INFORMATION WARFARE

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A Strategy for Peace...
The Decisive Edge in War

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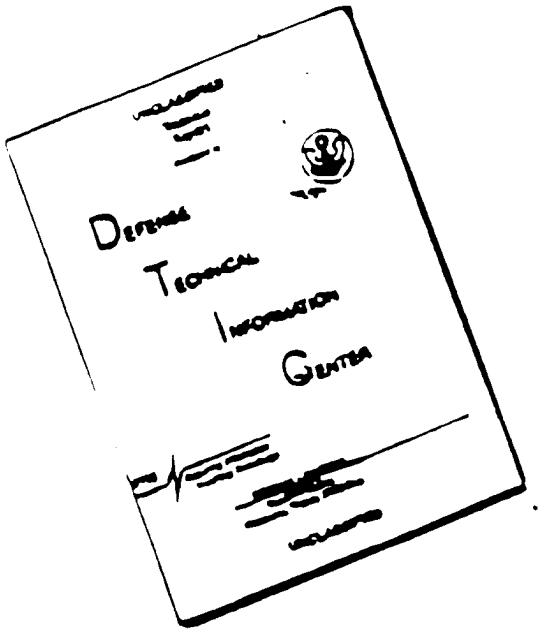

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"This brochure marks yet another aspect of the tremendous progress being made in Information Warfare (IW). Over the past two years, we have made great strides in raising awareness within DOD, the rest of Government, and industry. With that has come a conviction to act, and within the Joint Staff, we have formulated an IW implementation strategy designed to translate vision into practical processes and capabilities supporting joint warfighting.

We developed this brochure to outline basic IW concepts and summarize ongoing initiatives implementing those concepts.

Your continued support is needed to develop and support these initiatives and those yet on the horizon."

PETER PACE
Lieutenant General, USMC
Director for Operations

ARTHUR K. CEBROWSKI
Vice Admiral, USN
Director for C4 Systems

From the Chairman

Information Warfare (IW) has emerged as a key joint warfighting mission area. The explosive proliferation of information-based technology significantly impacts warfighting across all phases, the range of military operations, and all levels of war.

Our reliance on technology creates dependency and vulnerabilities throughout our global basing and information support networks and generates requirements for defensive IW capabilities. However, the same technologies also create vulnerabilities for our adversaries that can be exploited using offensive IW capabilities. When fully developed and integrated, IW offers enormous potential to support our warfighters.

A comprehensive IW approach is essential to ensure warfighters have the tools to exploit adversary vulnerabilities while ensuring full access to timely, accurate, and relevant information wherever and whenever needed. The Joint Staff developed an IW vision and strategy to address our most urgent needs. The concepts outlined in this brochure provide a common framework to guide our continuing and expanding efforts in this vital mission area.

JOHN M. SHALIKASHVILI
Chairman
of the Joint Chiefs of Staff

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The Compelling Need

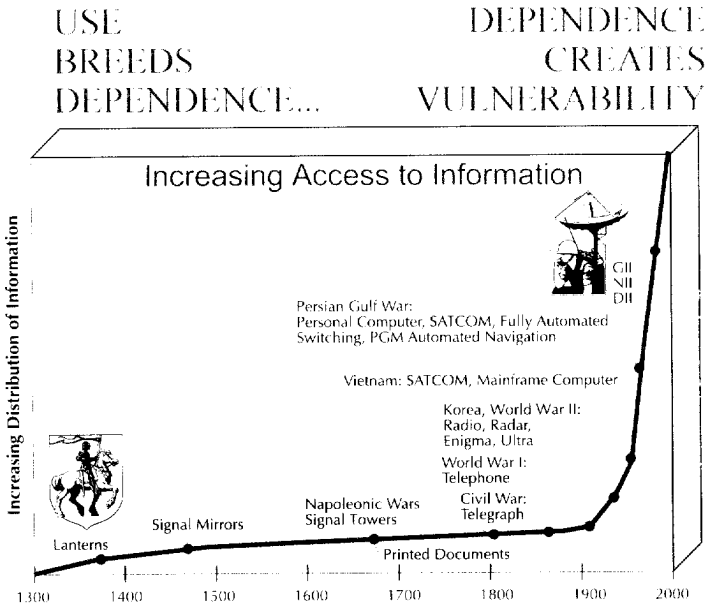
Relevance to the Warfighter

Some **potential adversaries are rapidly exploiting information and information system technologies** such as telecommunications, automated data processing, sophisticated decision aids, remote sensors, and other related systems. The spectrum of applied technologies ranges from established radio frequency, microwave, satellite, coaxial, and fiber optic transmission systems to new generations of digital and advanced personal communications systems. The availability and relatively low cost of these technologies in global markets increase the likelihood that they will be employed by potential adversaries in advanced command and control (C2) and information systems, as components of advanced weapon systems, and as offensive IW capabilities. National-level infrastructures, including economic, industrial, and transportation systems that support national and military warfighting objectives, are also becoming increasingly dependent on automated control and information systems for their operation.

The information age is here. Rapidly advancing information-based technologies and an increasingly competitive global environment have thrust information into center stage in society, government, and warfare in the 21st Century. Information and information-based technologies are pervasive and impact every facet of warfighting—from planning, deployment, and sustainment processes to the plethora of weapons systems employed by joint task force (JTF) commanders. **Timely, accurate, and relevant information is absolutely essential** to warfighting as large force structures give way to smaller, highly trained, and technically equipped forces. **Although the nature of war remains unchanged, its character is now in constant transition**.

Use Breeds Dependence

Information itself is becoming a strategic resource vital to national security. This reality extends to warfighters at all levels. Increasingly complex information systems are being integrated into traditional disciplines such as mobility, logistics, and C4I. Systems are designed and employed with inherent vulnerabilities that are in many cases the unavoidable consequences of enhanced functionality, efficiency, and convenience to users. The complexities and vulnerabilities of these information systems are often disguised by user-friendly software. The low cost associated with such technology makes it efficient and cost effective to extend the capabilities (and vulnerabilities) to an unprecedented number of users. The broad access to, and use of, these information systems enhances warfighting. However, these useful capabilities induce dependence, and that dependence creates vulnerabilities. These vulnerabilities are a double-edged sword — on one hand representing areas the Department of Defense (DOD) must protect while on the other hand creating new opportunities that can be exploited against adversaries.



Increasing Speed in Flow & Processing of Information

Operation DESERT STORM highlighted the increasing dependence of the US Armed Forces on information-based technologies and their powerful advantages. However, the impact was only the tip of a much larger and more complex reality of the evolving information age. Military operations and the precise application of decisive combat power are critically dependent on many simultaneous and integrated tasks that, in turn, depend on information and information systems, especially those tasks associated with critical command and control processes. Some of these tasks include:

- Conducting strategic deployment.
- Sustaining theater forces.
- Ensuring force protection, both in garrison and in forward-deployed areas.
- Preserving theater strategic command and control.
- Developing strategic and theater intelligence.

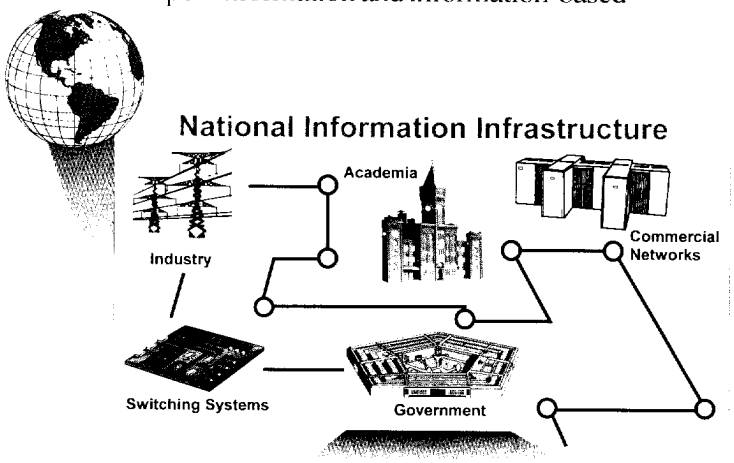
Many vital warfighting tasks are dependent upon information and information-based technologies. Warfighting information systems are linked through supporting infrastructures, thus exposed to attacks by a broad range of adversaries whose motives may be difficult to measure. Therefore, the difficulty in defending systems and processes upon which our warfighting capability depends is increased, and their defense is absolutely essential.

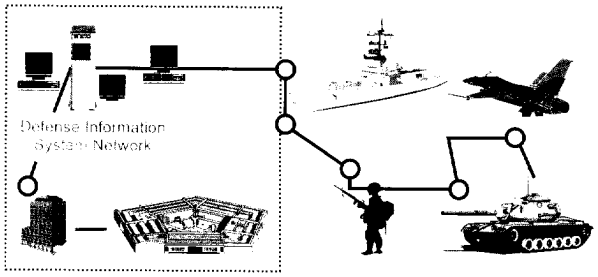
Information Warfare

IW focuses on a target set. IW is an amalgam of warfighting capabilities integrated into a CINC's theater campaign strategy and applied across the range of military operations and all levels of war.

The continuing growth of information systems and technologies offers nearly unlimited potential for exploiting the power of information in joint warfighting. Because there are no fixed boundaries in the information environment, the labels placed on information systems and associated networks may be misleading. Open and interconnected systems are coalescing into a rapidly expanding global information infrastructure that enfolds the US National Information Infrastructure (NII) and the Defense Information Infrastructure (DII).

The DII is embedded within and deeply integrated into the NII. Their seamless relationship makes distinguishing between them impossible. The two share terrestrial telecommunications networks, a variety of information data bases, and satellite communications networks. These infrastructures connect geographically separated forces and span international boundaries.

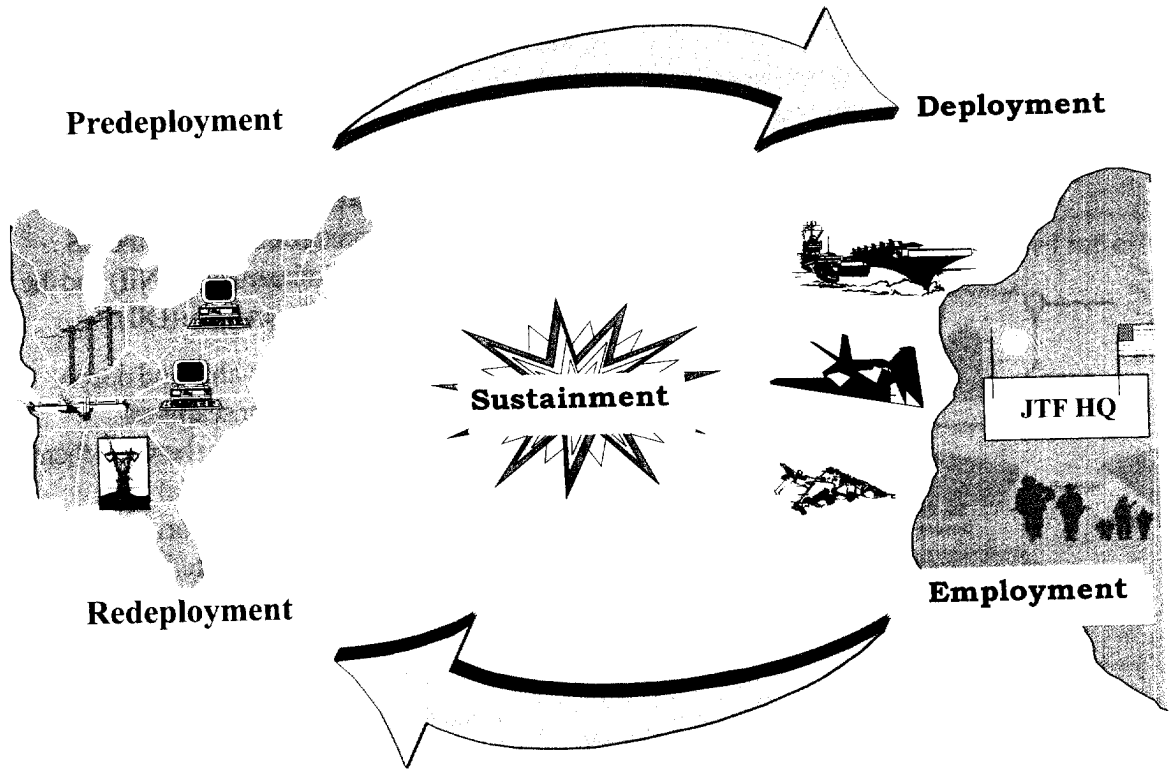




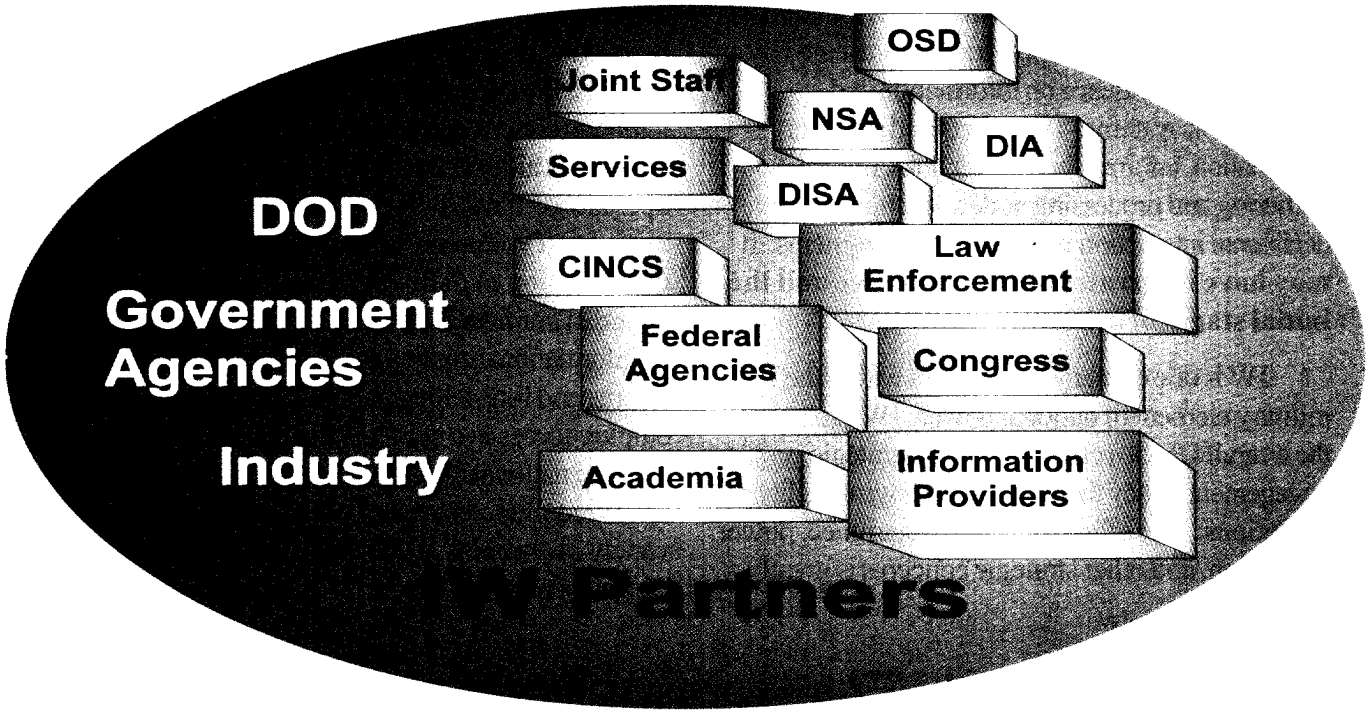
Reach-Back Support for the Warfighter

The successful conduct of warfare in the information age requires access to information available outside the theater of operations. Information infrastructures no longer parallel traditional command lines, and warfighters need frequent, instant, and reliable access to information at locations in CONUS as well as in theater. For example, **mobility and sustainment of forces are highly dependent on commercial "reach-back" infrastructures that include international telecommunications, the public switched network, transportation systems, and commercial electric power grids.** Warriors require secure video teleconferencing, detailed imagery from national sources, intelligence, logistics, and support data from diverse locations. The technical nature of these information infrastructures inhibits a commander's ability to control the flow of information or dynamically manage available information and telecommunications resources. To support offensive operations, warfighters may reach-back to employ information attack capabilities and techniques that provide an information advantage in their area of responsibility.

Providing capabilities to support military operations require the expansion of our information infrastructure beyond the established peacetime information environment. Warfighters must have assurance that this expanded infrastructure can attain the level of protection required to enable mission



IW impacts all phases, the range of military operations, and all levels of war



A teamed approach is essential to develop a comprehensive IW strategy

success. The authority to implement this or any other level of protection for the NII lies outside of the Department of Defense and government. **We must assist in demonstrating to service providers the compelling need for a collaborative, teamed approach in crafting solutions - not just to support the Department of Defense and to protect our national security, but to protect their own proprietary interests as well.**

Our dependence on information and information systems and the exposure of our vulnerabilities to a full range of threats, from computer hackers through criminals, vandals, and terrorists to nation states, have brought focus and compelling relevance to the emerging discipline of IW. Its unique characteristics set in motion revolutionary capabilities that will enhance and support warfighting into the next century.

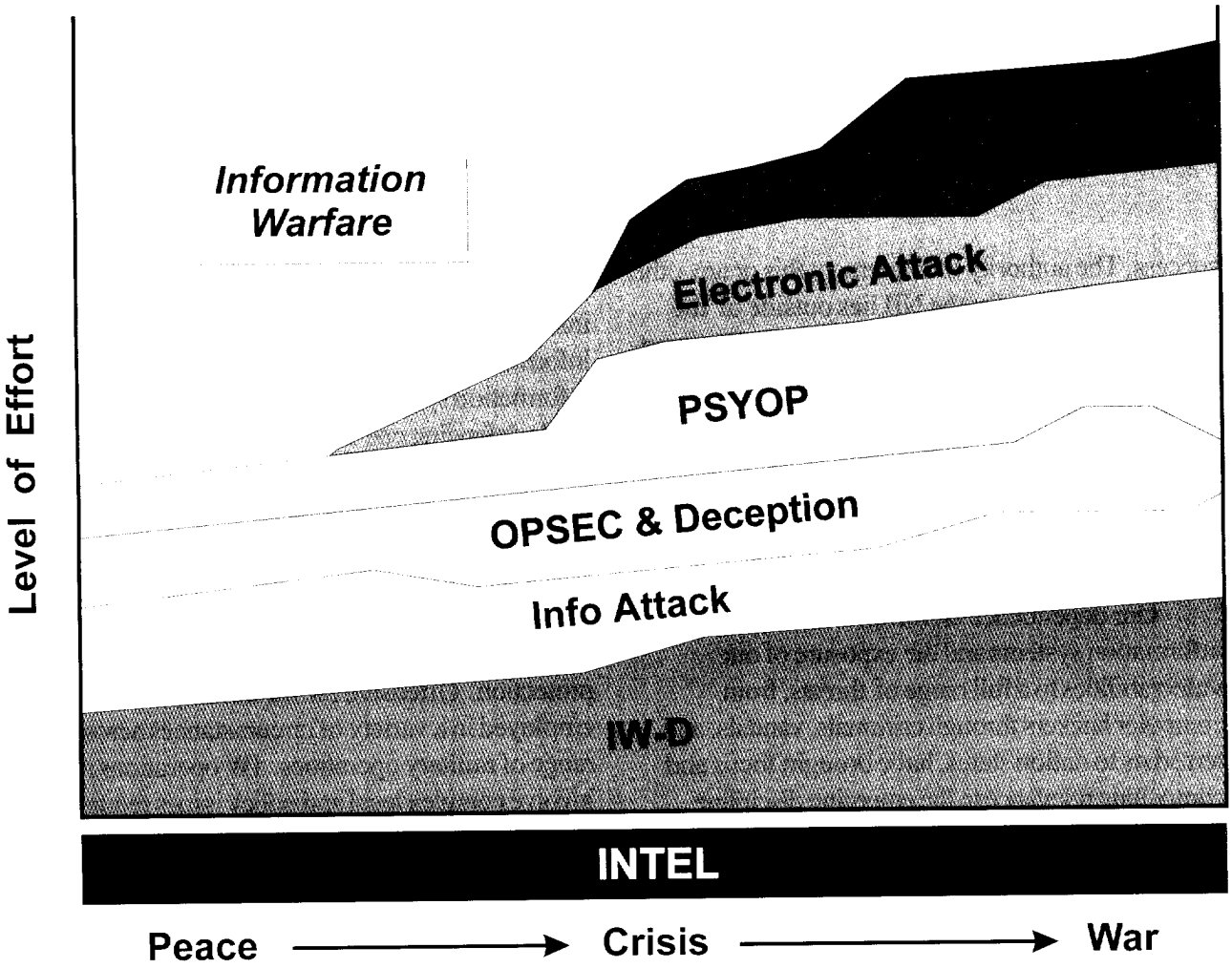
Information Warfare Basics

IW involves actions taken to achieve information superiority by affecting adversary information, information-based processes, information systems, and computer-based networks while defending one's own information, information-based processes, information systems, and computer-based networks. **IW applies across all phases, the range of military operations, and at every level of warfare.** Defensive IW activities are conducted on a continuous basis, in both peacetime and war, and are an inherent part of force protection. Offensive IW capabilities may be employed in a variety of circumstances across the range of military operations. IW operations may involve complex legal and policy issues requiring careful review and national-level coordination and approval.

As **an integrating strategy**, IW focuses on the vulnerabilities and opportunities presented by an increasing dependence on information and information systems. IW targets and protects information, information transfer links, information gathering and processing nodes, and human decisional interaction with information systems. It **may have its greatest impact in peace and the initial stages of crisis.**

IW is one of many capabilities within the US military element of national power. IW can support the overall US Government (USG) strategic engagement policy throughout the range of military operations. The effectiveness of deterrence, power projection, and other strategic concepts is greatly affected by the ability of the USG to influence the perceptions and decision making of others. In times of crisis, IW can help deter adversaries from initiating actions detrimental to the interests of the USG or its allies or to the conduct of friendly military operations. If carefully conceived, coordinated and executed, **IW can make an important contribution to defusing crises**; reducing the period of confrontation and enhancing the impact of informational, diplomatic, economic, and military efforts; and forestalling or eliminating the need to employ forces in a combat situation. Thus, IW at both the national-strategic and theater-strategic levels requires close coordination among a wide variety of elements of the USG, including the Department of Defense.

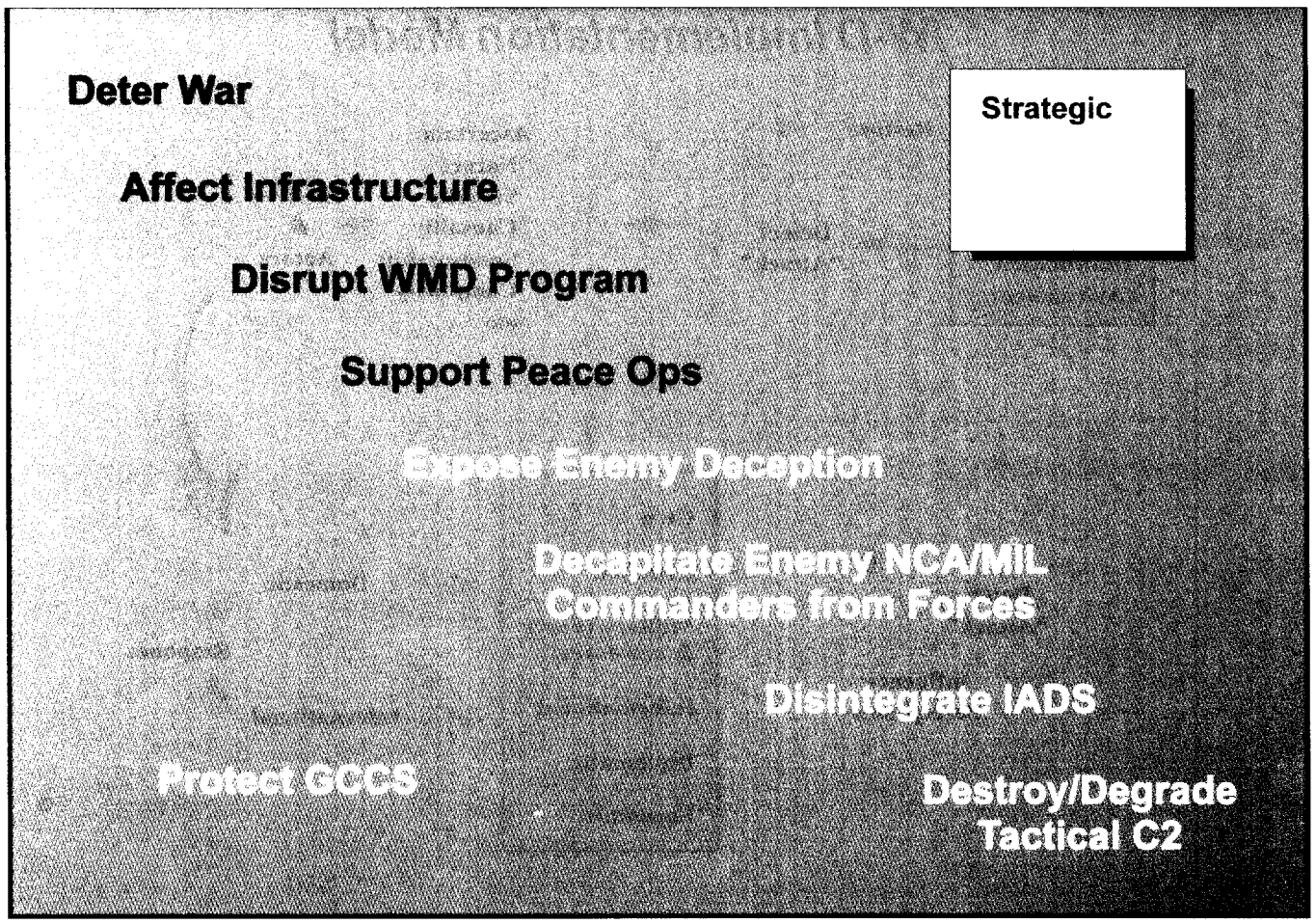
Engagement Timeline



IW can be waged in wartime within and beyond the traditional military battlefield. As a subset of IW, command and control warfare (C2W) is an application of IW in military operations that specifically attacks and defends the C2 target set. However, the capabilities and disciplines employed in C2W (psychological operations (PSYOP), deception, operations security, and electronic warfare) as well as other less traditional ones focused on information systems can be employed to achieve IW objectives that are outside the C2 target set.

There are both offensive and defensive aspects of IW. A common link between the two aspects is the target sets involved in IW - information and information systems. Just as DOD can use IW to affect the information and information systems of an adversary, so too can an adversary target DOD's information and information systems. Understanding the basic elements and the potential of offensive and defensive IW is a precursor to grasping the integrated IW strategy currently being developed within the Department of Defense. The remainder of this brochure will outline the concepts and ongoing initiatives in the emerging discipline of IW.

Spectrum of IW Objectives



Peace ←——————————→ War

Defining the IW Vision

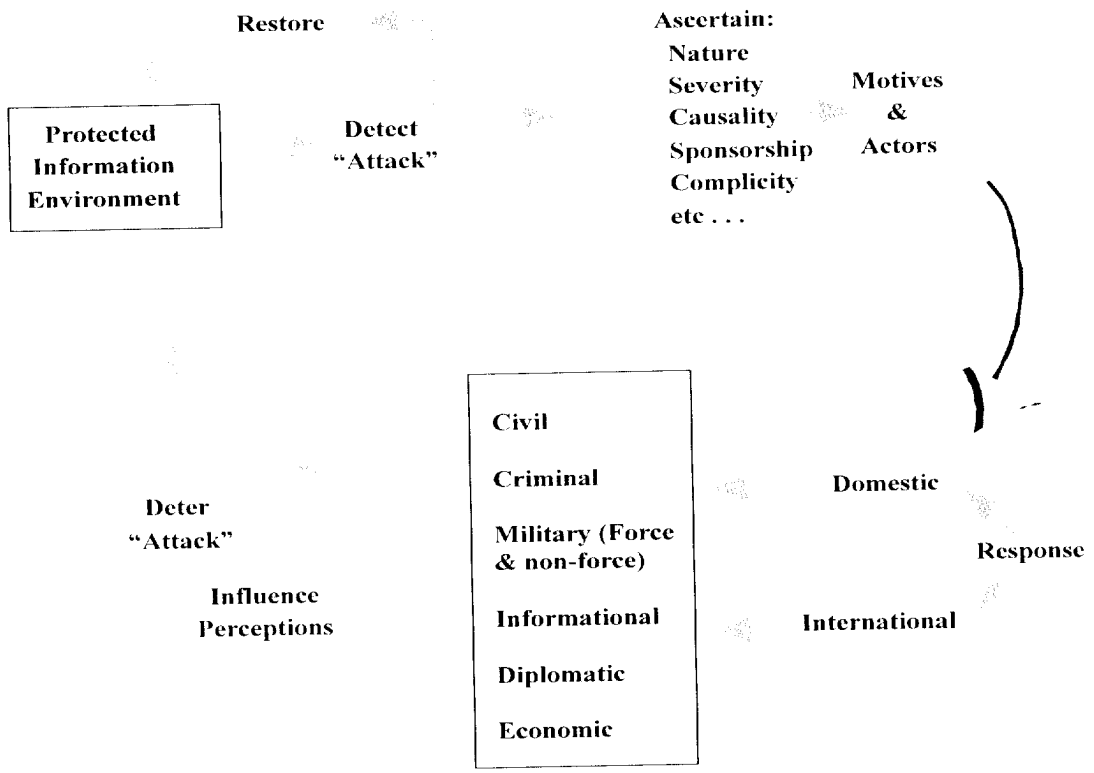
"The threat to our military and commercial information systems poses a significant risk to national security and is being addressed."

1996 National Security Strategy

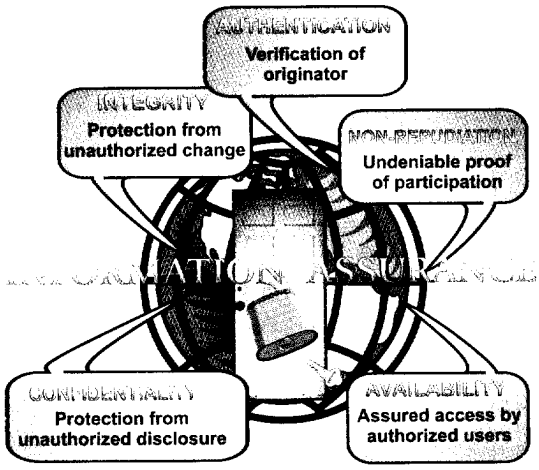
Organizing Defensive IW (IW-D)

IW-D actions must be carefully considered, integrated at all levels of war, and applied across the range of military operations. This requires IW-D to be organized as a system and tied together by policy, doctrine, technology, capability assessments, education, training, exercises, and a mutually supporting national organizational infrastructure. Along the way, the IW-D system can be integrated into the larger system of warfighting -- with the overall objective of capturing the latent potential of IW to dramatically enhance warfighting capability. Collaborative efforts within the Department of Defense and elsewhere in the Federal Government are moving rapidly to organize and implement IW-D as a system.

IW-D Implementation Model



A comprehensive model scalable to all levels of war



The IW-D System

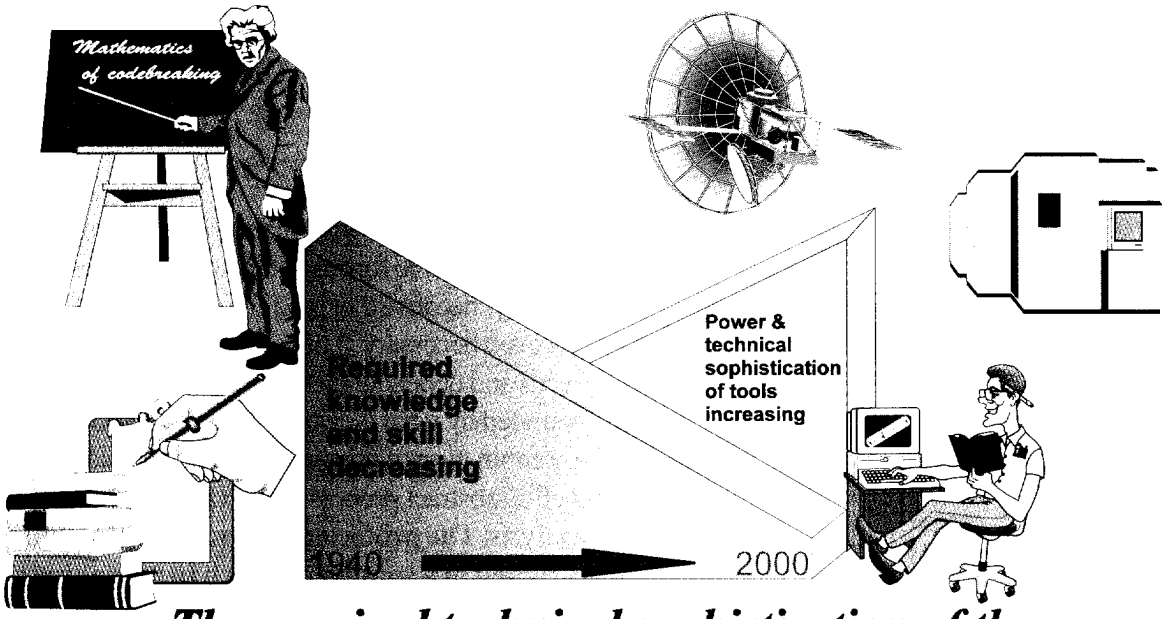
Organizing IW-D as a system begins with a broad vision implemented by collaborative efforts that move the vision and concepts from the abstract into a focused set of questions and answers on specific aspects of policy and standards. The five critical components that should be included in any attempt to implement an IW-D system are integrity, authentication, non repudiation, availability, and confidentiality. **IW-D implementation is designed with an objective of information assurance to protect access to timely, accurate, and relevant information wherever and whenever needed.** At the national level, the Department of Defense and other elements of government are working with industry to ultimately build the means to appropriately protect and defend the NII and DII, using a managed-risk approach. The true extent and implications of IW-D are only visible in a top-level implementation model. This model is scalable, as it is applicable at all levels of war and across the range of military operations.

Elements of the Model

The model begins with a defined and appropriately protected and defended information environment. Interacting with the protected environment is a process to identify threats, attacks, or other degrading conditions and to disseminate warnings when and if these occur. Attack detection initiates both restoration and response processes.

The Protected Information Environment

The protected information environment is not an impenetrable fortress that guarantees absolute security, because that is neither practical, affordable, nor even necessary. The focus is on defining real needs and dependencies. The environment is bounded by what is critical to national security. It is a combination of physical systems and places, as well as abstract processes such as intelligence analysis. **The protected information environment is rooted in a sound approach to managing risk.** Risk management processes include consideration of information needs, the value of information that may be compromised or lost if the protected information environment is breached (loss of access control), system vulnerabilities, threats posed by potential adversaries and natural phenomena, and resources available for protection and defense. In addition, **the value of information changes in each phase of military operations and must be considered in the risk management process.** The protected information environment not only provides the degree of protection commensurate with the value of its contents, but also ensures mechanisms are in place to respond to a broad range of attacks.



The required technical sophistication of the average intruder has dramatically decreased.

Threat

Articulation of the threat must be comprehensive -- overstating the threat leads to unnecessary levels of protection, expense, and effort. Conversely, understating the threat leads to overconfidence in system reliability and resilience under adverse conditions. This simple realization underscores the vital importance of a clearly defined and articulated threat. National intelligence organizations continue to characterize the evolving threat—a dynamic mission that must adjust to changing threat conditions.

To get at the essence of the threat requires an understanding of three elements:

- Identities and intentions of possible attackers.
- Possible attack techniques and methods.
- Potential targets, extending from the strategic to the tactical levels.

Indications and Warning

Threat knowledge is an input to a process that analyzes attack indicators and disseminates warnings to persons, organizations, and processes that are determined to be at risk or require warning indications to assist them in other decision-making processes. A comprehensive IW indications and warning (I&W) regime will require a policy structure to establish authorities, roles, and responsibilities across local, state, and national jurisdictions. Functionally, I&W for IW will require the closest cooperation between law enforcement, the Intelligence Community, and private enterprise. In this environment, crippling attacks can occur at speeds exceeding unaided human capacity to detect, analyze, and disseminate warnings. I&W will not occur without a collaborative government-industry effort.

Attack Detection

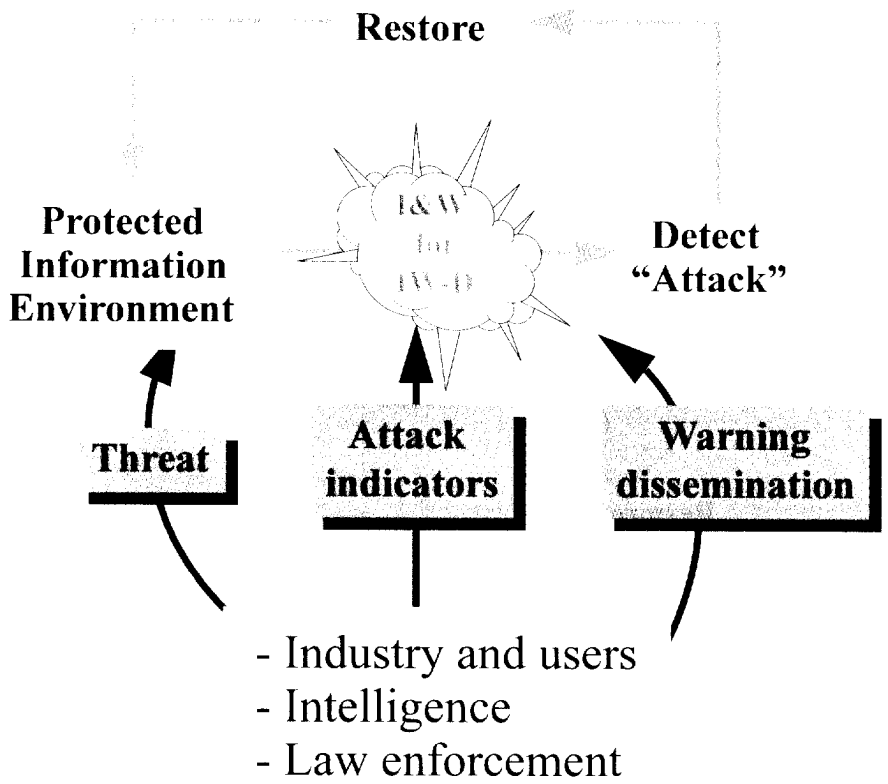
Defensive efforts to detect and identify adversary activities require close collaboration among government, industry, and society. **A critical element of the detection process is identifying indicators of adversary activity, analysis of those indicators, and dissemination of warnings.** This process requires a knowledge of the threat built upon information from various sources including law enforcement, the Intelligence

Community, system providers, and users. Finally, automated attack detection capabilities are necessary, given what may be extremely short timelines from initiation to the culmination of attacks. Defending against an attack, whether against a JTF's intelligence data base or against an automated component of the commercial national power grid, is predicated on how well the intelligence threat and associated indications and warning processes function and on the agility of systems providers, users, and administrators in implementing protective countermeasures.

The potential subtlety of early indications of adversary prestrike reconnaissance and exploitation techniques, as well as the speed with which a powerful attack can proceed from initiation to culmination, mandates a need for automated intrusion detection capabilities. **These capabilities must automatically detect system intrusions or aberrations and instantly generate alerts.** Additionally, automatic threat-mitigation that limits the extent of damage or spread of attack must be self initiating.

Restoration

Attack detection mechanisms trigger reactive processes. The first of these processes is restoration. **Restoration relies on a pre-established understanding of the desired levels and conditions of system performance and functionality.** Priorities may be then derived for restoring access to and availability of essential information, as well as detect when anomalous conditions have degraded systems and processes below their desired steady-state performance thresholds. Procedures for restoration of



The key elements of a comprehensive indications and warning process

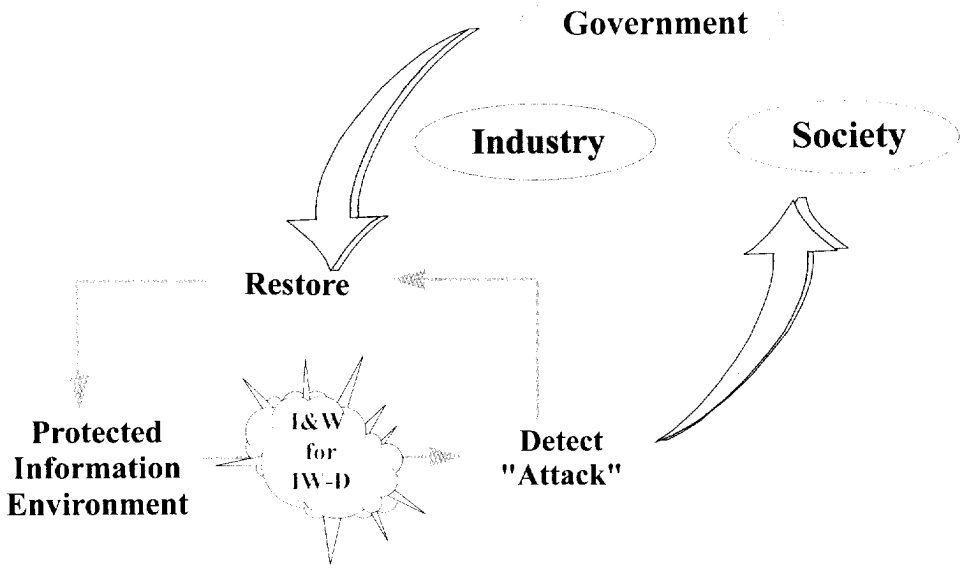
telecommunications exist for the Department of Defense and the National Communications System (NCS). The NCS facilitates executive and technical-expert dialogue between industry and the NCA through the National Security Telecommunications Advisory Committee (NSTAC). In the information age, the NSTAC continues to play a vital role in the Nation's total IW-D posture.

Response Process - Motives and Actors

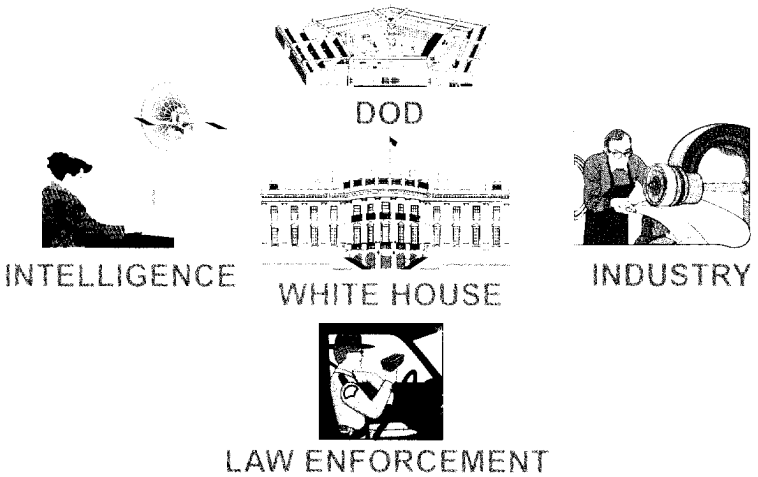
Attack detection mechanisms serve to trigger the response process. Timely identification of motives and actors is the cornerstone of effective and properly focused response, linking the analytic results of the I&W process to national-level decision makers.

The true nature of motives and actors engaged in attacks on US information, systems, or processes of national interest, whether domestic or international, permits an understanding of the jurisdictional environment in the response process. In the present IW environment, the clear identification of motives and actors will not lead to a simplified set of automatic response processes and options. This is true because the seam between civil and military roles in national security is blurred in the case of IW-D. An attack against a commercial system that manifests itself in a DOD network raises legal and policy issues, thus highlighting the need for increased interagency coordination and joint civil-military response operations. Through all of this, the limits of the proper and legitimate role of government to provide for the common defense must be recognized and respected, ensuring no violation of personal freedoms and rights of privacy.

The effectiveness of the response process is dependent upon efficient integration of attack detection and analysis capabilities. **Timely response is essential to influence adversary perceptions, establish user confidence, and maintain public support.**



Attack detection and restoral requires teamed efforts supported by automation



Effective response requires collaborative interagency efforts

Attacks themselves do not inherently point to the motives and actors in an unambiguous way. Apparently similar events or indications may have completely different causes, sponsorship, complicity, and severity. The different implications for national security point to the wisdom of providing decision makers with the best and most comprehensive information available on which to base decisions regarding response options. As such, the need for full cooperation between C4 technology and intelligence processes and capabilities is clear.

An Assembled IW-D System

Warfighters depend upon information to plan operations, deploy forces, and execute missions. Additionally, advanced information technologies have significantly altered these processes. Complex information systems support powerful infrastructures that dramatically enhance warfighter capabilities; however, increasing dependence upon these rapidly evolving technologies make joint forces more vulnerable.

IW-D is a comprehensive strategy being implemented to protect and defend information and information systems. When combined with offensive IW, the net result will be the opportunity to use IW to exploit situations and to win.

Offensive IW (IW-O)

As with the IW-D system described above, IW-O capabilities are employed at every level of warfare and across the range of military operations. The employment of offensive IW capabilities to affect an adversary's information and information systems can yield a tremendous advantage to US military forces during times of crisis and conflict. As a result, **combatant commanders must carefully consider the potential of IW for deterring and rolling back crisis.**

When viewed as an integrating strategy, IW weaves together related disciplines and capabilities toward satisfying a stated objective. Offensive IW applies traditional perception management disciplines such as PSYOP and information system attack to produce a synergistic effect against the remaining elements of an adversary's information systems, information transfer links, and information nodes.

Examples of IW Targets

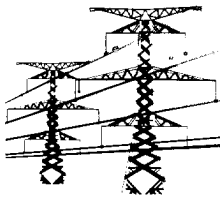
Leadership

- Key Personnel
- ADP Support
- Strategic Comms
- Power Base

Military Infrastructure

- Commanders
- C2 Comm Links
- C2 Nodes
- Troops
- Intel Collectors

Civil Infrastructure



- Comms (Links/Nodes)
- Industry
- Financial
- Populace

Weapons Systems

- Planes
- Ships
- Artillery
- PGMs
- Air Defense

Attack the information systems and processes that support these target sets

IW-O in Military Operations Other Than War (MOOTW)

Offensive IW related plans with their associated capabilities may be employed in peacetime to deter a crisis, control crisis escalation, project power, or promote peace. The **employment of offensive IW capabilities in these circumstances may require NCA approval with support, coordination, deconfliction, cooperation, and/or participation by other USG departments and agencies.** Although IW-O capabilities can be employed to undermine an adversary's regime, the primary focus of IW efforts in MOOTW should be to preserve the peace, deter escalation of a conflict, and prepare the battlefield so that if crisis escalated to conflict, the US military can effectively employ IW-O capabilities in a wartime scenario. Examples of other potential peacetime applications of offensive IW include the employment of IW capabilities to disrupt drug cartel communications lines in support of drug interdiction efforts and conducting a PSYOP campaign against a belligerent's potential allies with the goal of severing external sources of military, economic, and political support.

Wartime Employment of IW-O

Beyond the threshold of crisis, IW can be a critical force enabler for the joint warfighter. In addition to protecting information systems vital to the US military, **employment of IW-O capabilities can affect every aspect of an adversary's decision cycle by impacting its information centers of gravity.** Many of the activities associated with wartime employment of IW-O capabilities focus on the military command and control target set. However, there are many other important information system targets for the warfighter to focus on to fully realize the power of IW in wartime.

One type of information attack could be the application of IW capabilities against an adversary's automated information systems to disrupt production of critical war supporting industries. Another application might be the use of IW capabilities to sever an adversary's communications networks from the external military, economic, and political support-base.

Deterrence

There are two aspects of deterrence associated with IW. The **first is the deterrent effect IW-O capabilities can have on a potential adversary during peace and crisis.** As new IW capabilities continue to emerge, their potential usefulness to deter technology-dependent adversaries must be leveraged as much as possible.

The **second, more specific aspect, is the deterrence of an information-based attack against the United States.** Deterring IW attack requires the application of both offensive and defensive capabilities. Strong IW defenses help to discourage casual threats, thereby narrowing the playing field to a more distinct set of actors. When faced with an information-based attack, the ability of the Nation to respond quickly, effectively, and decisively will influence perceptions and assist in deterring future attack. In this regard, information joins economic, political, diplomatic, legal, and military power as an element of total national strength. The preservation of information contributes to the total power of our Nation and society. The result is a new form of strategic deterrence for the information age.

The Vision Comes to Closure

National leaders are able to choose from a broad range of options that are flexible and combinable to achieve the desired effect in most circumstances. **The IW vision does not demonstrate a nation that is invulnerable, but rather one that is vigilant, decisive, and prepared to respond to any threat, foreign or domestic.** That reality contributes to strategic deterrence in a context appropriate to the information age.

The IW vision...
supporting strategic deterrence in the Information Age

Implementing the IW Vision

"We must have Information Superiority...Information Superiority will require both offensive and defensive information warfare."

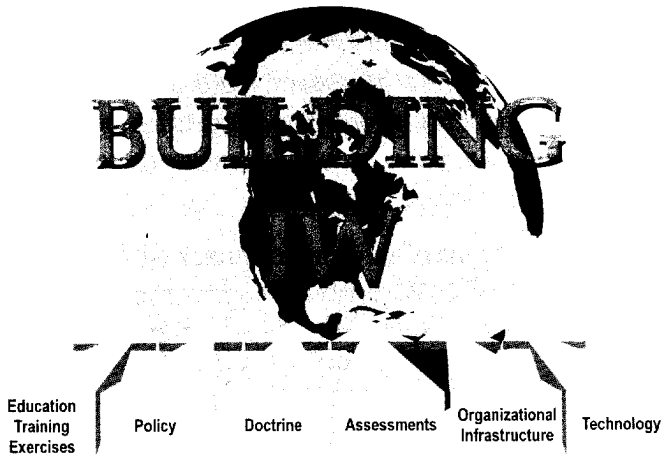
Joint Vision 2010

Taking It to the Troops

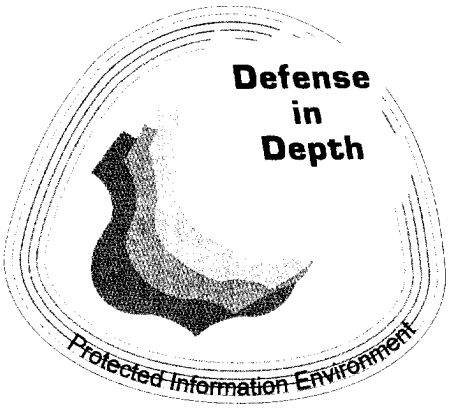
A common focus is essential to ensure a credible IW vision becomes a reality. **The three principles of the Joint Staff's implementation vision are:**

- Reduce the opportunities presented to potential adversaries by educating, training, and increasing the awareness of warriors to vulnerabilities and protective measures.
- Improve information attack capabilities and measures to protect against and detect attack on information and information systems by pursuing emerging technological capabilities and the synergy created by integrated defense-in-depth solutions.
- Build the necessary relationships, within government and throughout the Nation, to secure the information needs of all constituencies. Seal those arrangements in law and policy, resulting in reconstituted national deterrence to preserve peace, security, and stability.

Efforts are under way to integrate IW into all aspects of joint warfare. The Joint Staff, in cooperation with the Services and Defense agencies, is focusing on a common approach toward operationalizing IW. **Efforts in six major areas are coming together to support the warfighter.** They include:



- Education, training, and exercises
- Policy
- Doctrine
- Assessments
- Organizational infrastructure
- Technology



User Training • System Administration
Access Controls • Emergency Response
Multilevel Security

Education, Training, and Exercises

Education, training, and exercises offer the greatest return on investment. High-level military education at the National Defense University and Service professional military education institutions focus on the study of IW concepts, policy issues, doctrine integration, and the role of IW throughout the range of military operations and all levels of war. Additionally, the DOD Inter-Service Training Review Organization Initiative for Joint IW Training (DIIJIT) initiated 11 courses for DOD personnel. These courses range from senior-level awareness to technical training for systems administrators.

The DIIJIT is a great success story that epitomizes jointness. Additional courses are forthcoming that will continue to generate and focus IW study throughout the joint environment.

Information systems incident reports continue to reveal that most intrusions result from a lack of understanding and improper implementation of security measures by information users. Awareness and training modules are being inserted into a broad range of officer, enlisted, and civilian curriculum that explain vulnerabilities inherent in information systems, describe potential adversary threats, and educate people in proper system use.

Training for system and network administrators to identify and mitigate vulnerabilities is another investment yielding high dividends. Industry places a premium on and commits a great deal of resources to acquire and train specialists to administer and enforce information systems security policies. The Department of Defense should follow suit in this area.

At the organizational level, the Joint Staff is accelerating the integration of IW into joint exercises. Demonstration of IW concepts and capabilities in CINC-sponsored exercises will help planners and users better integrate IW into operations. **Lessons learned from incorporating IW into joint exercises also will help accelerate and shape policy and doctrine**.

IW Policy

The Department of Defense is participating in interagency discussions that focuses on IW policy issues and has created internal executive and working-level forums to identify, develop, and implement policies and concepts. Across a broad range of issues, IW efforts are examining DOD's role, the role of government in society, and the potential impact of emerging technologies and other factors. A Defense Science Board study is also helping to fuse national-level and DOD efforts in broad areas.

Given these considerations, appropriate policy positions and designation of responsibilities are being thoughtfully considered and reflected in DOD and CJCS policy documents. **The Joint Staff is participating in the revision of existing policy in addition to developing new IW instructions where needed.** Consistent with those efforts, Chairman of the Joint Chiefs of Staff

Defense Science Board Objectives

- Identifying the information users of national interest.
- Determining the scope of national information interests to be defended.
- Characterizing the procedures, processes, and operational arrangements required to establish a comprehensive national defense-in-depth strategy.
- Identifying the reasonable roles of government and the private sector in creating, managing, and operating a national IW-D capability.

Instruction (CJCSI) 3210.01, established "Joint IW Policy" to support warfighting. Also, CJCSI 6510.01A, established "Defensive Information Warfare Implementation," that focuses on key areas of protecting and defending information and information systems.

IW Doctrine

The Joint Staff is the lead agent for developing joint doctrine for information warfare. This doctrine will include both offensive and defensive IW principles. Joint IW doctrine will cover the organization for IW, responsibilities, coordination between levels of command, IW planning considerations, integration and deconfliction of IW activities, and intelligence support to IW. IW doctrine also will expand upon the principles of the Joint Pub 3-13.1, "Joint Doctrine for Command and Control Warfare (C2W)." DOD experiences will assist in illuminating broader IW concepts extending beyond the base doctrine of C2W. To complement this doctrine effort, the revision to the Joint Operation Planning and Execution System will fully integrate IW into the operations planning process.

Assessments

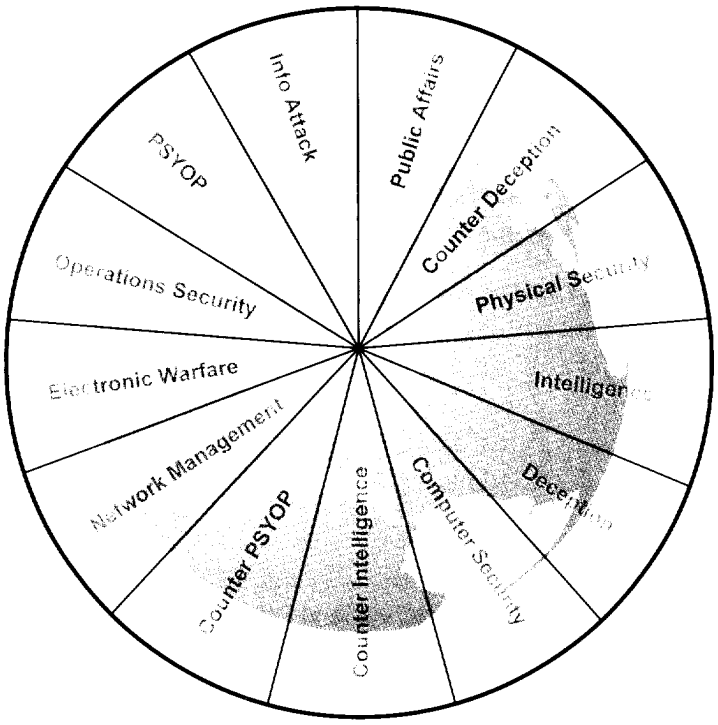
Capability assessments focus on the programmatic aspects of IW. **The Joint Warfighting Capabilities Assessment process, under the guidance of the Joint Requirements Oversight Council and with CINC participation, serves as the primary analytic tool to support the Chairman in articulating joint warfighting requirements.** This process achieves its objective by zeroing in on two key milestones of the Planning, Programming, and Budgeting System (PPBS). First is the Chairman's Program Recommendations leading to focused language in the Defense Planning Guidance. This is followed later in the PPBS process by the Chairman's Program Assessment.

Organizational Infrastructure

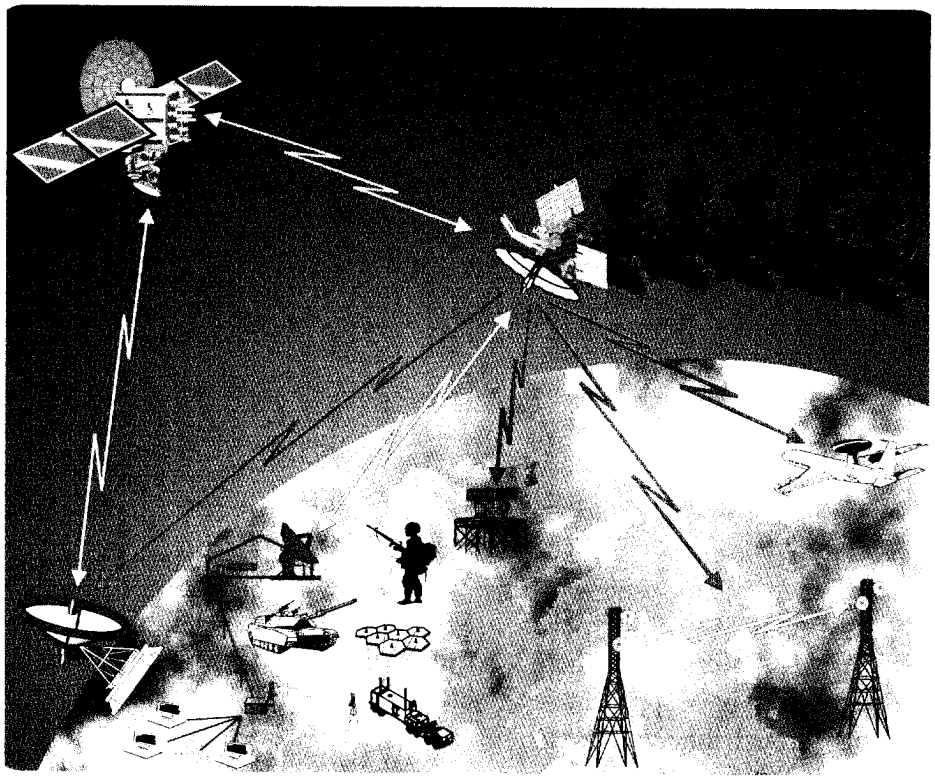
Many components have begun to organize to support IW activities. The interagency coordination requirements so central to IW effectiveness require careful attention to current organizational approaches.

Services and Defense agencies have initiated or expanded some capabilities to respond to security incidents and perform vulnerability assessments to fielded systems. These capabilities will play a vital role in mitigating vulnerabilities over time.

Most of the combatant commands have formed a tailored IW cell to meet the challenges presented by this emerging area. To provide the support the CINCs require, the Joint Staff has focused responsibility for CINC/operational support



Building information warfare means merging traditionally separate disciplines



Advanced information-based technologies... a key enabler of the IW vision

aspects of IW within the Operations Directorate through the creation of an IW cell that mirrors those at the combatant commands.

Intelligence underpins IW operations in peace, crisis, and war. **Critical to the continued success of IW-D efforts will be the availability of intelligence to support a comprehensive threat awareness**. Ongoing Intelligence Community efforts have produced initial assessments of the foreign threat, and other efforts are under way to expand that work. A comprehensive and rigorous understanding of the total threat is a critical requirement to develop a credible risk management strategy, effective and focused training, education, and awareness programs.

The Intelligence Community also is stepping up to the unique requirements of targeting and battle damage assessment. These efforts will require new processes and techniques to link the intelligence and operational communities. The net effect will be an intelligence community that is prepared and focused to meet the significant challenges that lay ahead in IW.

Technology

Information-based technology is a principal enabler of the IW vision. The Joint Staff continues to develop and maintain ties with government and industry laboratories to keep abreast of the latest discoveries and to explore ways to leverage technology to support IW requirements. **Maintaining ties to academic and scientific organizations provide a glimpse at the leading edge thinking that may influence future warfighting strategy and doctrine**. This process also provides valuable insights that can direct current IW capabilities and architectures in favor of emerging trends.

Conclusions

An Assembled Vision

We have entered an age of information where nations and military organizations have opportunities to gain decisive advantage through timely access to accurate, relevant information. Information is fast becoming a strategic resource that will drive a global competitive environment and permeate every facet of warfighting in the 21st century.

Warfighters depend upon information to plan operations, deploy forces, and execute missions. Additionally, advanced information technologies have significantly altered these processes. Complex information systems support powerful infrastructures that dramatically enhance warfighter capabilities; however, increasing dependence upon these rapidly evolving technologies makes joint forces more vulnerable. Conversely, many of these same vulnerabilities extend to our adversaries, offering new opportunities to use offensive capabilities to help gain a friendly advantage.

IW concepts are being implemented to protect and defend information and information systems. When combined with offensive IW, the net result will be the opportunity to use IW to exploit situations—and to win.

IW is a reality today and in the future; it impacts societies, governments, and the range of military operations, and all levels of war. Implementing the IW vision is a challenging task. Warriors should understand IW and its relevance to survive and fight, now and in the future. This concept has set forth a common vision that will generate an awareness of the strategy and the many complex issues yet on the horizon.

The Joint Staff, in cooperation with the Services, combatant commands and Defense agencies, is working toward implementing the common vision highlighted in this brochure. Efforts are under way now. Warriors must help implement these concepts to capture the latent potential of **Information Warfare - a strategy for peace...the decisive edge in war.**

"The joint campaign should fully exploit the information differential, that is, the superior access to and ability to effectively employ information on the strategic, operational, and tactical situations which advanced US technologies provide our forces."

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For questions, comments, or additional copies of this document, please contact The Joint Staff, Information Assurance Division (J6K), (703) 614-2918, or the Information Warfare - Special Technical Operations Division, J-38, (703) 695-0392