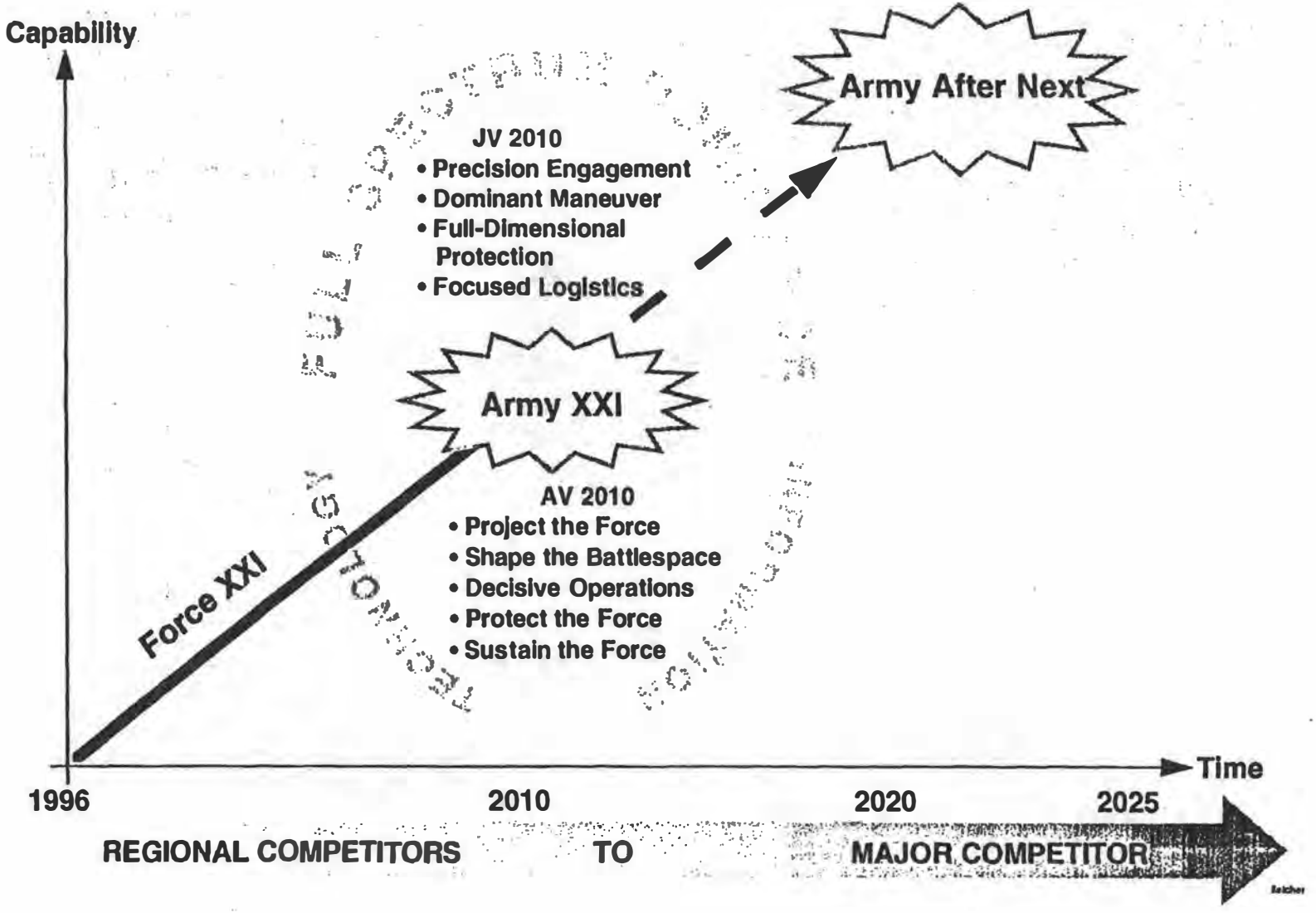
THE ARMY AFTER NEXT PROJECT

Current Thoughts on the Army After Next

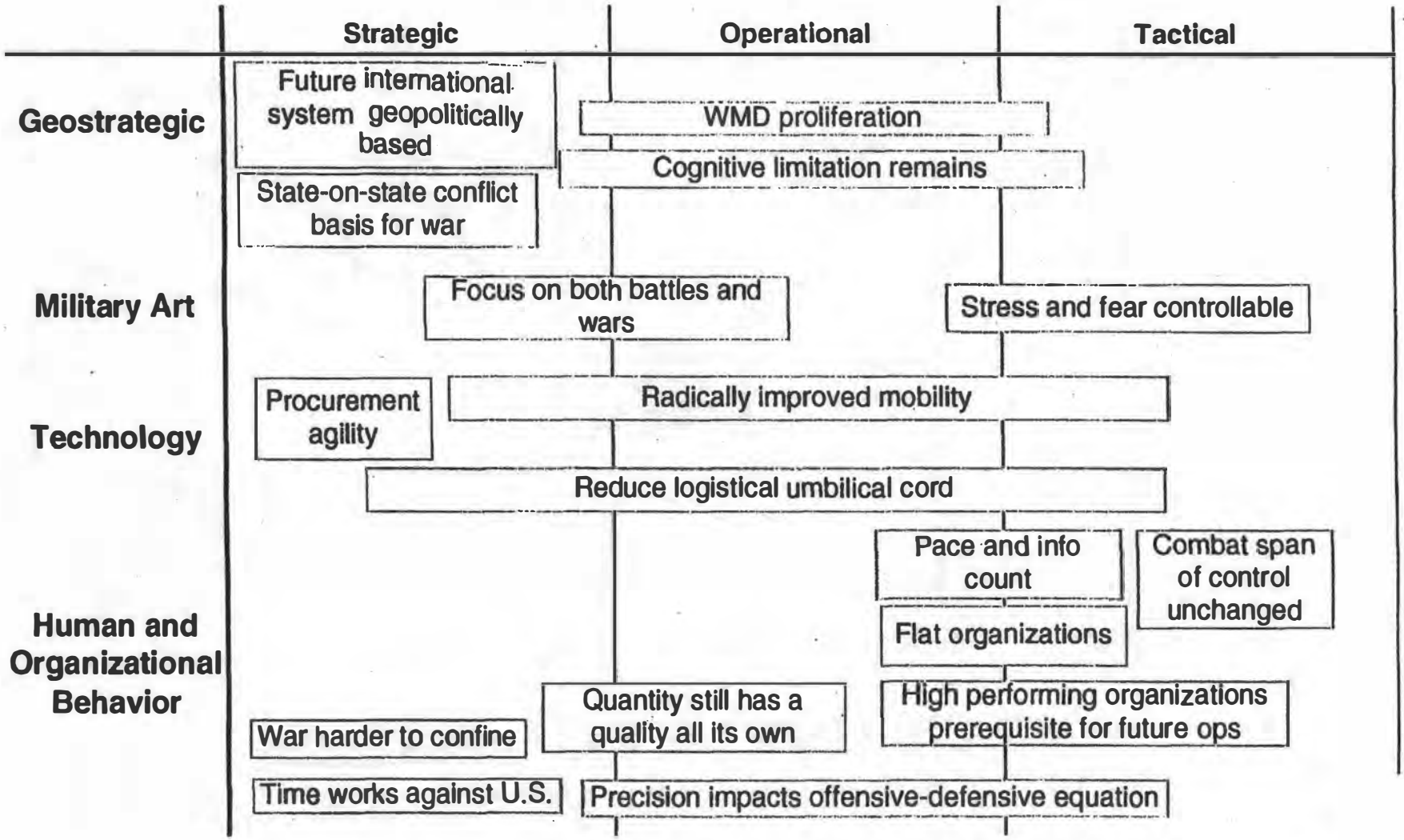
1996

"AAN . . . A Full Spectrum Force for an Uncertain Future"

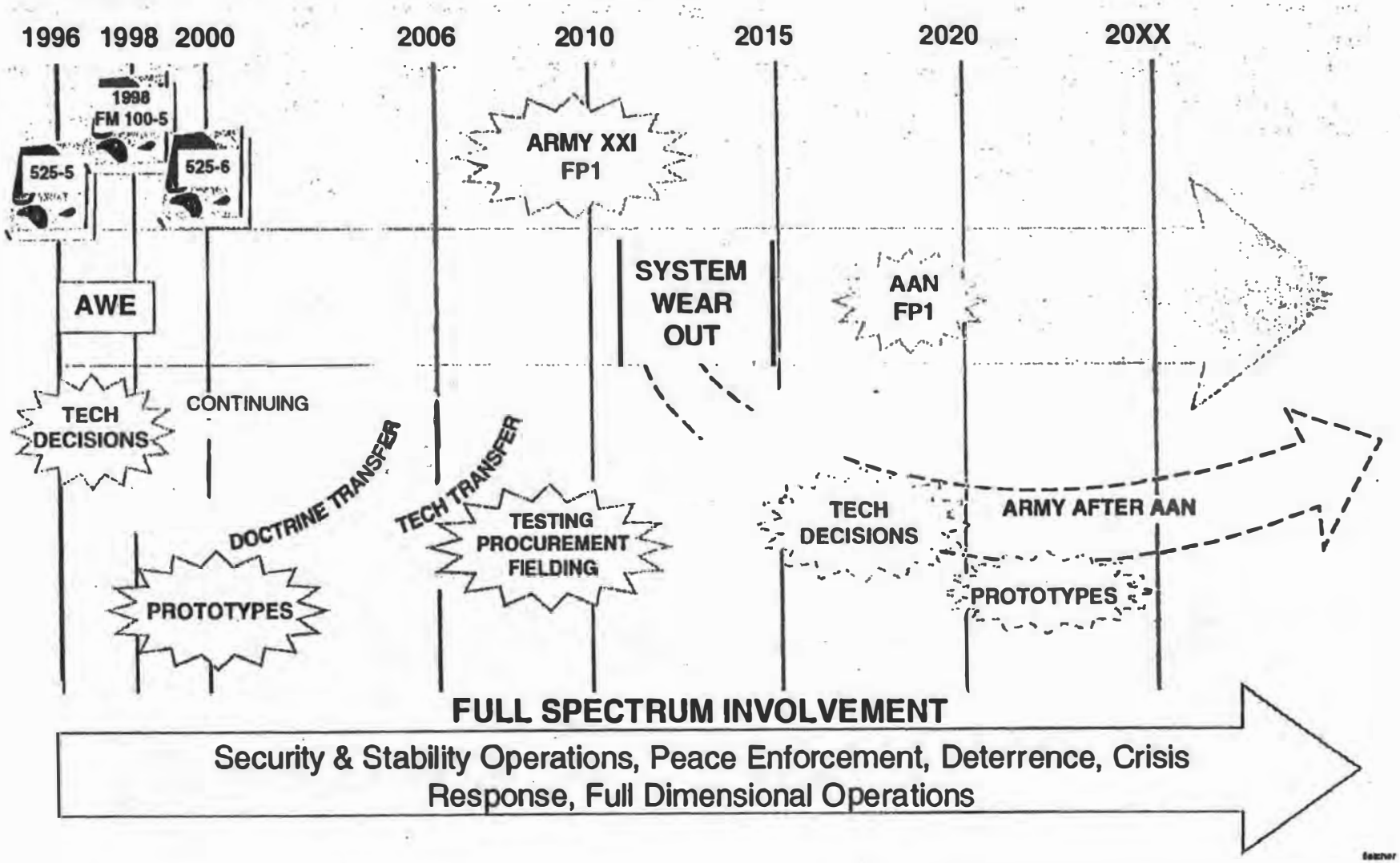
THE PATH TO AAN MUST PASS THROUGH FORCE XXI



AAN EMERGING IMPRESSIONS

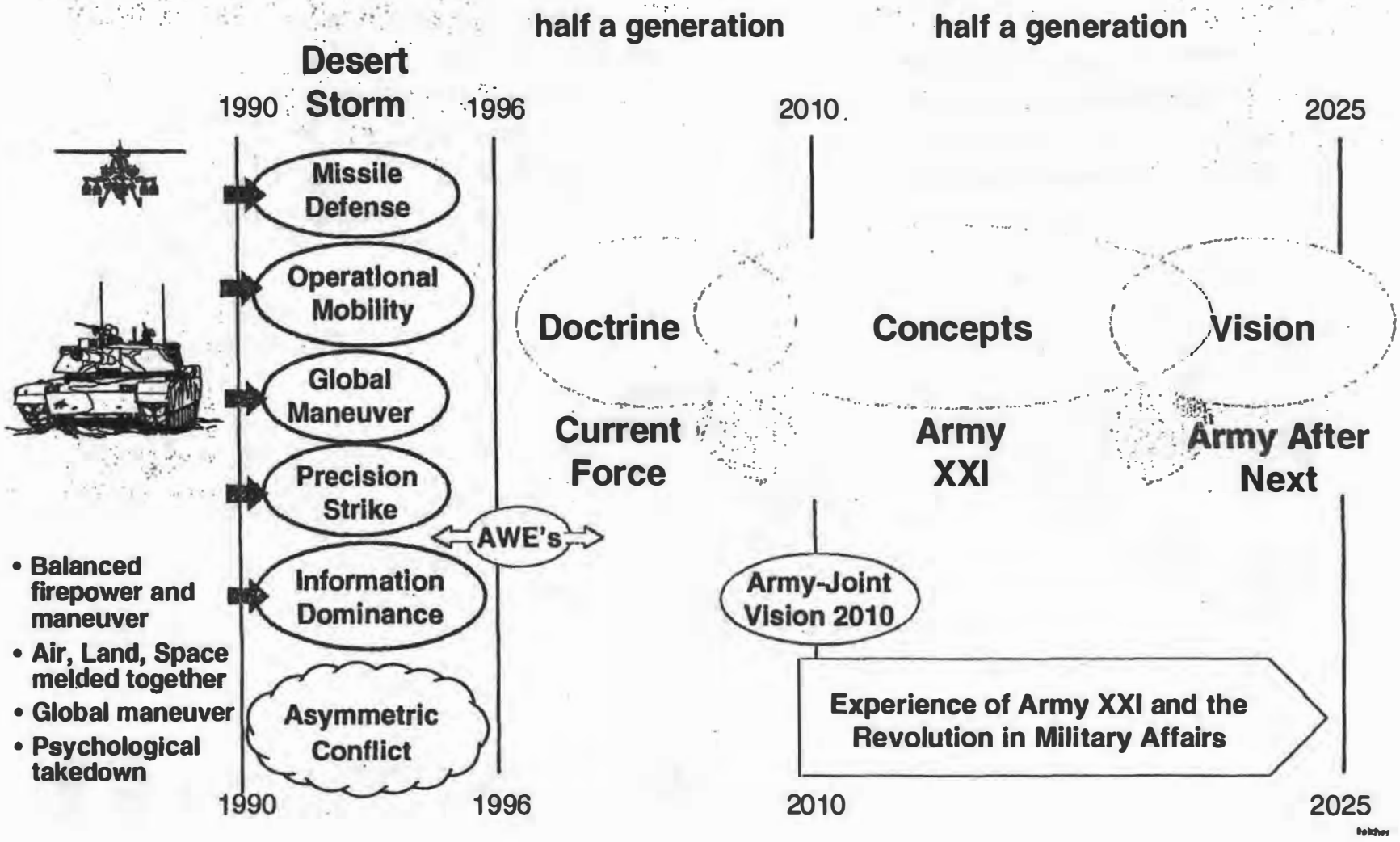


INFLUENCES ON THE ARMY'S FUTURE – GETTING TO AAN AND BEYOND

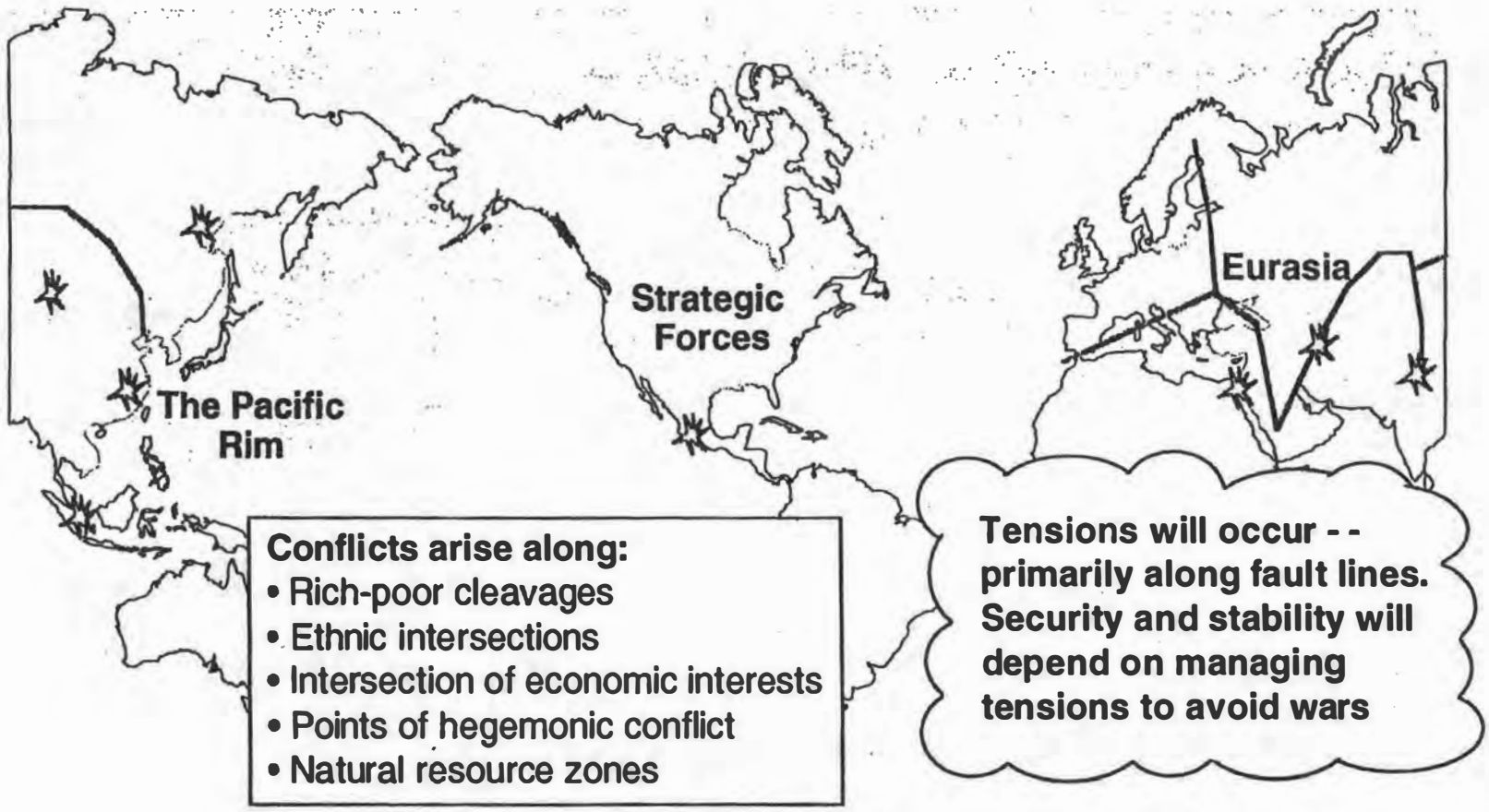


THE PATH AND PATTERNS STRETCH INTO THE FUTURE

Army XXI and Army After Next



GEOPOLITICS of 2025



Conflicts arise along:
- Rich-poor cleavages
- Ethnic intersections
- Intersection of economic interests
- Points of hegemonic conflict
- Natural resource zones

Tensions will occur -- primarily along fault lines. Security and stability will depend on managing tensions to avoid wars

Eurasia and Pacific Rim . . . where fault lines and interests will most likely intersect

SEVEN YEARS INTO THE 21st CENTURY WE SEE A RISING PATTERN of ASYMMETRY

Among our potential foes there's a common, almost spontaneous movement to posture themselves for asymmetric competition

- **Streamlining current forces**
- **Education/professionalization**
- **Regional focus on local hegemony**
- **Shifting operational concepts – deflect air & sea power to preserve standing armies**

	Army	Asymmetric Investments
India	980,000	
North Korea	1,000,000	
Pakistan	520,000	
Iran	345,000	
Iraq	350,000	
Russia	670,000	
China	2,200,000	

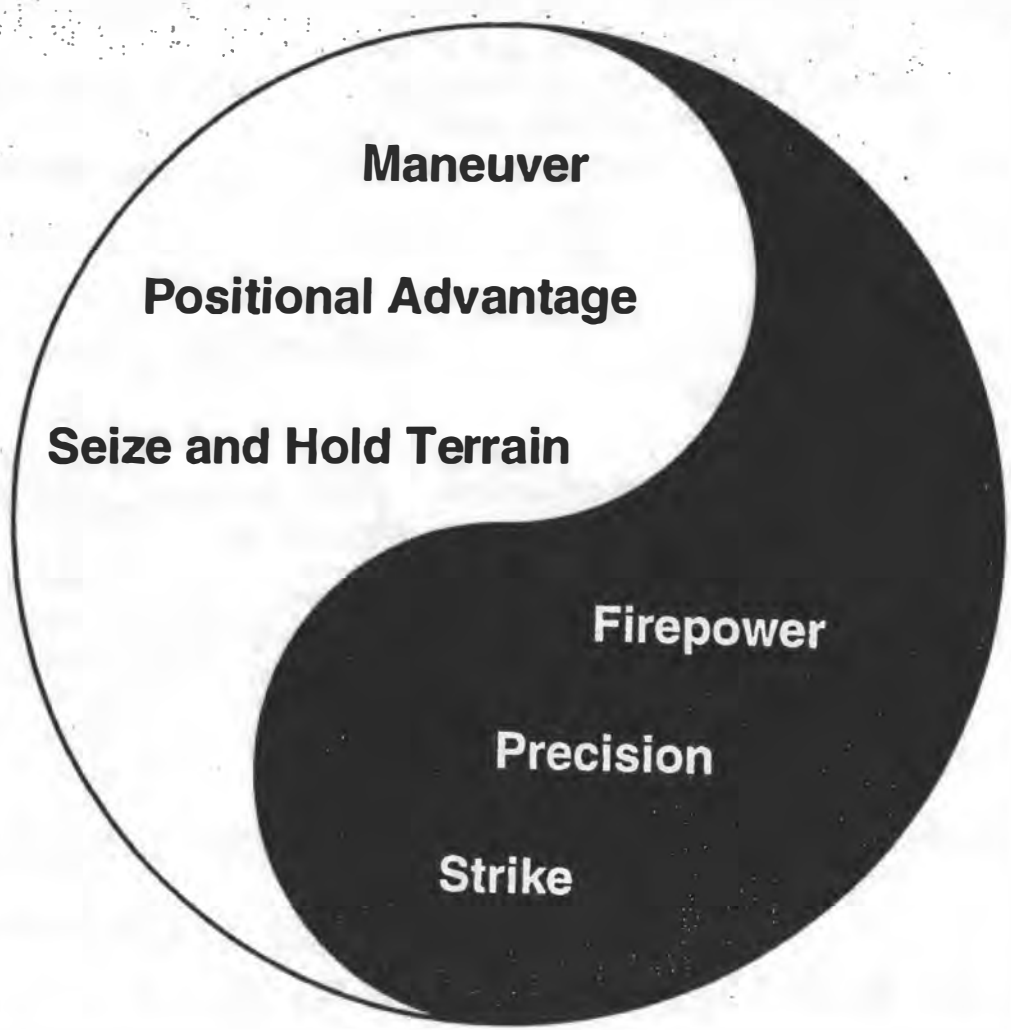
Legend

- Missiles – Ballistic & Cruise
- Air Defense
- Submarines
- C⁴I/IW
- WMD
- Fighters
- Missile Ships

PROBABLE LONG-TERM U.S. STRATEGY (to 2025)

- **Security policy will center on:**
  - Security of the United States
  - Stability overseas in areas of vital national interest
    - Democracy, economic vitality facilitated by physical, long term presence
- **Military strategy will center on:**
  - Defense of United States; land, sea, air, and space
  - Forward engagement *(stationing)* in vital regions: probably Eurasia and Pacific Rim
  - Projectable military power
- **Engagement & enlargement will continue worldwide across the full spectrum of operations**

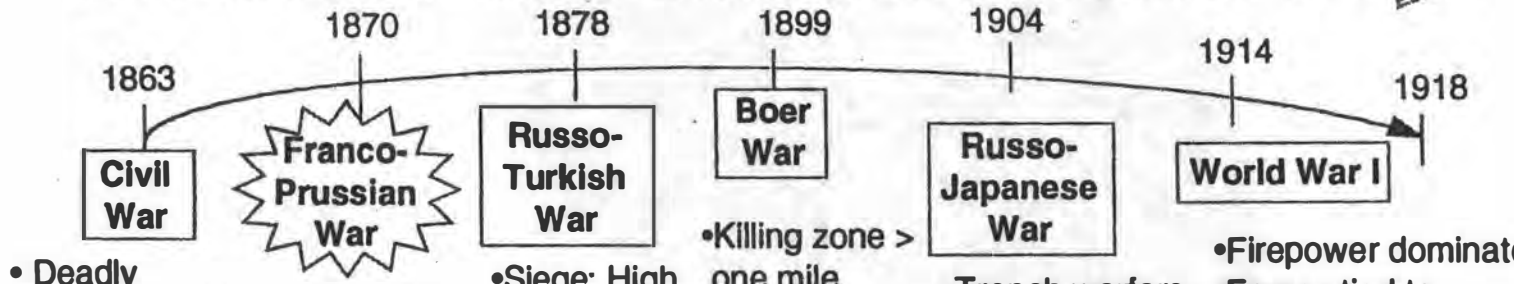
ART of WAR: a HISTORICAL PERSPECTIVE on the CYCLES and PATTERNS of CHANGE



Belcher

CHANGES IN THE ART OF WAR FOLLOW TECHNOLOGY DRIVEN CYCLES

FIREPOWER – MANEUVER IMBALANCE . . . STALEMATE



- Deadly zone now 1000 yds across
- Asymmetric forces
- Invalid analog
- Siege: High casualties
- Killing zone > one mile
- Linear attack fails
- Trench warfare
- Barbed wire
- Mines
- Massive barrages
- Stalemate
- Firepower dominates
- Forces tied to railhead, no operational maneuver
- Deadly zone too costly to cross

Period of Transition

1922

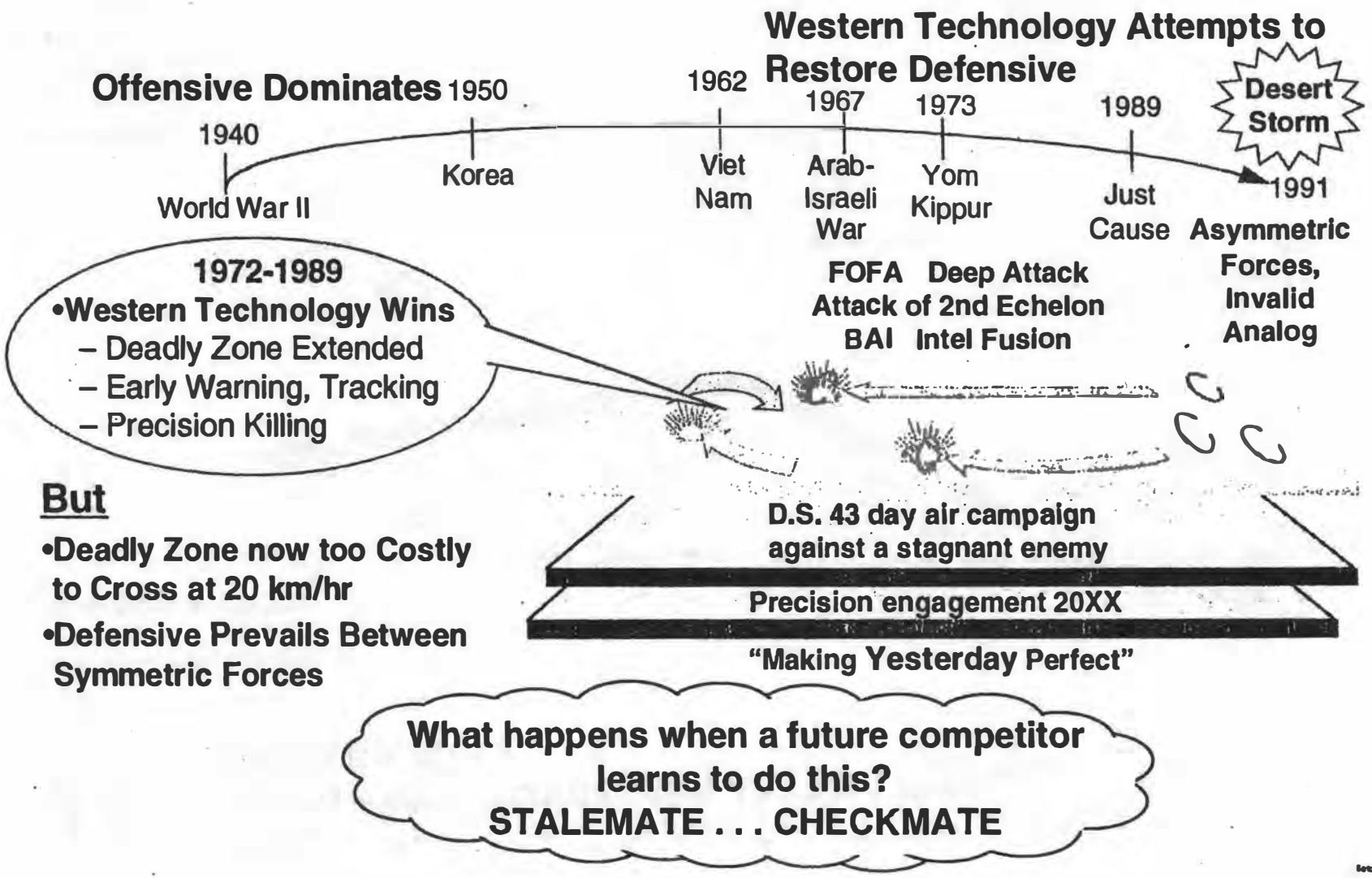
- **Horror of attrition war demands change**
- **Period of quiescence allows ordered change**
- **Known technologies applied to break stalemate**
  - Motorization
  - Wireless
- **German advantage in application: Doctrine, Training, Leadership**

1939

- **Offensive Dominates**
- **Complementary forces**
  - Cross deadly zone intact at 20km/hr
  - Break with railhead, strike COG.
  - Complete maneuver, consolidate, insure dominance

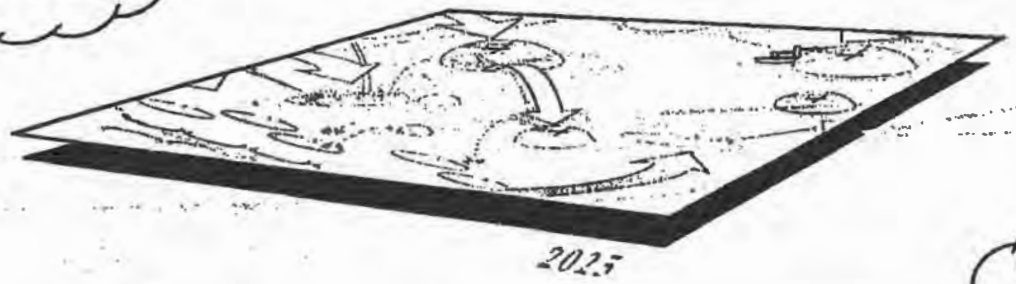
Knowledge about future conflict can arise only through the laboratory of actual conflict

INVESTMENT IN DEFENSIVE WORKED . . . AND COMPRESSED CYCLES OF CHANGE



AS TECHNOLOGY ACCELERATES, THE CYCLIC PERIOD OF WARFARE COMPRESSES AND BATTLESPACE EXPANDS GEOMETRICALLY

Strategic scale becomes operational; concepts must adjust accordingly



AAN - 2025
- Multiple theater
- Global
- ? Hours
- Killing zone: 10^7 m

Cyclic rate of change may soon exceed our structural ability to adapt

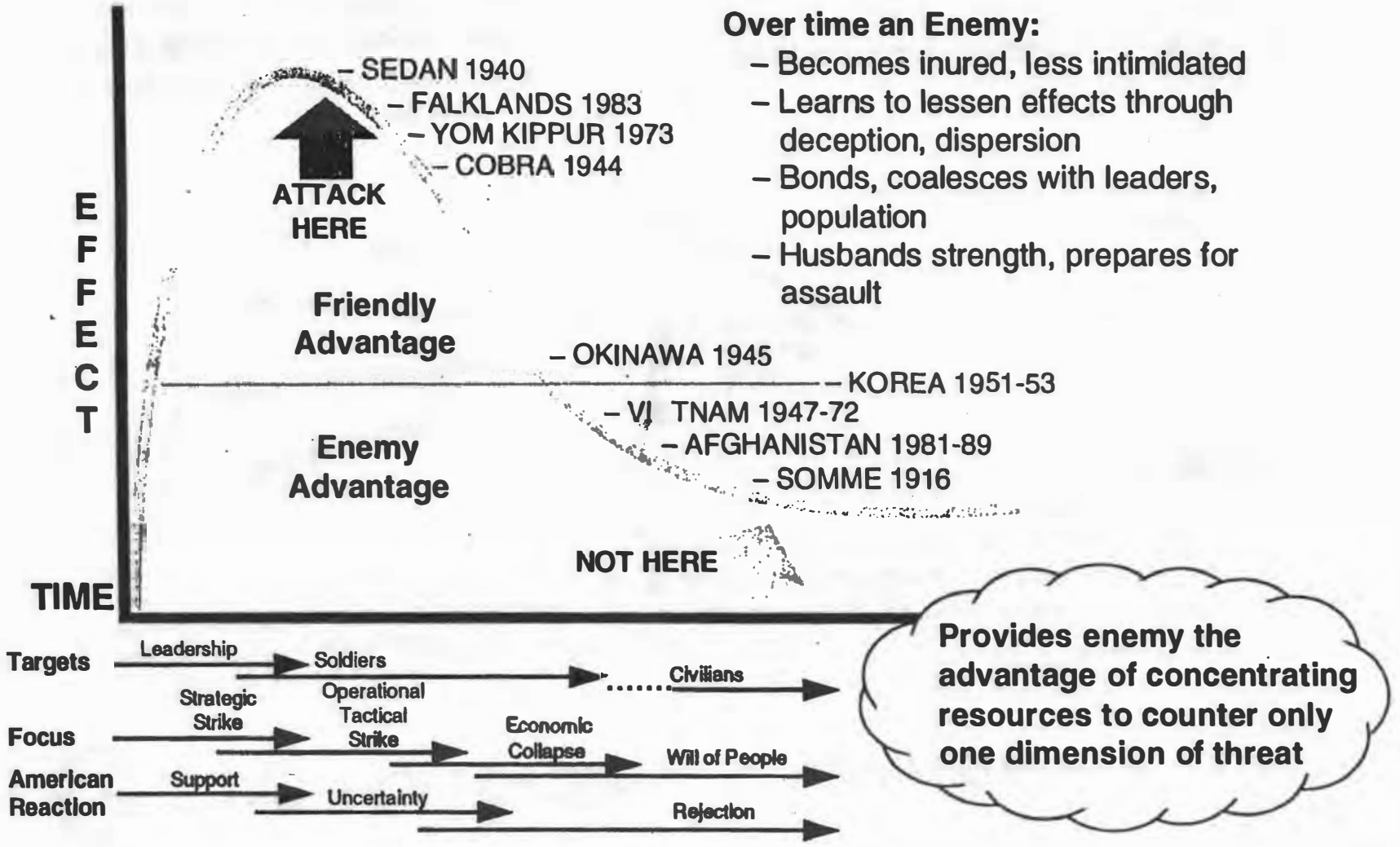
Desert Storm - 1991
- Single theater
- 1000 x 1000 miles
- 100 hours
- Killing Zone: 10^5 m

France - 1940
- Single theater
- 550 x 650 miles
- Three weeks
- Killing Zone: 10^4 m

Chancellorsville - 1863
- Single theater
- 200 x 250 miles
- One month
- Killing Zone: 10^3 m

Ulm - 1805
- Single theater
- 150 x 150 miles
- One month
- Killing Zone: 10^2 m

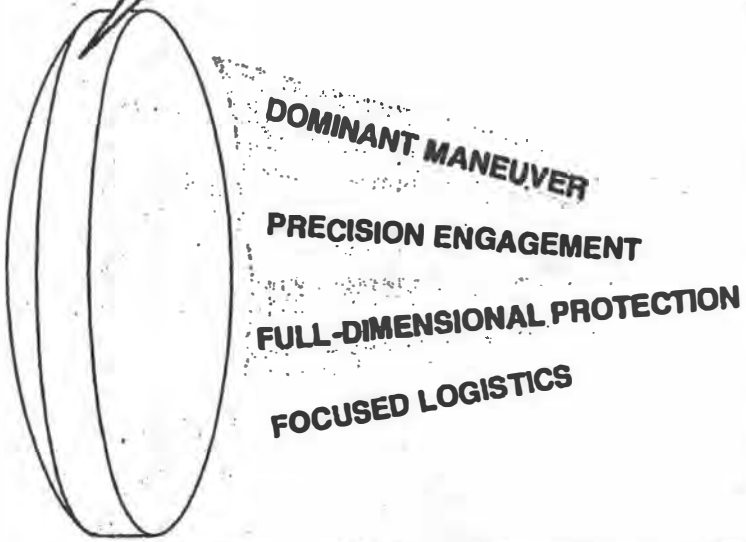
FIREPOWER-CENTERED APPROACH: UNNECESSARY RISK. FIREPOWER EFFECT DECLINES OVER TIME



JOINT VISION 2010 : THE IMPERATIVE for BALANCE

- INFORMATION SUPERIORITY
- TECHNOLOGICAL INNOVATIONS

"Taken together, these four new concepts will enable U.S. to dominate the full range of military operations . . ."
– JV 2010



PEACETIME ENGAGEMENT

DETERRENCE AND CONFLICT PREVENTION

FIGHT AND WIN

In combat, the Army assures land force dominance through the integration of the combat power of all U.S. Services . . . in pursuit of decisive objectives.

FM 100-1

Full Spectrum Dominance is dependent upon a balance of Dominant Maneuver and Precision Engagement, each enabled and reinforced by Full-Dimensional Protection and Focused Logistics

MANEUVER and PRECISION ENGAGEMENT ARE COMPLEMENTARY: BALANCE IS ESSENTIAL

DOMINANT MANEUVER (Positional Advantage)	PRECISION ENGAGEMENT (Strike)
Controls Battlespace	Impacts Battlespace
Permanent, Durable, Sustained	Transitory
Controlled Effect	Uncontrolled Effect
Decisive	Indecisive
Guarantees Finality	Lacks Closure
Multidimensional, (Lethality, Maneuver, Protection)	Unidimensional, (Only Lethality)
Versatile, applies across operational spectrum	Limited to narrow band on operational spectrum
Determinate	Indeterminate
Flexible	Inflexible
Human Component	Technical component

Precision Engagement alone is not the answer - balance with Dominant Maneuver is <u>essential</u>

WE CAN MANEUVER AND STRIKE TODAY WITHOUT SERIOUS CHALLENGE. BUT WHAT ABOUT DAY AFTER TOMORROW?

- **We have already shown our hand . . .**
  - Fixation with precision strike
  - Apparent lack of commitment over time
  - Aversion to casualties
  - Fear of collateral damage
  - Sensitivity to domestic and world opinion

Failure to Apply Dominant Maneuver and Precision Engagement in Harmony Invites Strategic and Operational Stalemate

- **The information revolution will quickly fill in the military-technical details**
- **A future enemy needs only the will and resources to develop his own means of precision strike**
- **Less sophisticated, but much larger strike capability coupled with geostrategic advantages may result in operational stalemate**

ASSUME A FUTURE FOE WHO EMBRACES AN ASYMMETRIC MILITARY STRATEGY

If he chooses confrontation on land:

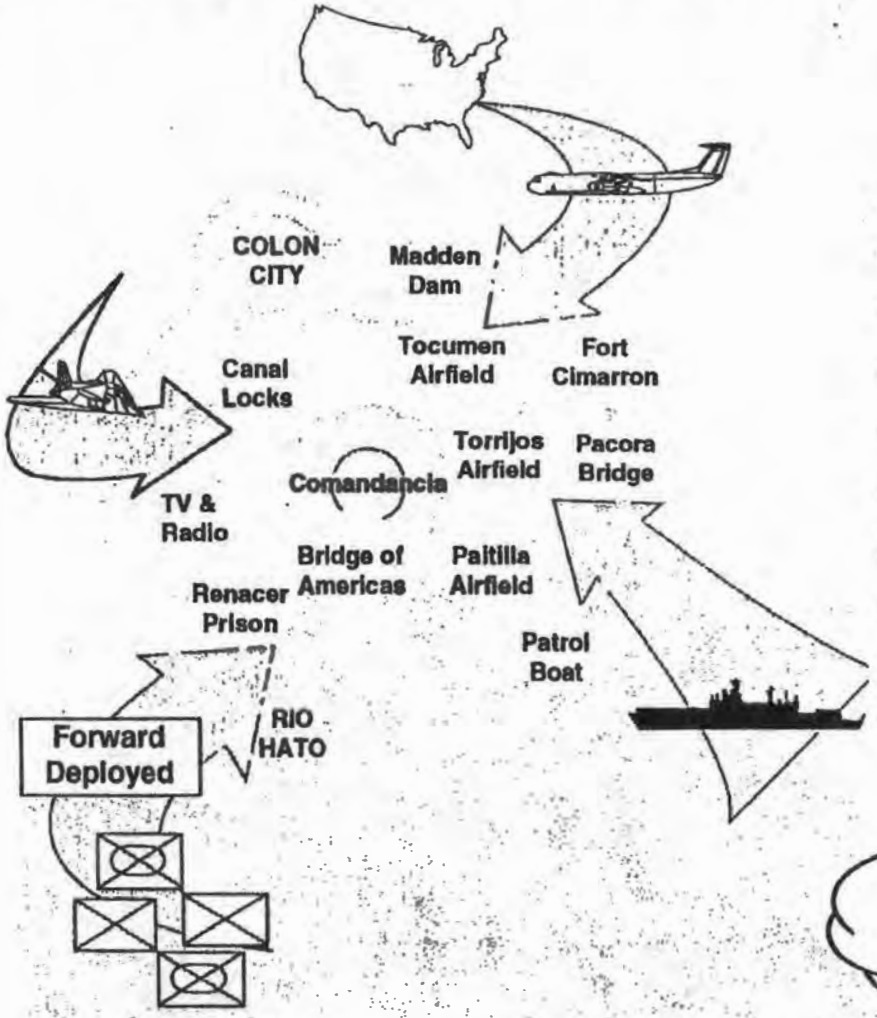
- Avoids head on challenges to US air & naval superiority
- Buys off-the-shelf precision
- Exploits simple counters to our precision strike
- Fields very large army - - competent, well-led, close to home . . .

. . . then by 2025, his challenge will be to <u>counter</u>, not match, U.S. capabilities

- Symmetric forces and weapons characterize advantaged nations in balanced, stable geopolitical environments
- Asymmetric forces and weapons characterize disadvantaged nations and actors with revolutionary impulses

Solution: Balanced Precision Engagement and Dominant Maneuver

BACK TO PATTERNS AND CYCLES . . .
JUST CAUSE AS A WINDOW INTO THE FUTURE



- **Center of Gravity: Will of the Opponent**
- **Speed**
- **Overmatch**
- **Limited Killing, Damage**
- **Information Dominance**
- **Assured Land Control**
- **Assured Termination**
- **Strategic Reach**
- **Strategic Convergence**
- **Overseas Presence**
- **Dispersed Operations**
- **Melding of Land, Air, Sea, and Space**

In a swift, overwhelming campaign the objective is the enemy's will – not overwhelming destruction

NATURE OF FUTURE MILITARY ENVIRONMENT

- Radically increased lethality
- Radically increased mobility
- Translucent battlespace
- Wide range in size and nature of potential conflicts
- Global information environment
- Expansive urbanization

FUTURE MILITARY ENVIRONMENT IMPERATIVES

Speed . . .

- **Forces must move to survive and succeed**
- **High-tempo operations**
- **Pulsed operations**
- **Focused logistics**
- **Master information operations**
  (Attack, Protect, Enable)
- **Agile, high operational transition capability**
- **Adaptive, full-spectrum force**

High speed, continuous, day and night

Capable of altering size and composition in stride to align with changing METT-T

A rich menu of options to fit anywhere along the operational continuum

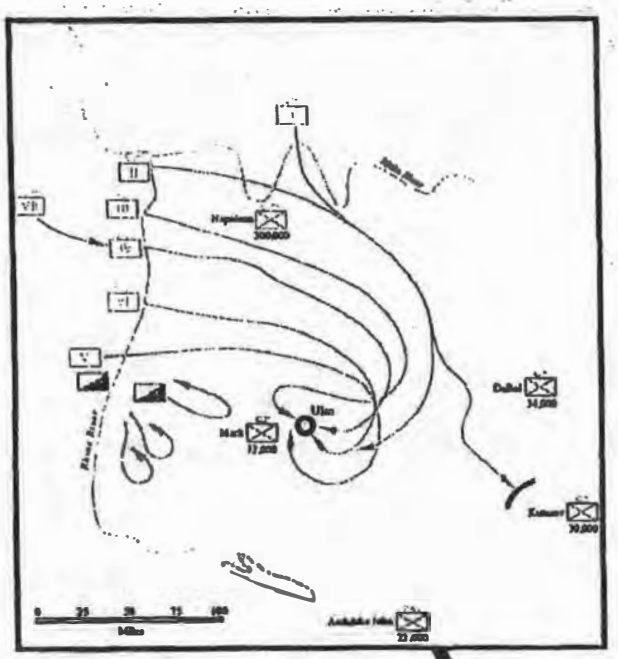
AAN CONCEPTS

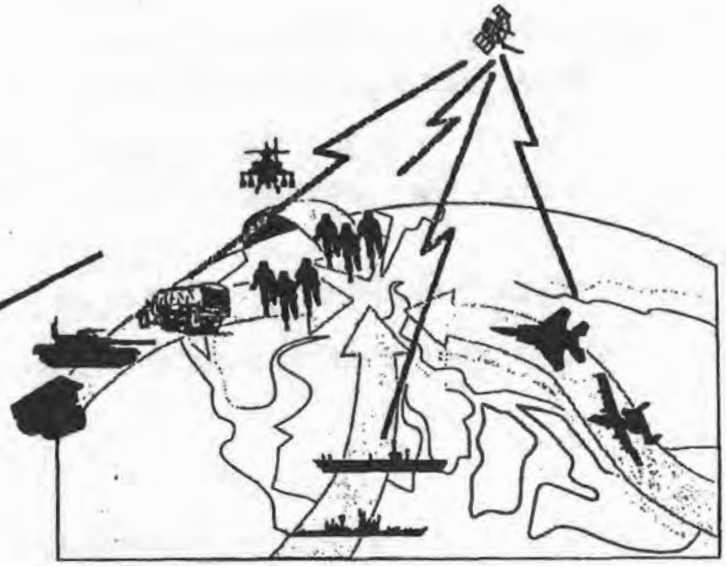
- **Strategic mobility**
  - Global maneuver begins process of psychological collapse
- **Avoid attrition warfare**
  - Win wars quickly at minimum cost to both sides
  - Cross the killing zone intact - speed, simultaneity
  - Protection derived from a shield of knowledge (our inheritance from Force XXI)
- **Dominant maneuver**
  - Dominant maneuver and precision engagement - restore the balance
  - Psychological collapse of enemy's will to resist
  - Unprecedented operational reach
  - Increased tempo

AAN CONCEPTS (Continued)

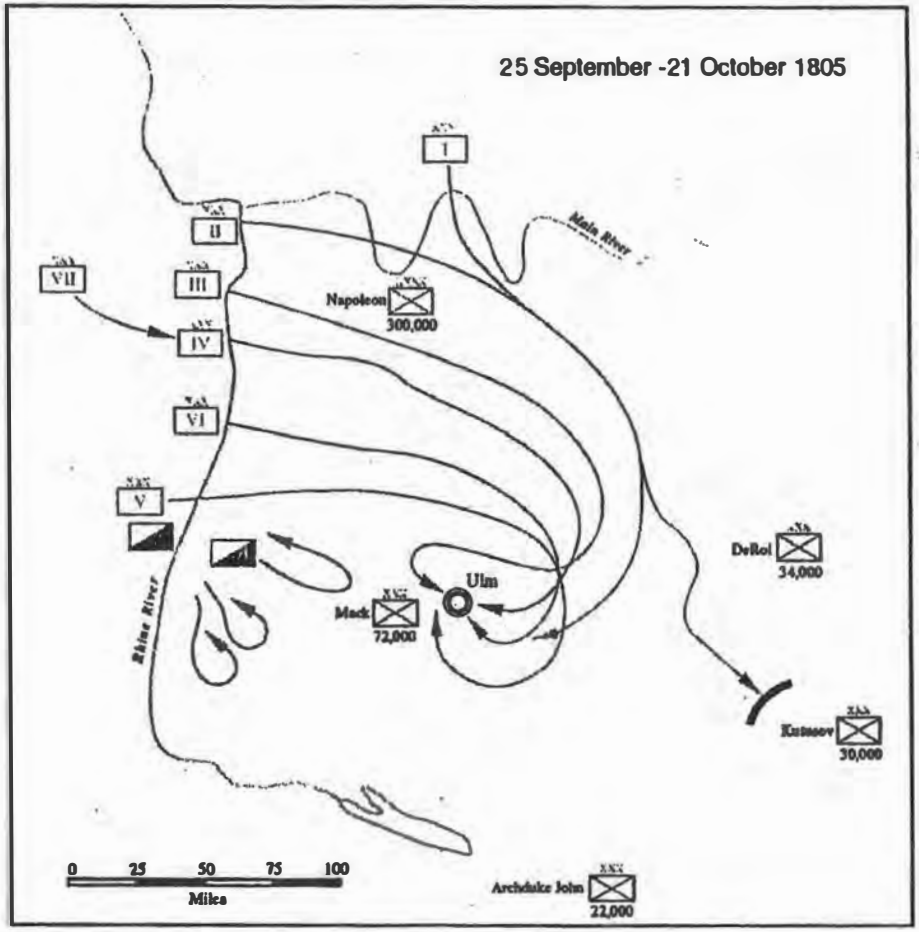
- **Protect and sustain in bare-based environment**
  - Sever (or shrink) the logistical umbilical cord – our technological long pole
- **Expansible**
  - Wars, not just battles
  - Quantity has a quality all its own – size counts
  - Long-term physical presence, staying power
  - Full-dimensional force – durable, flexible, versatile, decisive
  - Integrated with other services or complementary forces – key role across four concepts of JV 2010

Strategic Maneuver





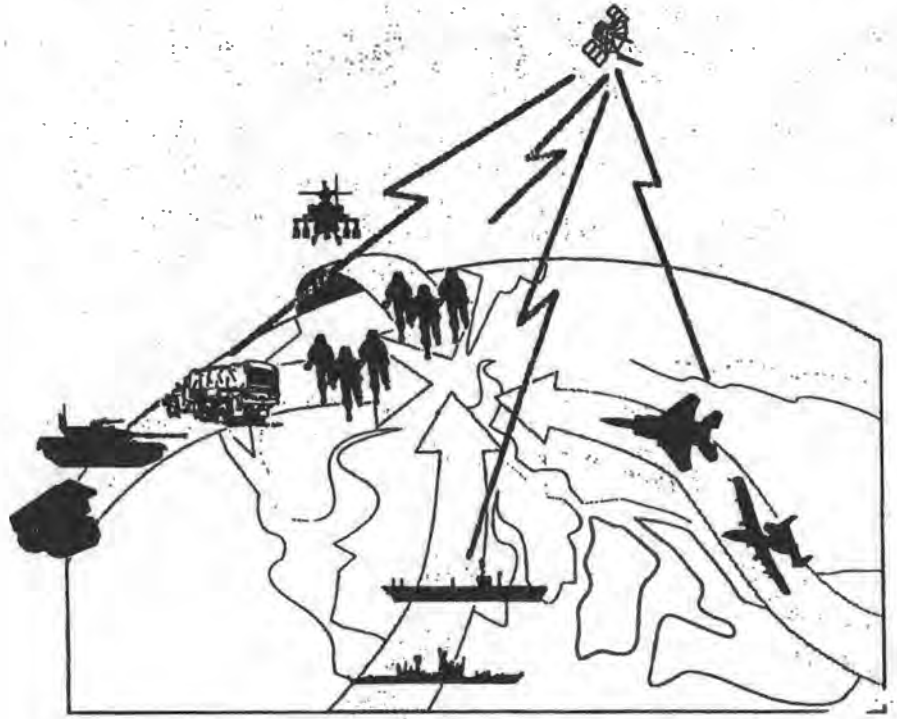
The Ulm Campaign Demonstrates the Demoralizing Power of Dominant Maneuver at the Strategic Level



- Projected from the French coast
- Maneuvered from points on the Rhine
- Austrians blinded, isolated and deceived by cavalry
- Enveloped from all directions by forces advancing along independent axes
- Inexorable advance, unprecedented pace
- Movements synchronized to achieve implosion of overwhelming combat power
- Austrians left with image of uncontestable competence and unstoppable force

- Issue: not victory versus defeat, but victory <u>when</u> and at <u>what cost</u>
- Result: Austrian's will to fight broken <u>before close combat commenced</u>

Global Strategic Maneuver: The Ulm Campaign circa 2025



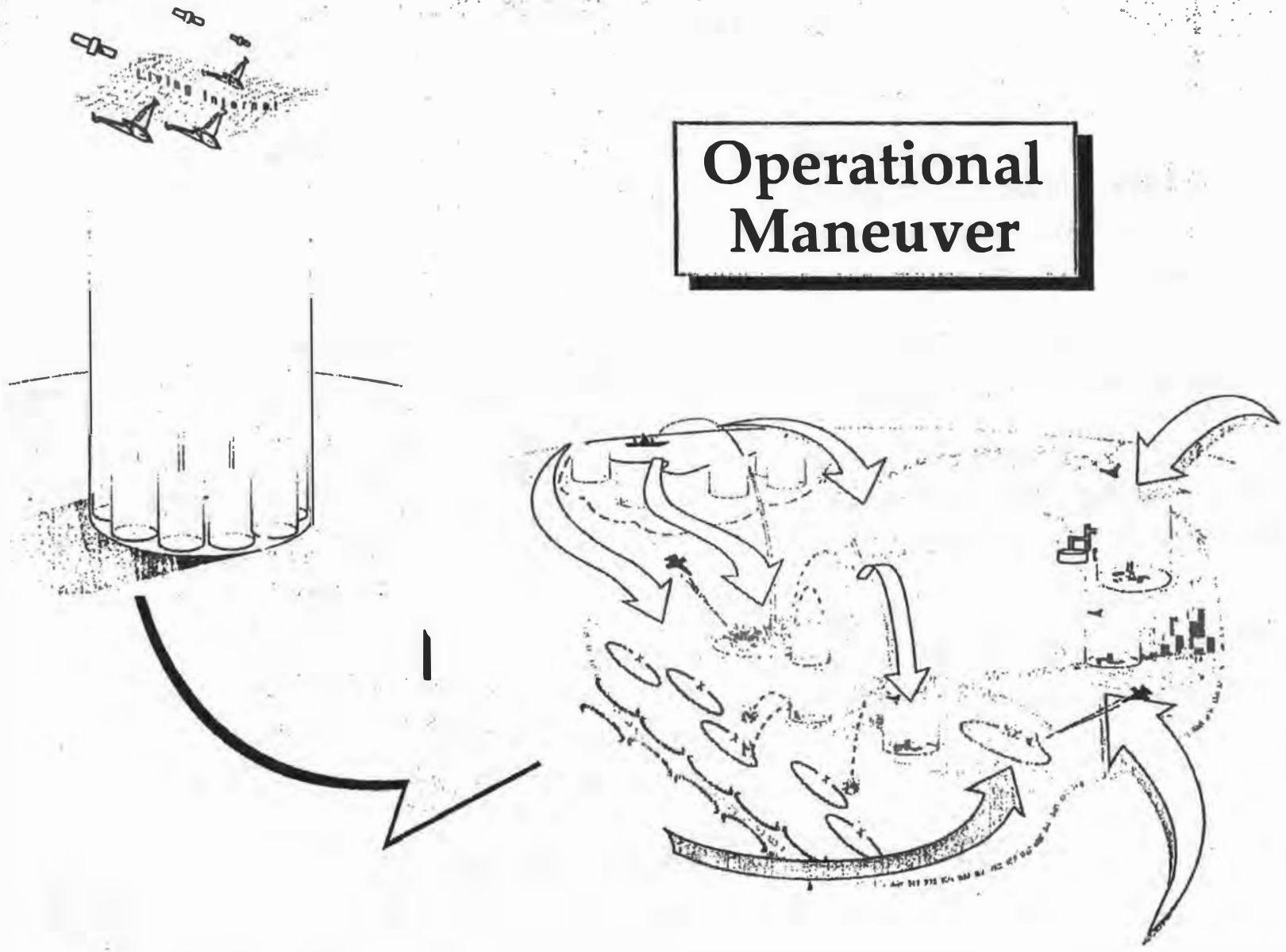
Seize Initiative,
Build Momentum . . .

- Power projection from all points on the globe converge and paralyze enemy
- Simultaneous convergence of overwhelming land, air, space, and sea forces
- Overseas presence quickens global maneuver
- Being "First with the Most" reduces risk and begins process of psychological domination

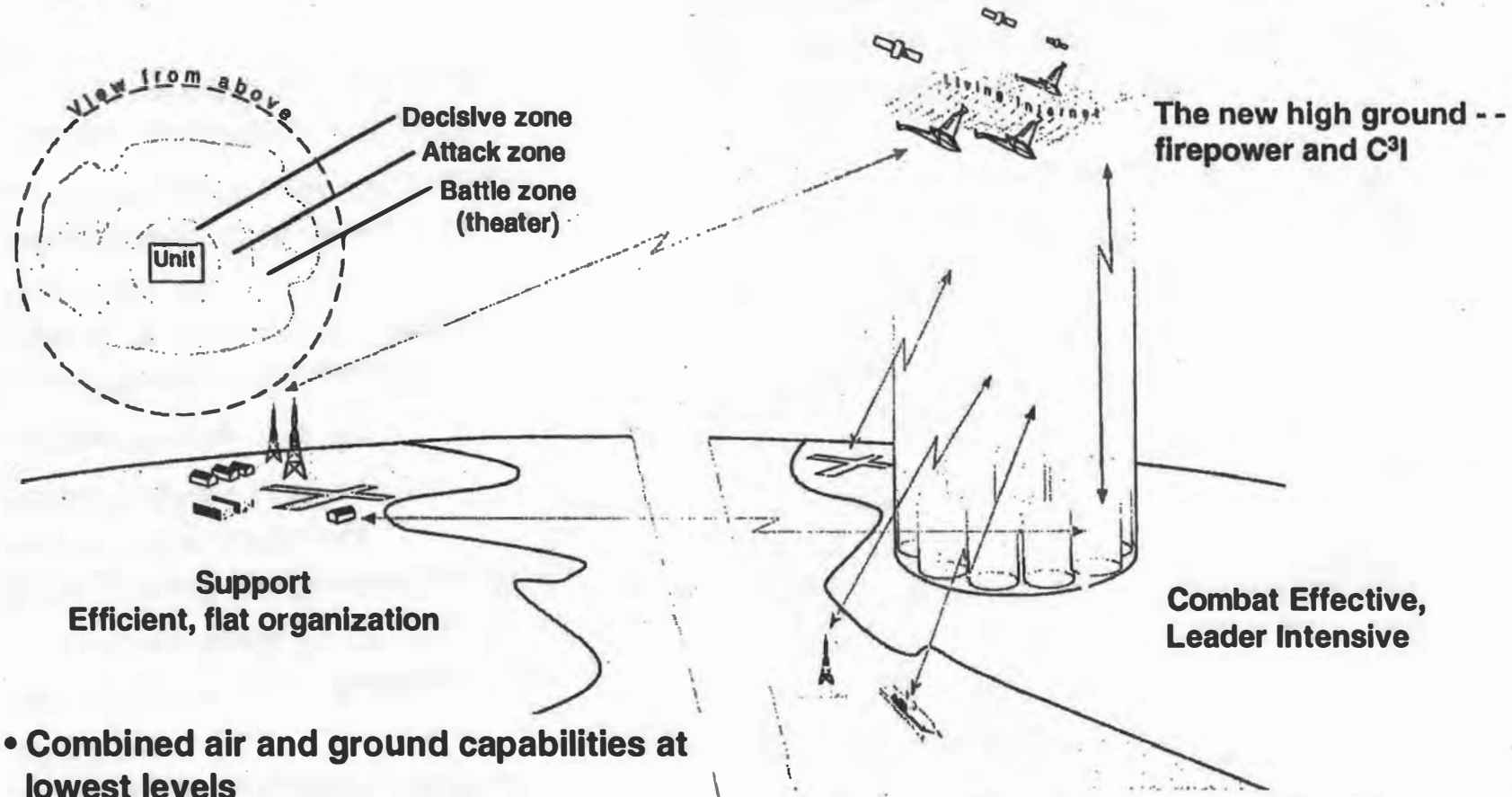
The Goal: A globally self-deployable force capable of striking directly at strategic and operational centers of gravity

Belcher

Operational Maneuver



OPERATIONAL CHARACTERISTICS of AAN (2025)

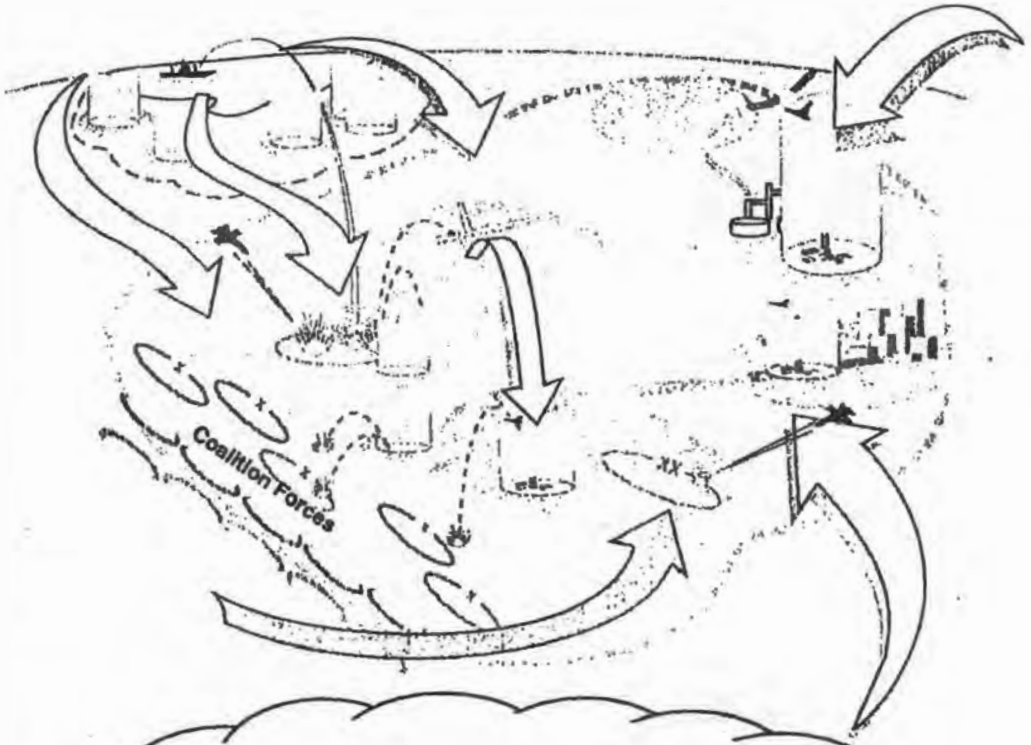


- Combined air and ground capabilities at lowest levels
- Independent operations for weeks
- All operating systems resident within battle force
- "Reach back" for combat functions (Fires, C^2, Logistics, Intel Fusion)

- Self-protection through movement, organic weapons, low-observables, and situational awareness
- Engage enemy with information, organic, and inorganic weapons

HOW LANDPOWER MIGHT BE APPLIED

- Operational offensive, tactical defensive
- Strikes directly at strategic and operational centers of gravity
- Speed, reach and overwhelming tempo = physical and psychological domination
- Merges heavy and light
- Establishes and assures control; long-term sustained staying power
- Hybrid force: mix of mature Force XXI units and AAN units
- Organic integration of air and ground capabilities at lowest level



Controls center of gravity.
Forces enemy to come to us and either fight and lose, or abstain and concede.

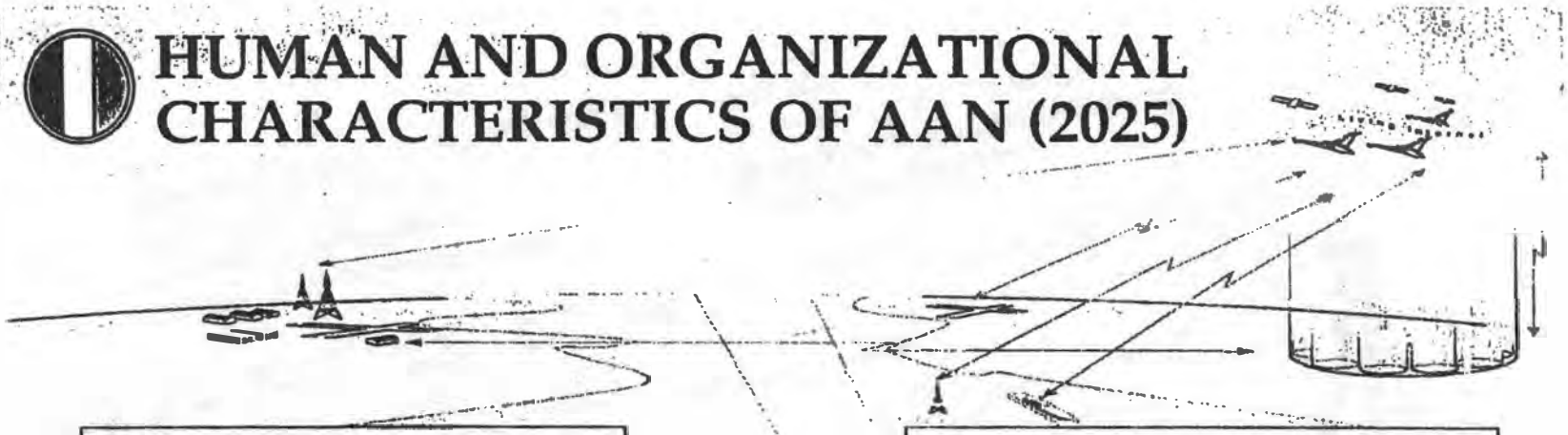
AAN ENABLING TECHNOLOGIES

- **Energy**
  - Motive
  - Propellant
  - Electrical
- **Communications**
  - "Internet"
- **UAV and satellites**
- **Ultra-fast lift**
- **Remote capabilities**
  - Vehicles, sensors, robotics

AAN Uniquely Suited to Exploit Full Range of Military and Civilian Research & Development

Capabilities/Requirements	Developmental Sources
• High Speed Strategic Lift	• DOD: DARPA, Other Services, Joint, DOD Programs
• Situational Awareness	• Industral Technologies: Information, Space, Civil Aviation, Transmodal Shipping, Simulation, and Training
• The "Living Internet"	• Subsidized Industry: CRAF, Merchant Marine, Intermodal Transportation
• Cellular Communications	• Other Government Agencies: National Labs, NRO, CIA, DOE, DOT
• The "Unblinking Eye"	• Army: R&D, Force XXI
• Tactical & Operational Fires	
• Speed: Strategic – Operational – Tactical	
• "Reachback" and Split-based Operations	

HUMAN AND ORGANIZATIONAL CHARACTERISTICS OF AAN (2025)



SUPPORT: Focus on Efficiency

Organizational imperatives and processes drawn from civilian/industrial sector

- Flat organizations
- Decentralized management
- Low leader-to-led ratio
- Direct producer-to-user distribution
- Relatively protected
- Individual specialization
- Just-in-time logistics
- Heavily civilianized/contracted force

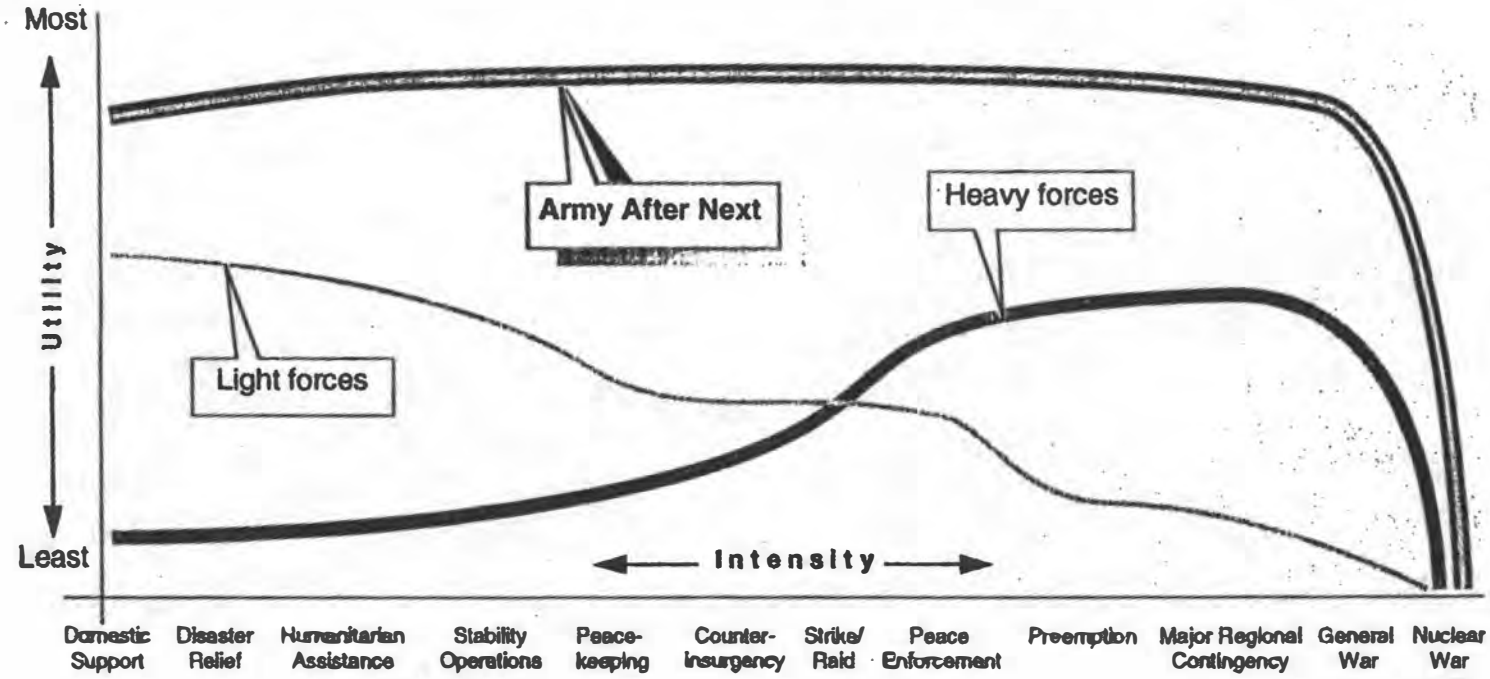
COMBAT: Focus on Effectiveness

Unique military organizations focused on extreme effectiveness and lethality

- Organizational principles
  - High leader-to-led ratio
  - Highly trained, Multi-skill soldiers
  - Accent on maturity and cohesion
  - Unprecedented unit integrity
- High tooth-to-tail ratio in deployed forces
- Systems designed to limits of human cognition
- Designed for continuous operations
- Reliant on mastery & application of information to achieve operational advantage

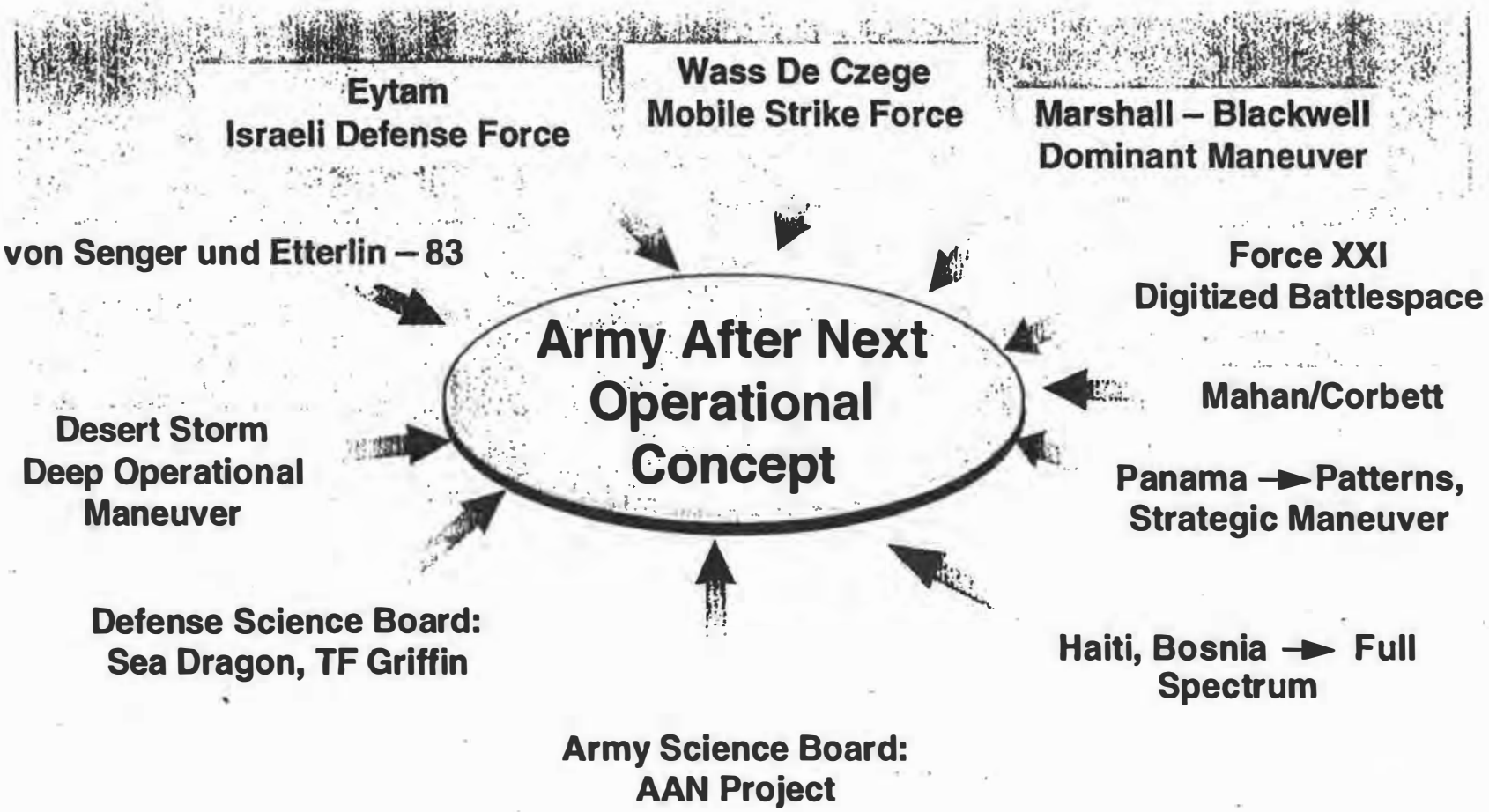
Requires revolutionary change to traditional personnel and management approaches

AAN . . . EFFECTIVE across the FULL SPECTRUM



- Rapid, global deployability
- Reduced logistical tail
- Tailorable, Versatile
- Suited to primative infrastructure
- Operationally mobile
- Melds Dominant Maneuver & Precision Engagement
- Expansible

INTELLECTUAL CONVERGENCE GIVES US CONFIDENCE THAT WE'RE ABOUT RIGHT



ANNEX G

The Navy and the RMA

THE NAVY AND THE REVOLUTION IN MILITARY AFFAIRS

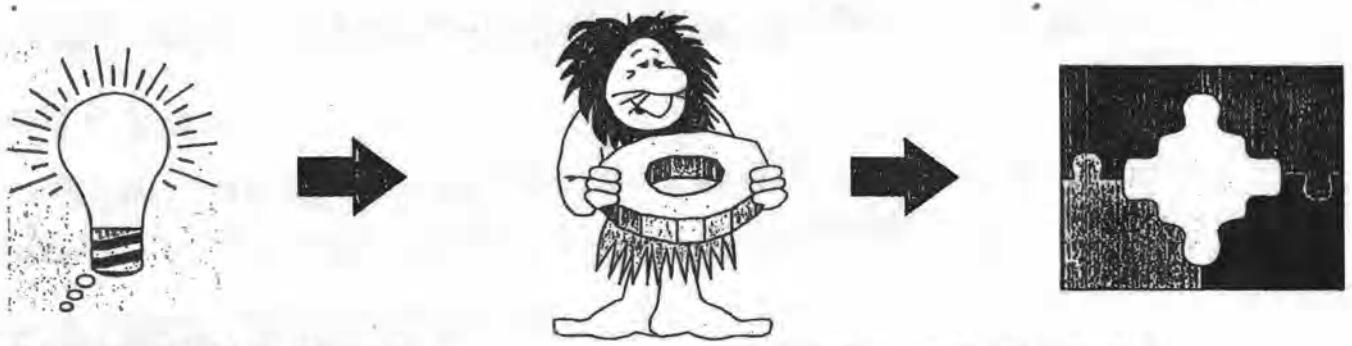
DIRECTOR, ASSESSMENT DIVISION (N81)

CHARACTERISTICS OF A REVOLUTION IN MILITARY AFFAIRS

- PROFOUNDLY CHANGES THE CONDUCT OF WAR
- GENERALLY INCORPORATES MANY NEW TECHNOLOGICAL DEVELOPMENTS RATHER THAN A SINGLE PROFOUND ONE
- MUST COMBINE TECHNOLOGIES WITH INNOVATIVE OPERATIONAL AND ORGANIZATIONAL CONCEPTS
- CATALYZED BY OPERATIONAL CHALLENGES
- MOST INNOVATIONS APPEAR EVOLUTIONARY
- RECOGNIZED AFTER IT HAS OCCURRED

A 20TH CENTURY HISTORY OF MAJOR NAVY INNOVATIONS

IDEA **INNOVATOR** **RMA**



INNOVATOR	INNOVATION
WILLIAM MOFFETT	CARRIER AVIATION
HYMAN RICKOVER	NUCLEAR PROPULSION
BILL RABORN	POLARIS
WAYNE MEYER	AEGIS
WALT LOCKE	CRUISE MISSILES
BILL OWENS	C4ISR CONNECTIVITY
ROD REMPT	TBMD

SOME CURRENT NAVY INNOVATIONS

- "SENSOR-TO-SHOOTER" C4ISR
- COOPERATIVE ENGAGEMENT CAPABILITY (CEC)
  - Mountain Top Demonstration
- THEATER MISSILE DEFENSE (TMD)
  - Ballistic Missile, Cruise Missile
- NAVAL FIRES INITIATIVES
  - Longer ranges, brilliant submunitions, accuracy independent of range, penetrating weapons
- ARSENAL SHIP
- MODULAR SHIP/SUBMARINE/AIRCRAFT DESIGN

APPROACHES TO INNOVATION

CENTRALIZED

- Best for a single overarching strategic problem
- Requires a defined desired "end state" from the start
- Top down innovation effort
- Potential "Out-of-Box" innovations can be discouraged
- Enables focused resource allocation
- Risks being wrong

DECENTRALIZED

- Best for an ambiguous strategic environment
- Not directed toward a specific "end state"
- Diverse efforts addressing future operational challenges
- Innovation comes from varying directions
- Hedges for uncertainty

SOME NAVY INNOVATION ACTIVITIES

- NAVAL STUDIES BOARD (NSB)
- NAVAL RESEARCH ADVISORY COUNCIL (NRAC)
- NAVAL POSTGRADUATE SCHOOL (NPS)
- NAVAL WAR COLLEGE
- CNO'S STRATEGIC STUDIES GROUP (SSG)
- CNO'S EXECUTIVE PANEL (CEP)
- OFFICE OF NAVAL RESEARCH (ONR)
- WARFARE CENTERS
- DIRECTOR, TEST AND EVALUATION AND TECHNOLOGY REQ (N091)
- NAVAL DOCTRINE COMMAND
- NAVY CINC SCIENCE ADVISORS
- WARGAMES
  - TECHNOLOGY INITIATIVES GAME (TIG - ANNUAL)
  - MARITIME RMA WARGAMES
  - STRATEGIC CONCEPTS WARGAMES
- "FUTURIST" BRIEFINGS TO RESOURCES AND REQUIREMENTS REVIEW BOARD (R3B)
- ADVANCED TECHNOLOGY DEMONSTRATIONS (ATD)
- NAVAL TECHNOLOGY INSERTION PROGRAM (NTIP)
- S&T AFFORDABILITY PROGRAM
- AT SEA BATTLE LAB

CNO EXECUTIVE PANEL

- **DISTINGUISHED CIVILIANS WHO EXPLORE LONG-RANGE VISION AND NAVAL STRATEGY ISSUES REQUESTED BY CNO**
- **RECENTLY COMPLETED A TASK FORCE ON "NAVAL WARFARE INNOVATIONS"**

  CONCLUSIONS INCLUDE THAT NAVY

  - **Without peer today, but asymmetric challenges, spread of technology, and affordability are significant future issues**
  - **Dominance over the longer term will require major innovations in the conduct of naval operations**
  - **Has many very good innovation efforts today, but needs better process for rapid generation and experimental testing of innovative concepts**

STRATEGIC STUDIES GROUP (SSG) "NAVY CENTER FOR INNOVATION"

FOSTER NAVY-WIDE CULTURE IN INNOVATION AND DEVELOP WARFIGHTING BREAKTHROUGH FOR THE FUTURE

- **IDENTIFY FUTURE WARFARE CHALLENGES**
- **EXPLORE INNOVATIONS IN NAVAL WARFIGHTING**
- **DEVELOP WARFIGHTING CONCEPTS**
- **UNDERPIN THESE CONCEPTS WITH TECHNOLOGIES**
- **ESTABLISH CRITERIA TO EVALUATE THESE CONCEPTS IN OPERATIONAL EXPERIMENTS**
- **RECOMMEND ACTIONS DIRECTLY TO THE CNO**

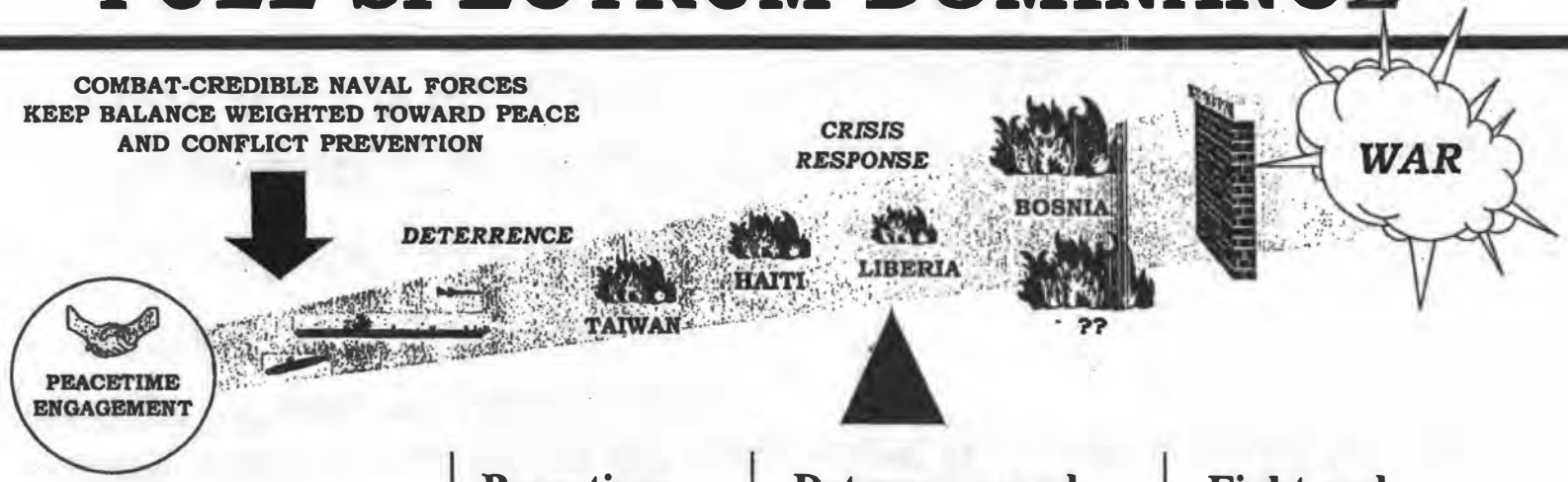
WARGAMES

- **"RAINBOW SERIES" OF 118 GAMES DEVELOPED CARRIER AND AMPHIBIOUS WARFARE CONCEPTS USED IN WWII**
- **"GLOBAL" AND OTHER WAR GAMES OF 70's, 80's, AND 90's DEVELOPED THE NAVY'S COMPOSITE WARFARE CONCEPT (CWC) WHICH LED TO THE FIRST STEPS OF CEC AND TBMD**
- **NAVY HAS CONDUCTED 18 WAR GAMES FOCUSED ON THE RMA IN THE PAST THREE YEARS**
  - **6 Strategic Concepts, 3 Navy Organizational and Operational, 3 Maritime Games, 3 Future Navy Games, 3 Technological Initiatives Games (TIG)**
  - **Focus Navy innovation efforts**
  - **Develop Operational and Organizational Concepts**

AT SEA BATTLE LAB

- **GOAL: DOVETAIL TECHNOLOGICAL ADVANCES AND INNOVATIVE OPERATIONAL CONCEPTS WITH REAL WORLD TRAINING AND SIMULATION**
- **CONTINUOUS REAL-WORLD DEMONSTRATIONS OF TECHNOLOGICAL AND OPERATIONAL INNOVATIONS**
- **RECENT EVENTS: GLOBAL BROADCAST SERVICE, CEC "MOUNTAIN TOP", AEGIS TBM TRACKING, AIRBORNE LASER MINE DETECTION, SSN CONTROL OF UAV**
- **FUTURE EVENTS: CJTF/JFACC AFLOAT, JMCIS AIRBORNE SURVEILLANCE, ARMED HELOS ON CVBGs, IW MISSION PLANNING, ANALYSIS AND C2 TARGETING (IMPACTS)**
  - **FEB 97 C4ISR/Arsenal Ship (3rd Fleet)**
  - **AUG 97 NSFS Improvements/TBMD (2nd Fleet)**
  - **SPRING 98 MPF/MIW Improvements (6th Fleet)**
  - **FALL 98 Sub-Arsenal Ship/Aerostats (3rd Fleet)**

THE MILITARY'S GOAL
FULL SPECTRUM DOMINANCE



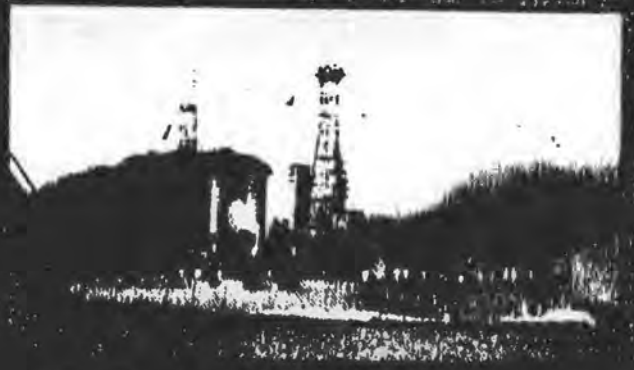
	Peacetime Engagement	Deterrence and Crisis Prevention	Fight and Win
Information Superiority	✓	✓	✓
Dominant Maneuver	✓	✓	✓
Precision Engagement	✓	✓	✓
Full Dimensional Protection	✓	✓	✓
Focused Logistics	✓	✓	✓

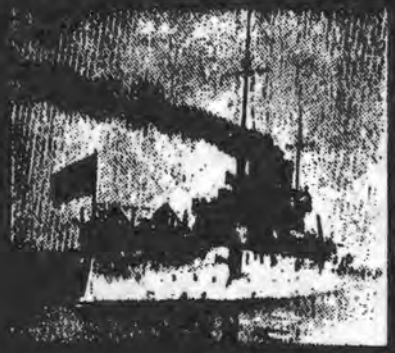
CHALLENGES TO INNOVATION

- **CURRENT OPERATIONAL TEMPO**
  - **Must exploit opportunities during exercises, deployment workups and during real-world operations**
- **RESOURCE CONSTRAINTS**
  - **Limited resources for experimentation, demonstration and prototyping**
  - **Escalating support and infrastructure costs may inhibit modernization plans**
  - **Many funding sources already used for modernization or recapitalization initiatives:**
    - **» BRAC implementation**
    - **» Completion of BUR Force Structure reductions**
    - **» Regionalization of maintenance and installation mgmt**
    - **» Increased Privatization / Outsourcing**

EVOLUTION OF NAVAL FORCES

19th Century





20th Century

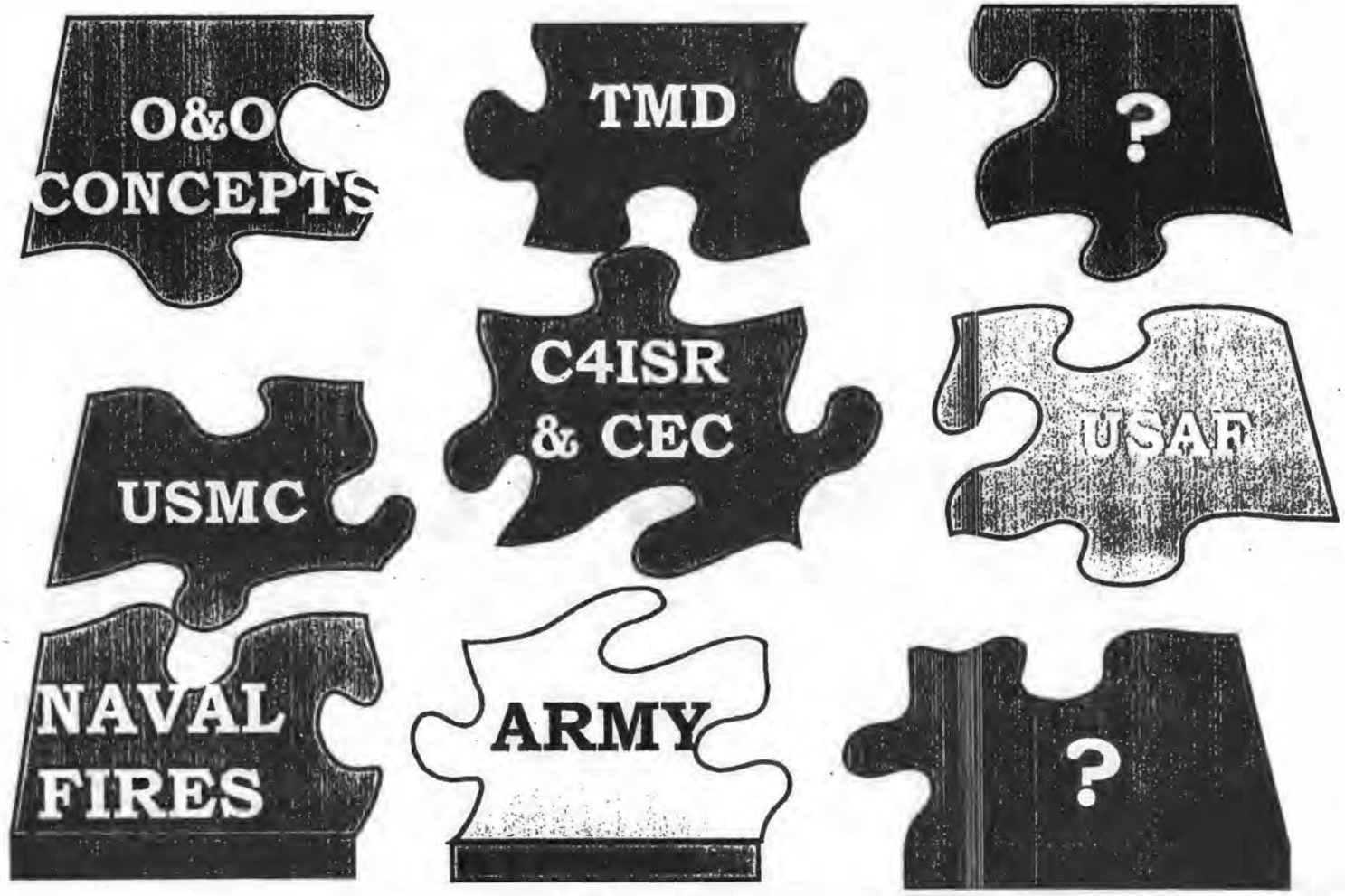
21st Century ?

THE OPPORTUNITY AND CHALLENGE

"We are in a revolution of no less importance than the advent of steam propulsion, carrier aviation, or nuclear submarines. The so-called revolution in military affairs has moved information and the need for information dominance to center stage in thinking about warfare."

- **CNO - AUTUMN '95 *JOINT FORCE QUARTERLY* "LEADING THE REVOLUTION IN C4I"**

THE RMA PUZZLE



SUMMARY

THE NAVY IS INNOVATING!

ANNEX H

Air Force—RMA Perspectives

OSD/NA Airlie Workshop
12-13 November 1996

"Air Force - RMA Perspectives"

Major General Donald Peterson
HQ USAF Director of Plans

RMA DEFINITION

"A REVOLUTION IN MILITARY AFFAIRS (RMA) … INVOLVES THE SYNERGISTIC INCORPORATION OF ***NEW TECHNOLOGIES IN MILITARY SYSTEMS***, ***INNOVATIVE OPERATIONAL CONCEPTS***, AND ***ORGANIZATIONAL ADAPTATION*** WITHIN THE ARMED FORCES THAT ***FUNDAMENTALLY ALTER THE CHARACTER AND CONDUCT*** OF MILITARY OPERATIONS."

DR. JOHN DEUTCH

RMA Cornerstones

SYNERGISTIC FUSION:

- Technology
- Organization Agility
- Operational Concepts

Technology

- PGMs
- Stealth
- C4ISR
- ABL
- What's next: "Hyper-tech breakthrough?"

PGMs and the RMA

Conflict	Bombs Required*	CEP
WW II	9070	3300’
Korea/Vietnam	176	400’
DESERT STORM	4	< 10’
Operation “20XX”	1	< 10’ (All Wx)

* Pk = 0.90/2000 lb/Target Size: 60’ x 100’

Stealth and the RMA

- B-2; F-117; F-22; UAVs
- Negates adversaries' defenses
- Enables early attacks prior to US air superiority
- Dictate Optempo/Seize initiative/Surprise

C4ISR and the RMA

"Piercing the Fog of War"

- JSTARS
- AWACS
- SATELLITES

[redacted]

Post-WW II Air and Space
Revolutionary Innovations

- Atomic Bomb
- Satellite
- Jet Engine Technology
- Stealth
- Microchip
- ***Airborne Laser***: '50's Sci Fi; reality in '90s

Airborne Laser

- "Speed of light" kills
- Counters the WMD threat -- over his head
- Takes on "SCUD hunting"
- Cost per shot: only $1K

Organizational Agility

- AF Innovative Approaches
- Acquisition Reform
- Responsive Logistics
- Air Force Agility
  - Information Superiority
  - Visionary Ethos
- CORONA FALL '96
  - Battle Labs Concept

Innovative Approaches

Breaking down barriers: DoD and Com'l

- Dual-Use Infrastructure/Technologies
  - EELV/Space Launches
  - Leverages Int'l Competitiveness
- "Privatization in Place"
  - Depot Mx: Newark (NJ); Kelly AFB (TX); McClellan AFB (CA)
- JPATS and Joint Training

Acquisition Streamline
"Lightning Bolt Initiatives"

- Paperwork/Rules Reduction
  - JDAM success story: $40K to $18K unit cost
- MILSPECS: Smarter, Leaner
  - Titan ruled by 104; EELV requires Zero
  - SBIRs: costs reduced by $300M; accelerated 1st launch from 2004 to 2002

Responsive Logistics

- "Lean & Mean"
- Just-in-time at operational level
- Minimize in-theater footprint, CONUS-Theater tail
- Effective sustainment of AEF

[redacted]

Information Superiority

- Newly Recognized AF Core Competency
- Incorporating into AF Doctrine
- "Cornerstones of Information Warfare"
- Activated 1st IW Sq (Shaw AFB, SC)
- UAV Sq Stand-up (Nellis AFB, NV)
- On Deck: E-8/ "Joint Stars" Sqdn

Visionary Ethos (1)

- CSAF/LR effort
  - Long Range Vision/Plan
  - 3-star BOD Corporate Buy-in
- Air University "2025" Project
- AF Scientific Advisory Board
  - "New World Vistas"

Visionary Ethos (2)

- RAND: "Shaping the Role of Air Power"
- "CORONA Fall" Issue Papers
- Air Force Vision
- Air Force Long Range Plan -- Backcast

CORONA FALL '96
Battle Lab Initiative

- AF Command & Control
- AF Information Warfare
- Unmanned Air Vehicle (UAVs)
- Air Expeditionary Force (AEF)
- Space
- Force Protection -- "Post-CORONA Add"

Operational Concepts

- "Sensor-to-Shooter"
- AEF: Tailored Force Packages
- "Systems of Systems"
  - C4ISR/IW challenge:
    - Process "Data" --> timely, relevant "Info" to "Warfighter"

Fusion of RMA Cornerstones
"Bringing it all together"

- Goal: Air Superiority
  - Operational Advantage accrues to all forces, throughout the theater of operations
  - Coveted, Incalculable Force Multiplier
- Case Study: DESERT STORM

$$(\text{Stealth} \times \text{PGM})^{\text{C4ISR}} =$$

Revolutionary Operational Concept

Air Power Operational Concept

- (PGMs x Stealth) ^{C4ISR} = Revolutionary Conops
- Thousands of Years of Serial Warfare : "RIP"
- *"Era of Parallel Warfare"*
  - How to exploit to give US "permanent" (generational) advantage?
  - Better yet, how to take to next level?

[redacted]

Joint Vision 2010

- Prior to JV 2010: Salient Strengths of US Armed Forces
  - Balance of Specialization
  - Integration of Execution
- Separate Service Visions can result in redundancies, conflicts, and gaps in capabilities
- JV 2010 Roadmap to Joint Operations

AF Core Competencies

- Air & Space Superiority
- Global Attack
- Rapid Global Mobility
- Precision Engagement
- Information Superiority
- Agile Combat Generation

Value of Human Capital

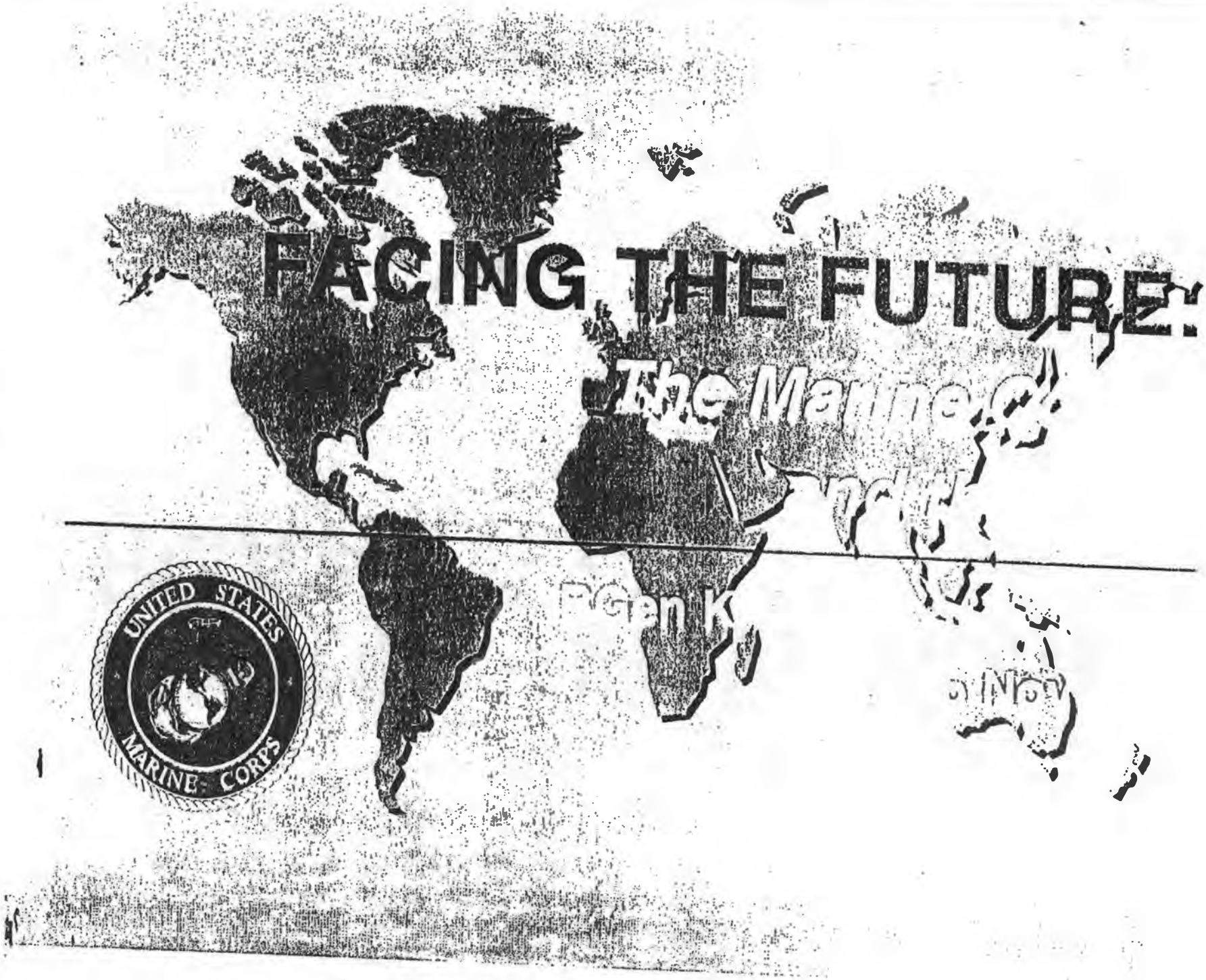
- "Year of Training" (1992)
- Air & Space Basic School
- Inclusion of Civilian Force
- Mission Ready Training
- Modeling & Simulation

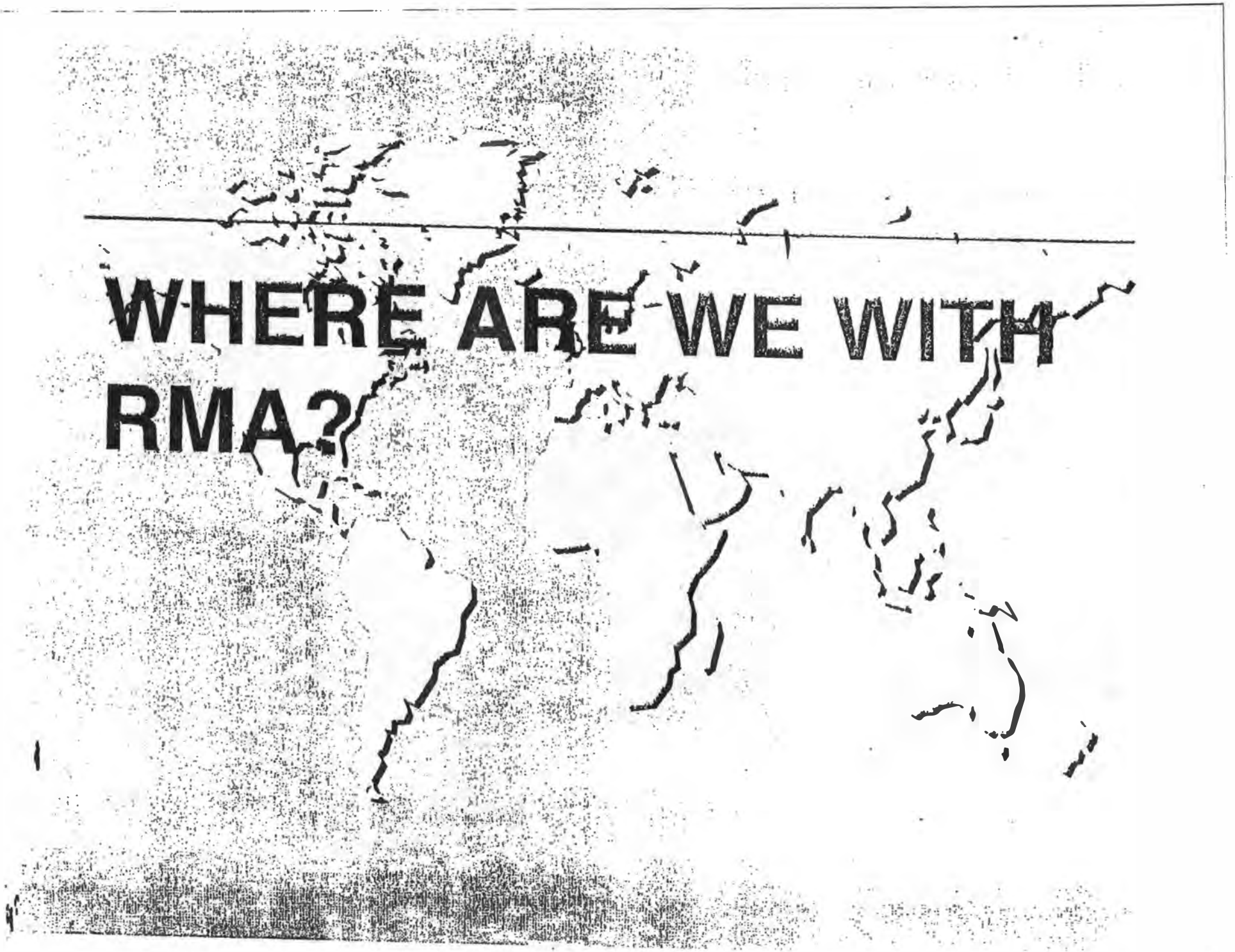
RMA Observations

- We started *before* DESERT STORM
- DESERT STORM: AF successfully leveraged technologies around periphery of an RMA
- RMA complicated by vividness of rapid technological changes
- Leverage trends: "anticipate & execute"
  - Primary Focus: Conops, Organizational Agility

ANNEX I

Facing the Future: The Marine Corps and the RMA

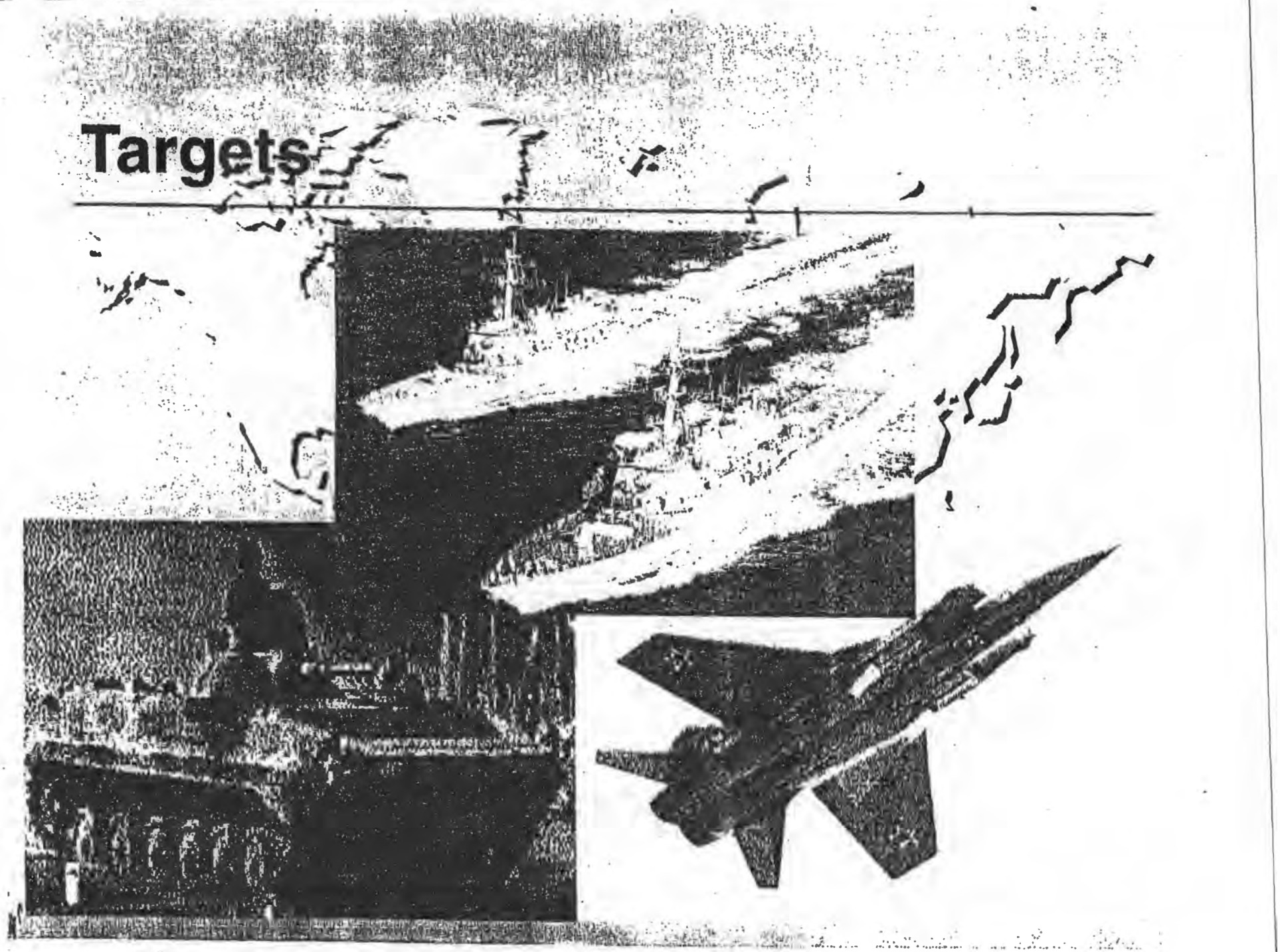

FACING THE FUTURE:
The Marine Corps
UNITED STATES
MARINE CORPS


WHERE ARE WE WITH
RMA?

RMA Terminology

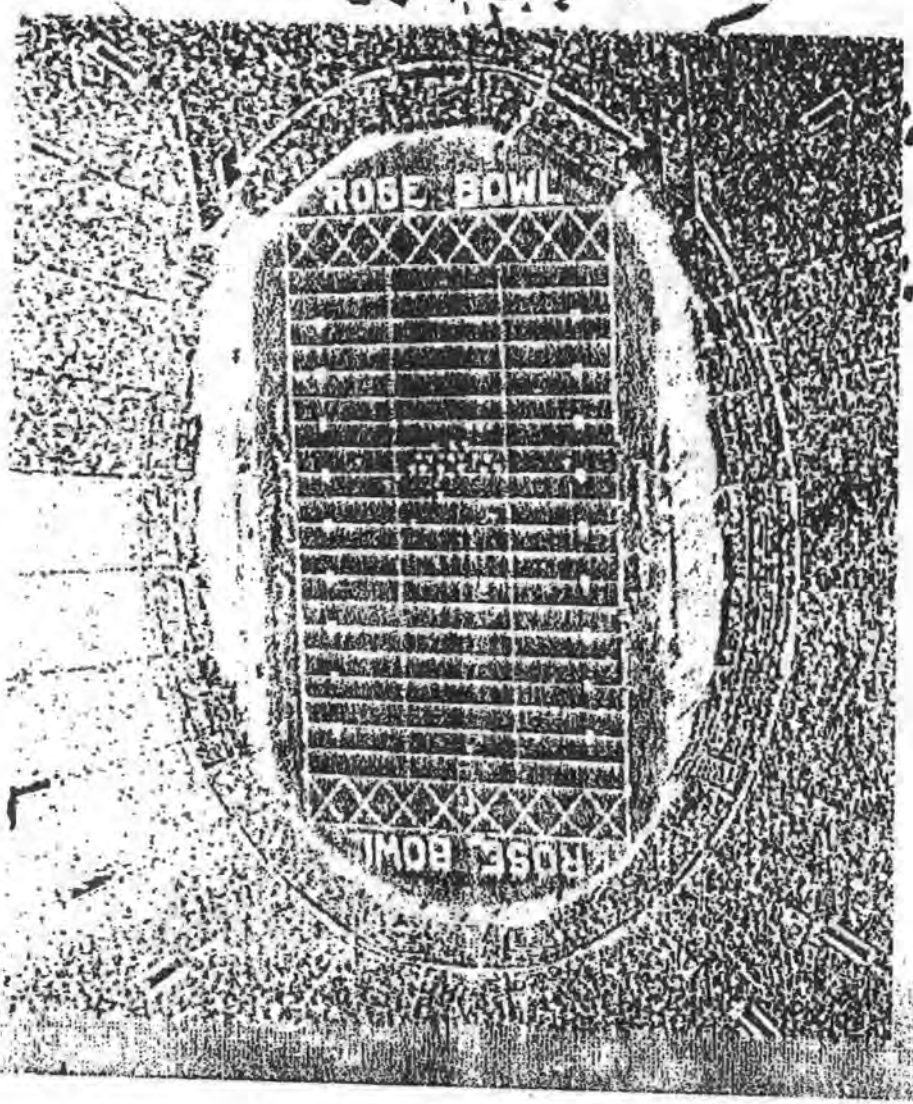
- Targets
- Competitors
- Systems
- Precision
- Knowledge

Targets



Targets

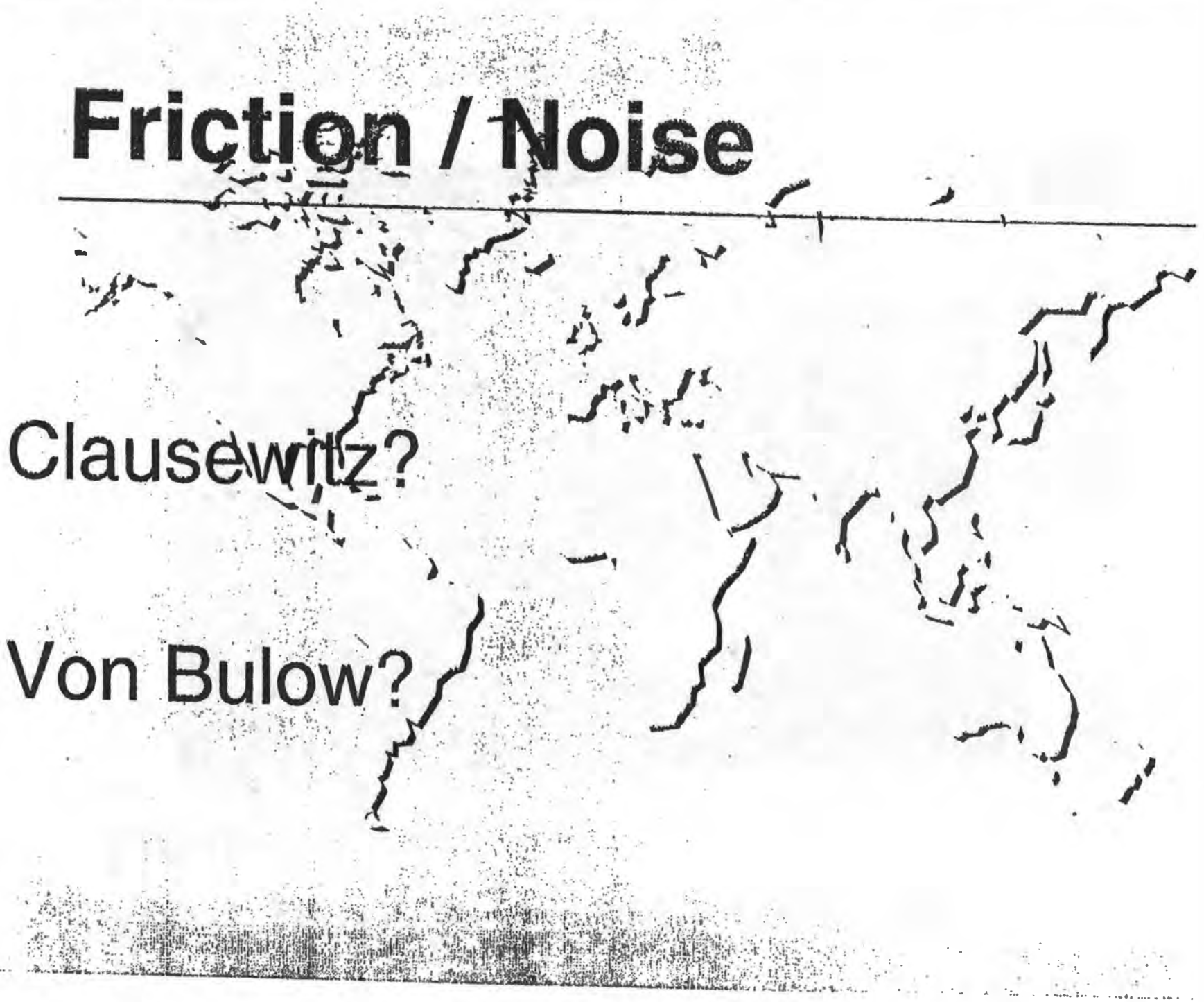
The American Approach: Competitors



- Rules
- Players
- Spectators
- Referees
- Boundaries
- Defined Goals and time
- Penalties for infractions

Awareness/Knowledge vs. Understanding

Friction / Noise



Clausewitz?

Von Bulow?

Patterns

Infiltration — Tactical OBJ — Stealth

Blitzkreig — Operational OBJ — Force

Embedded w/in Infrastructure (Distributed) — Strategic OBJ — Stealth

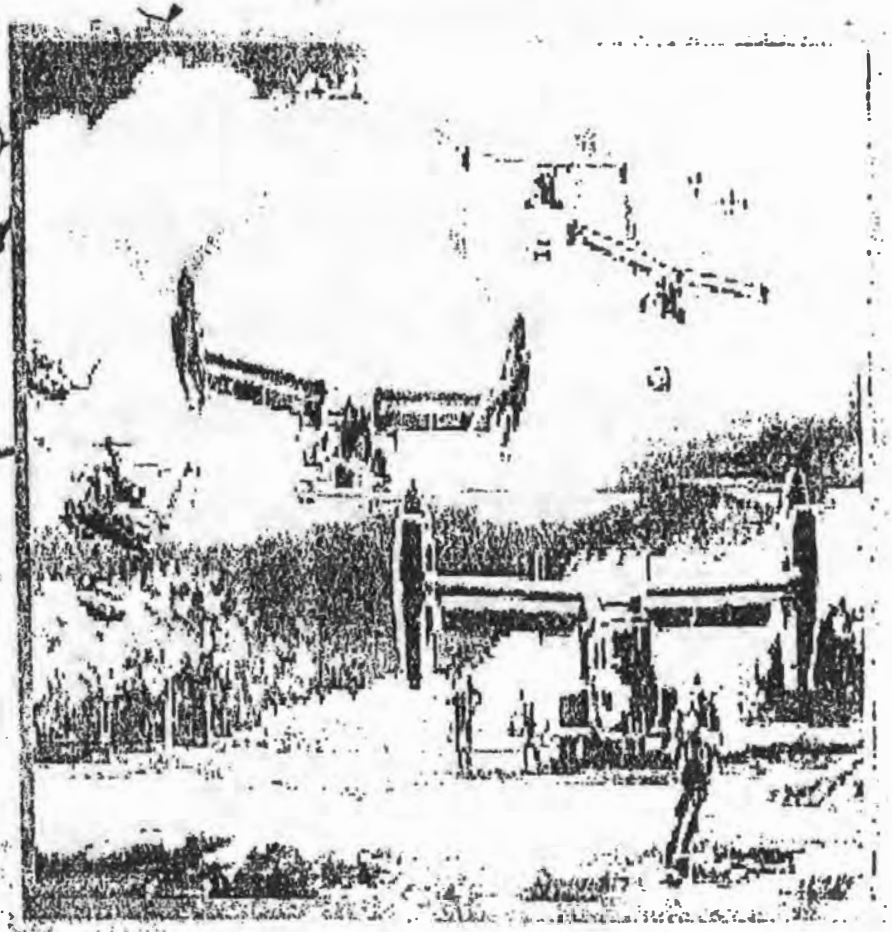
The Strategic Problem Misread?

Mars Meets Uncertainty

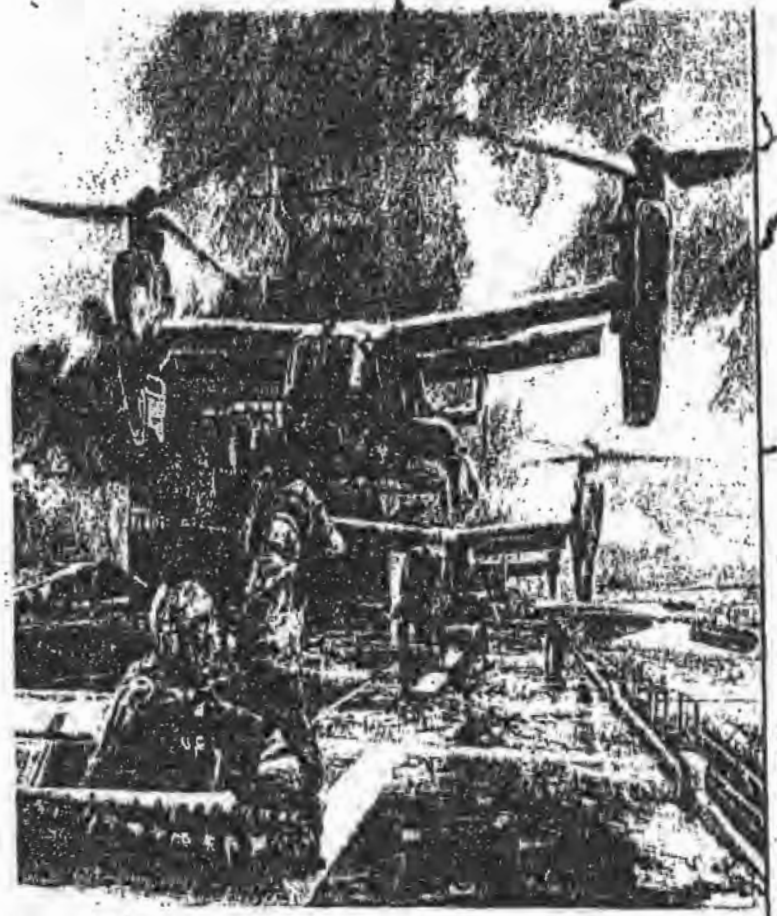
Case Study	Assumed Primacy	Strategic Reality
Civil War	Offense	Defense
WW I	Offense	Defense
French before WWII	Defense	Offense
RMA	Offense	?

The Marine Corps:A History of Innovation

- Close Air Support
- Amphibious doctrine
- Small Wars Manual
- Helicopter
- Combined Action Platoons
- VSTOL Aviation
- Maritime Prepositioning
- MEU(SOC)
- Tilt-rotor Technology



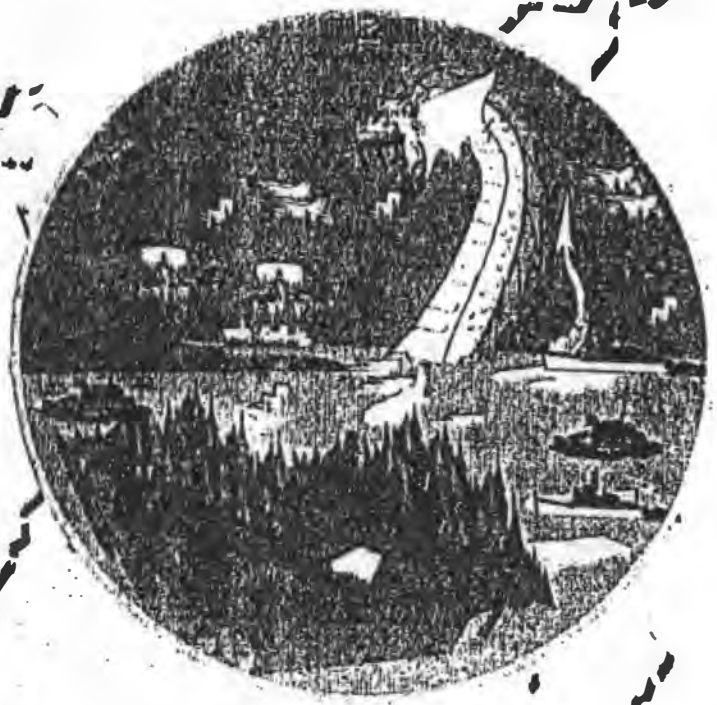
Continuing the Tradition:
"Casting a Wide Net"



- Training & Education
- RMA Wargaming
- Chem-Bio Incident Response Force
- Non-Lethal Technologies
- New Sciences
- Genetic Algorithms
- CMC Warfighting Lab

Commandant's Warfighting Lab

- Engine of change
- Energizes combat development process
- Exploring a wide range of concepts:
  - Future tactics
  - Maximizing human potential
  - Flattened C2
  - Urban warfare
  - Responsive fires



Current RMA Activities

Hunter Warrior

- Digitization of the battlefield
- Extension of Naval battlefield
- Operations in non-contiguous battlefields
- Small unit operations
- Employment of digitized / robust C4I
- Linking overhead sensors to tactical commander

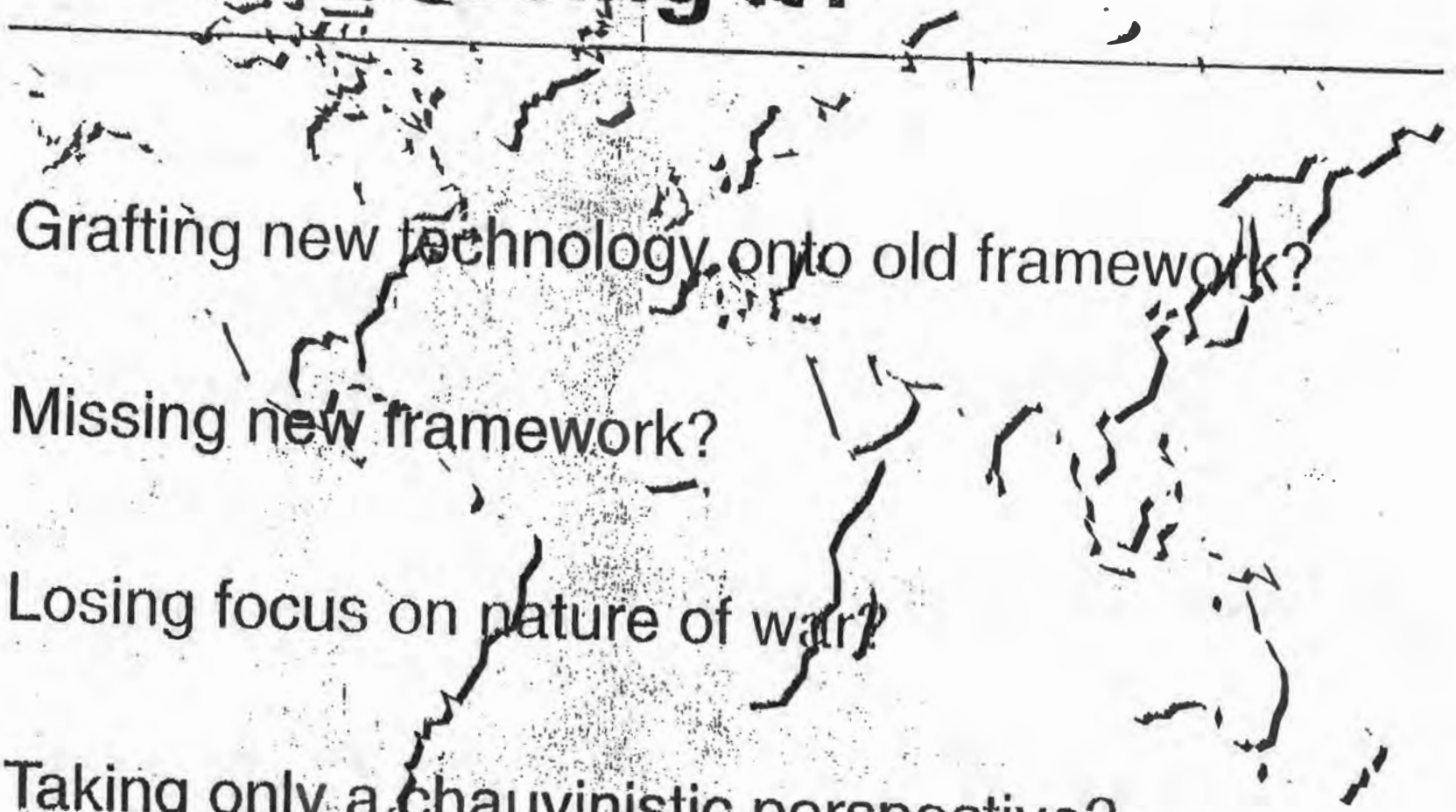
Projected RMA Activities

Extension of the Naval Expeditionary Littoral

Urban Warrior

- Application of C4I
- Development of alternative to GPS
- Leverage technology with regard to:
  - Organization
  - Doctrine
  - Equipment

The RMA is real, but could we be missing it?



Grafting new technology onto old framework?

Missing new framework?

Losing focus on nature of war?

Taking only a chauvinistic perspective?

Some Questions...

Strategy

What are desired ends?

Why use force?

What means of force will be most effective in obtaining desired ends?

Where we need to go next

- Greatest concern: Blind spots!!!
  - Need Red Team to assess U.S. vulnerabilities
  - Assess potential opponent RMA applications
- Who benefits most in RMA?
  - U.S.: Evolving industrial-era weapons
  - Adversaries: Employing COTS capabilities
- Think hard about metaphors
  - Limited by unconscious images

Where we need to go next (cont.)

- Cultivating innovation
  - Protect orphans
  - Sponsor innovators
- Invest in insight and wisdom
  - Need to develop real understanding of other cultures
  - Avoid chauvinism
- Preventive Defense
  - Explore how RMA can contribute

Cultivating Innovation