



DD 21 Land Attack Destroyer

Leading Navy into the 21st Century

DD 21...Influencing Events Ashore

"DD 21 will be our first ship...to embody the post-Cold War purpose of our Navy: to influence events ashore, directly and decisively, anytime and anywhere."

*ADM Jay L. Johnson
Chief of Naval Operations*

Surface Warfare Magazine, November 1997

"The continued development of the Navy's Land Attack Destroyer is absolutely critical to success in future operations."

*Lieutenant General John E. Rhodes
Commanding General
Marine Corps Combat Development Command*

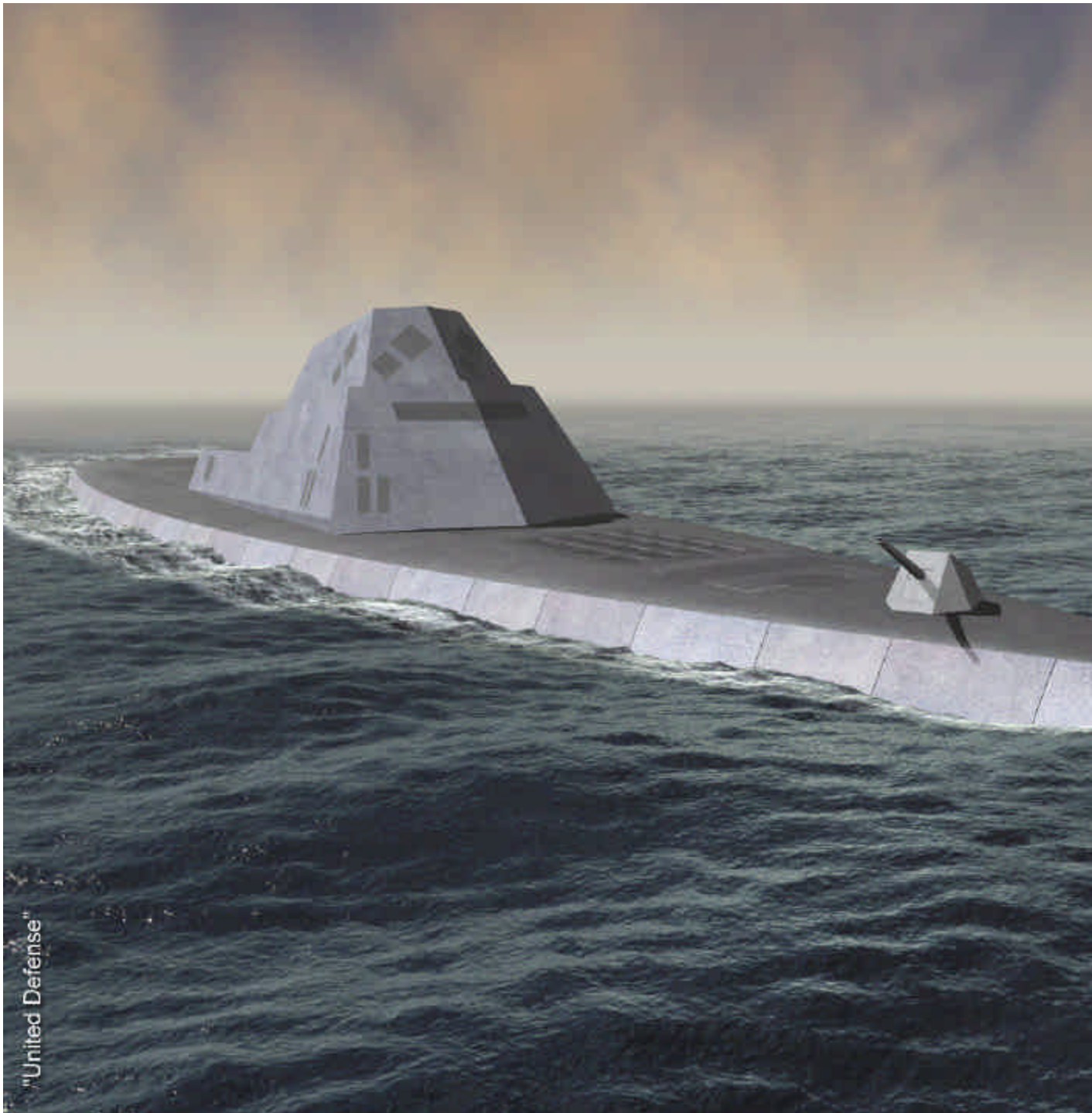
Before the Senate Armed Services
Seapower Subcommittee, 3 March 1999

"Our new DD 21 Land Attack Destroyer is Star Trek technology. A state-of-the-art warship, DD 21 represents a revolution in surface combatant design and aquisition and will provide direct land-attack support for forces ashore."

*RADM Michael G. Mullen,
Director, Surface Warfare Division (N86)
Office of the Chief of Naval Operations*

USNA Shipmate Magazine, April 1999

United Defense



"United Defense"



Why DD 21

Operational
Capabilities

Enabling
Technologies

Objectives

Foundation
for
Success

Why DD 21

Changing
World

Declining
Force
Levels

Declining
Resources

Joint
Littoral
Warfare

Requirements

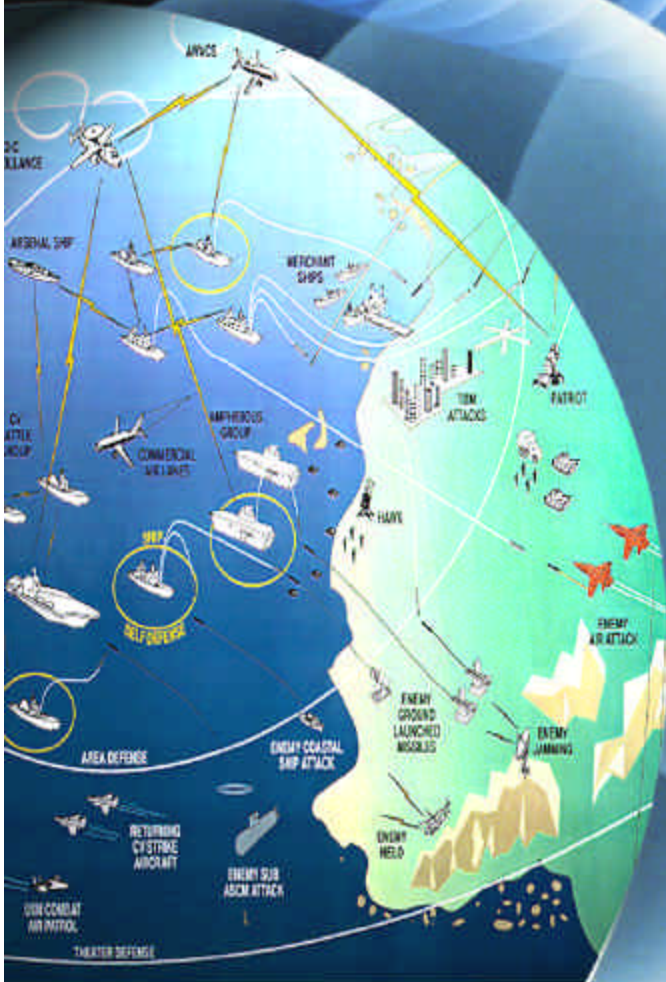
In Harms Way to Stay...Fight...and Win

Our world is changing at a faster rate than we have ever experienced and we are being forced to deal with this change and its greater demands with fewer resources and lower force levels.

In October 1998, the National Security Strategy for a New Century stated, “The military challenges of the 21st century, coupled with the aging key elements of U.S. force structure, require a fundamental transformation of our military forces.”



The World is Changing



Our world today is spinning toward an uncertain future. While today's surface combatants will continue to serve the nation exceptionally well for decades to come, times have changed. An evolving geopolitical landscape, new transnational threats and fiscal constraints continue to pose challenges to America's military effectiveness. These circumstances, coupled with the tremendous opportunities afforded by the information revolution, are driving the United States to adapt its warfighting strategies and modernize its armed forces in order to retain its military advantage. No longer can U. S. warships expect to engage in an open ocean quest for control of the sea against the Soviet Union. They are less likely to have the relative luxury of conducting long range AAW and passive ASW, or engaging anti-ship missiles and surface targets in an uncluttered background. Today's environment demands that U.S. Naval forces be prepared to fight and win in the littorals. As a result, for the first time in half a century, the design and engineering of U.S. Navy warships are focused well beyond the former Soviet threat.



For the first time in half a century, the design and engineering of U.S. Navy warships are focused well beyond the former Soviet threat

Declining Force Levels... Declining Resources



**Operational
Requirements**

Assets

You can't keep doing more with less indefinitely.

Even though we are no longer focused on countering the former Soviet threat, the demand for capable Naval forces has not declined. In fact, it has increased. The Navy is called upon to conduct contingency and humanitarian ops, to participate in peacekeeping missions, to perform counter drug ops, to evacuate civilians, and to contribute to achieving national objectives in major regional conflicts around the world.

At the same time, the budget, the people, and the force levels to meet these requirements have declined (from the Reagan years). To date, the Navy has been able to meet the operational requirements levied upon it. However, the Navy cannot do more with less indefinitely.

The Quadrennial Defense Review (QDR) determined that the Navy needs a minimum of 116 surface combatants to meet projected operational demands. Many of our ships are reaching the end of their mission effective lives faster than they are being replaced by new ships.

In order to maintain the required force level in a time of reduced defense resources, affordable capability must be the focus for the next generation surface combatant.

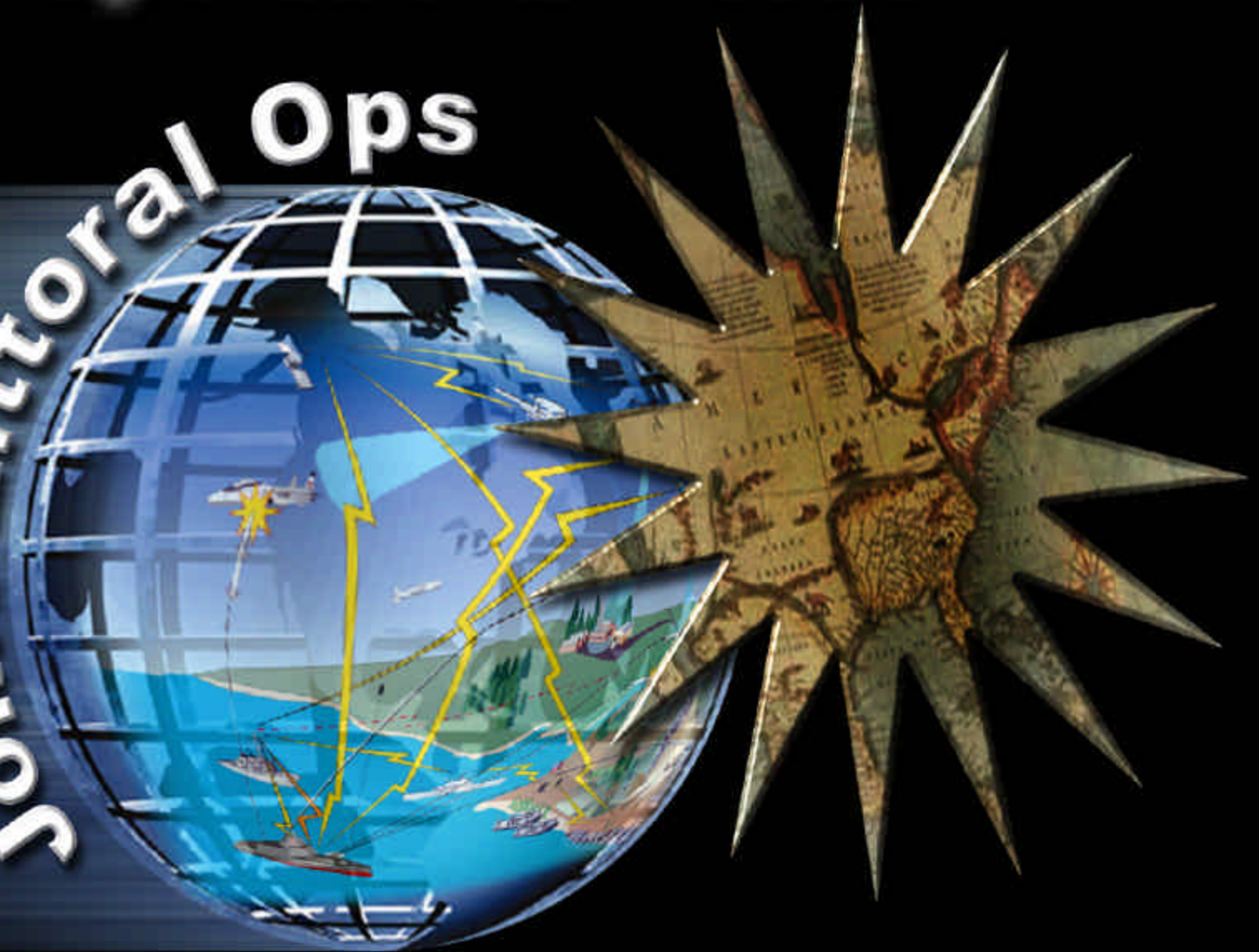


"If we go below 116 warships we will reach a point where we will be visibly absent from critical, forward deployed areas of operations. Investments for the future -- like DD 21 -- are vital."

RADM Mullen, N86
Seapower Mag.
Sep 98

Operational Focus

Joint Littoral Ops



Our Naval forces, designed to fight in a relatively uncluttered open ocean environment, are being pulled into littoral regions where they face a variety of new and challenging threats including: anti-ship missiles; theater ballistic missiles; mines; gunfire emanating from shore batteries, ships or small craft; torpedoes; and various types of chemical, biological and radiological weapons. The near-land environment greatly increases the threat density, clutters the operational picture with unknown and neutral merchants, and significantly decreases ownship reaction time. In recent years, U.S. ships have seen action in support of operations in Bosnia, Haiti, the Sea of Japan, Liberia, the Arabian Gulf, the Gulf of Sidra, and Yugoslavia. In these conflicts our ships have operated with joint and allied forces in an extremely congested environment, and at greatly increased risks due to interoperability challenges and restrictive Rules of Engagement.

U.S. Navy surface combatants have been, and will continue to be, called upon to contribute to power projection and provide credible forward presence, battlespace dominance, and force sustainment in support of military operations around the globe. Surface combatants act as the “tip of the spear” that allow naval expeditionary forces to be “first to the fight” and give follow-on Joint forces access to the theater of operations. Additionally, these warships have the unique ability to control three distinct and complex warfare environments - on, above, and below the ocean’s surface - and to support maneuver forces ashore.





Doctrine

Defines the 2010 battlespace

Assesses impact of new technologies, concepts and threats

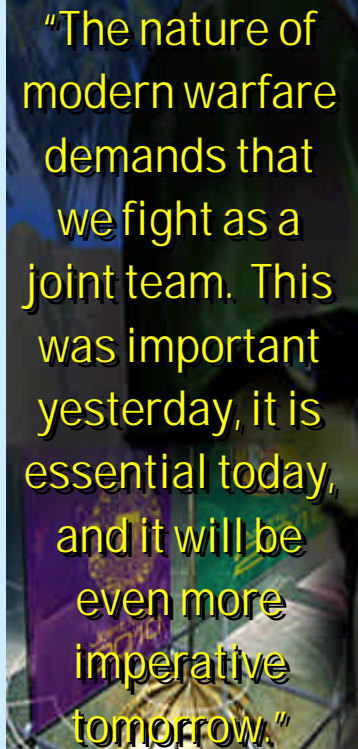
Identifies requirements of Joint Force Commanders

Identifies systems and capabilities that will require integration / interoperability

The new operational focus on joint littoral warfare demands new doctrine for our fighting forces. *Joint Vision 2010* is the conceptual template for how America's armed forces will achieve new levels of effectiveness in joint warfighting. Focused on achieving dominance across the range of military operations, it provides a common direction for our Services in developing their unique capabilities within this joint framework.

- *Army Vision 2010* focuses on the Army contribution to joint operations -- the ability to conduct prompt and sustained operations on land throughout the entire spectrum of the crisis.
- The Air Force's *Global Engagement* highlights the continuing commitment to provide the air and space capabilities required to deter, fight, and win.
- The Navy's *Forward From the Sea* and the Marine Corps' *Operational Maneuver from the Sea* reemphasize the Naval Forces' role in the projection of power and forward presence and address the unique contribution of naval expeditionary forces in peacetime operations, in responding to crises, and regional conflicts.

These vision statements position our Services to operate as a joint team in meeting the needs of the nation in the first quarter of the 21st century.

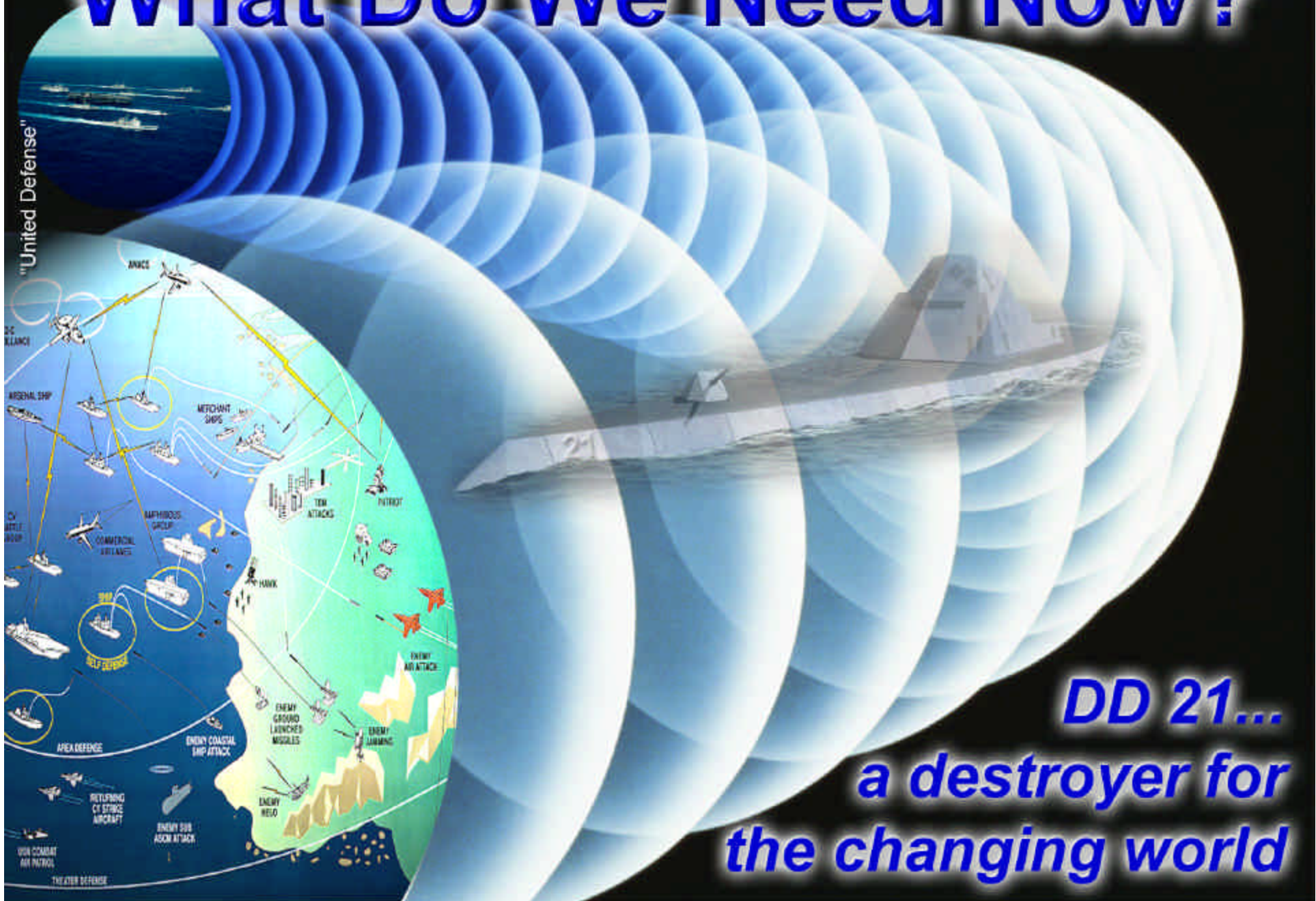


"The nature of modern warfare demands that we fight as a joint team. This was important yesterday, it is essential today, and it will be even more imperative tomorrow."

John M.
Shalikashvili

Former Chairman,
Joint Chiefs of
Staff

What Do We Need Now?



***DD 21...
a destroyer for
the changing world***

To meet our national requirements we need twenty-first century surface combatants that support a Navy and Marine Corps team shaped for joint operations. This focus requires a highly visible, peacetime presence and integrated, jointly interoperable warfighting forces. Credible multi-mission combat capability is required to support diplomacy and deter aggression. However, if deterrence fails, surface combatants must be able to quickly arrive on scene, unhindered by diplomatic approval. Once there, they must rapidly establish battlespace dominance, permit coalition building, enable joint force buildup and participate in coordinated projection of joint offensive power from the sea.



Credible
forward
presence

Multi-mission
combat
capability

Joint
Interoperability

Tailored for
offensive
operations

DD 21 Must...

"Carry the war to the enemy through offensive operations with precision strike weapons."

"Destroy enemy targets ashore through use of precision strike weapons."

"Destroy / neutralize enemy land forces, merchant shipping, submarines and aircraft."

"Contribute to open ocean surface, air, sub-surface dominance."

"Be highly survivable."

"Employ a total ship architectural / engineering approach."

"Be automated."

Navy planners began developing operational requirements for the 21st Century Surface Combatant in the mid 1990's. These requirements were derived from a Joint Service context, based on threats envisioned for the littoral operating environment and from the required 21st century warfighting capabilities as prioritized by the Fleet Commanders.

The SC-21 Mission Needs Statement was approved by the Joint Requirements Oversight Council (JROC) on 26 September 1994 and Milestone 0 approval was granted by the Defense Acquisition Board (DAB) on 18 January 1995. Following Milestone 0, the Navy conducted a two year Cost and Operational Effectiveness Analysis (COEA) to identify mission deficiencies, clarify requirements, and evaluate alternative ship concepts and force structures.



SC-21 Family of Ships

Common design concept
Flexible mission upgrade
Single support structure
Streamlined acquisition
Open systems architecture

DD 21
Tailored Maritime Dominance /
Land Attack emphasis
2004 award 32 ships / 2008 delivery

CG 21
Air Dominance /
full capability emphasis
Post 2020 timeframe

Close aboard...and on the horizon

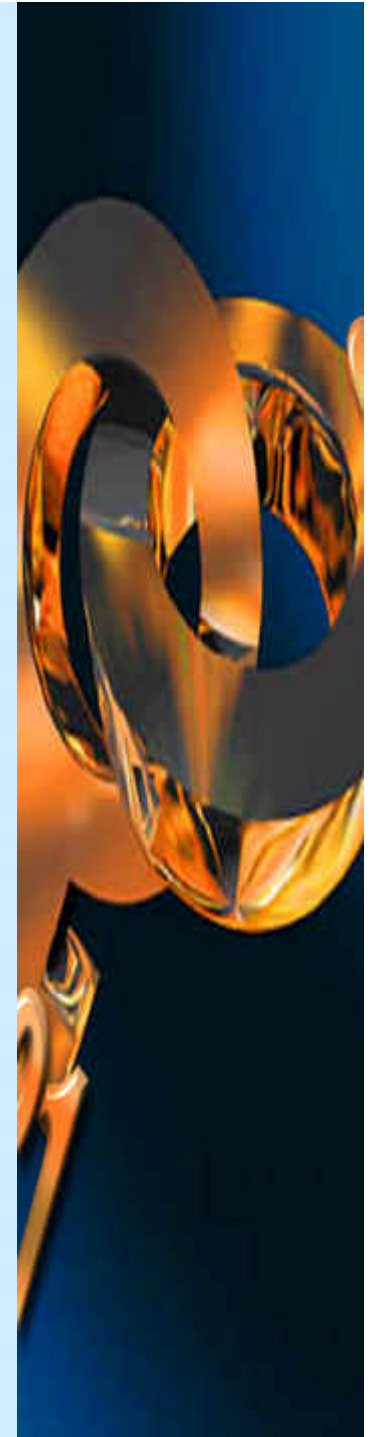
The COEA recommended that the SC-21 Mission Needs Statement be met with a family of multi-mission surface combatants that can counter and adapt to the spectrum of threats and contingencies they are likely to face in the next century. A key characteristic of their recommendation was affordability.

The COEA efforts culminated in the approval of the DD 21 Operational Requirements Document by the JROC on 16 October 1997. Key Performance Parameters (KPP's) were identified in the following areas:

- Land attack
- Joint interoperability
- Signatures
- Manning
- Ship maneuvering

DD 21 will be a multi-mission destroyer tailored to maritime dominance and land attack missions. Contract award is planned for 2004 with delivery in 2008. CG 21 will be a fully capable next generation air dominance cruiser to replace today's AEGIS Cruisers.

DD 21 will be designed with the necessary growth capacity to accommodate the additional missions of CG 21. This common design, along with an open systems architecture, will facilitate affordable and flexible mission upgrades to ensure this family of ships remains mission capable over its full service life.



DD 21 Operational Capabilities

Land Attack

Maritime
Dominance

DD 21 will be an offensive, multi-mission destroyer capable of operating independently or with a Naval, Joint, or combined task force. The ship's offensive, land attack orientation is being engineered and balanced with traditional multi-mission surface combatant capabilities that will be needed for DD 21 to dominate the maritime battlespace. While tailored for land attack, the ship's ultimate mission is to fight and win any battle...open ocean or littoral.

DD 21 is the first U.S. Navy surface combatant founded entirely upon 21st century strategic concepts set forth in policy documents such as the Chairman of the Joint Chiefs of Staff's *Joint Vision 2010* and the Navy-Marine Corps' *Forward . . . From the Sea* and *Operational Maneuver from the Sea* publications. Collectively, these concepts emphasize seamless interoperability, information superiority, and precision firepower to enable battlespace dominance and to influence operations ashore, directly and decisively.

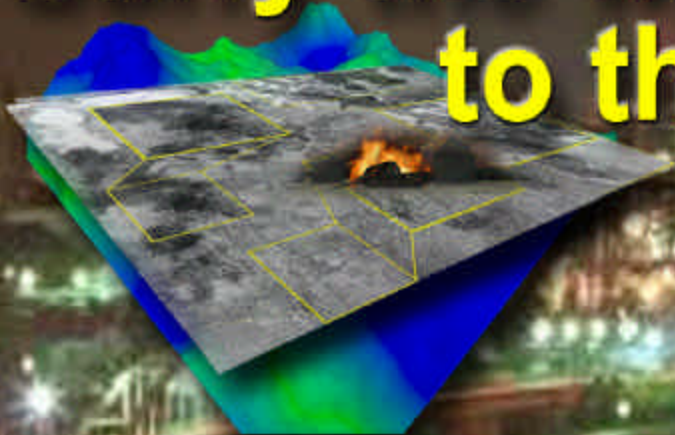
DD 21 will feature two primary operational capabilities: Land Attack and Maritime Dominance.



DD 21 is the first U.S. Navy surface combatant founded upon 21st century strategic concepts

Land Attack

Carry the war...
to the enemy's
center of gravity



DD 21's joint warfighting effectiveness will be gauged on its ability to perform land attack missions in support of precision engagement, one of four operational concepts outlined in *Joint Vision 2010*.

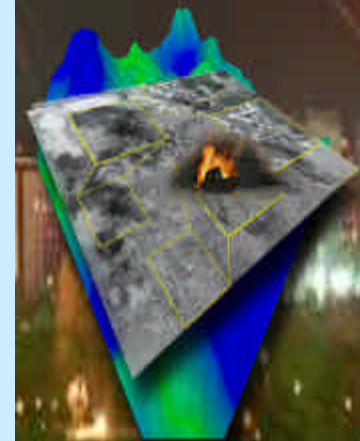
Armed with a wide array of land attack weapons, including a next-generation naval gun system, DD 21 will provide precise, sustained, and distributed (i.e., geographically dispersed) naval fires over a wide area in support of expeditionary forces ashore operating deep inside the littoral nation's territory.

The Navy and its Industry partners are developing revolutionary land attack weapon systems and technologies for naval surface fire support, battlefield interdiction, and strike warfare in support of the *Operational Maneuver from the Sea* strategic concept. By incorporating these systems, DD 21 will meet the Marine Corps' fire-support requirements, as well as Joint Service land attack needs, delivering ordnance with improved range, responsiveness, accuracy, volume, and lethality against broader target sets.

Depending on the contingency, DD 21 will have the ability to influence events "on the beach" and "over the horizon" - more than 1,000 miles inland, effectively carrying the war to the enemy's center of gravity.

"DD 21 will ...
influence
events ashore,
directly and
decisively,
anytime and
anywhere."

Admiral Johnson
CNO
Nov 97



Advanced Strike Capability



Greater lethality

Increased range

Improved accuracy

Penetrating warheads

Loitering, reprogrammable missiles

Shipboard mission planning and control

DD 21 will launch and control highly advanced precision strike missiles with flexible capabilities, such as:

- penetrating warheads to destroy underground targets, and
- loitering missiles which can be reprogrammed in-flight to strike higher priority, emergent, or mobile targets

DD 21 will manage “call for fire” taskings through both onboard and off-board mission planning and control systems to ensure it destroys the ***right target*** with the ***right weapon*** at the ***right time***.



Right target,
right weapon,
right time

Advanced Gun System

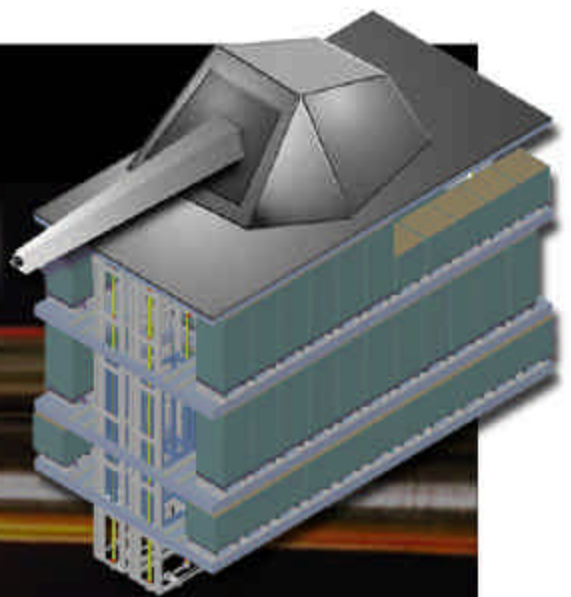
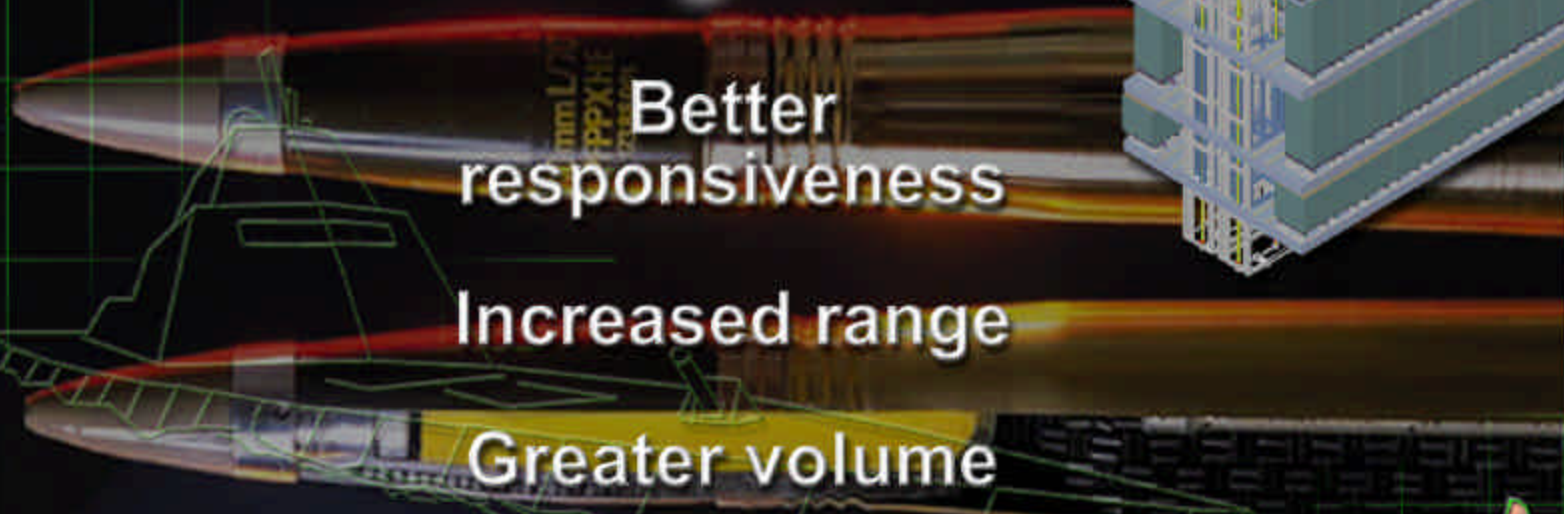
Better responsiveness

Increased range

Greater volume

Precision guided munitions

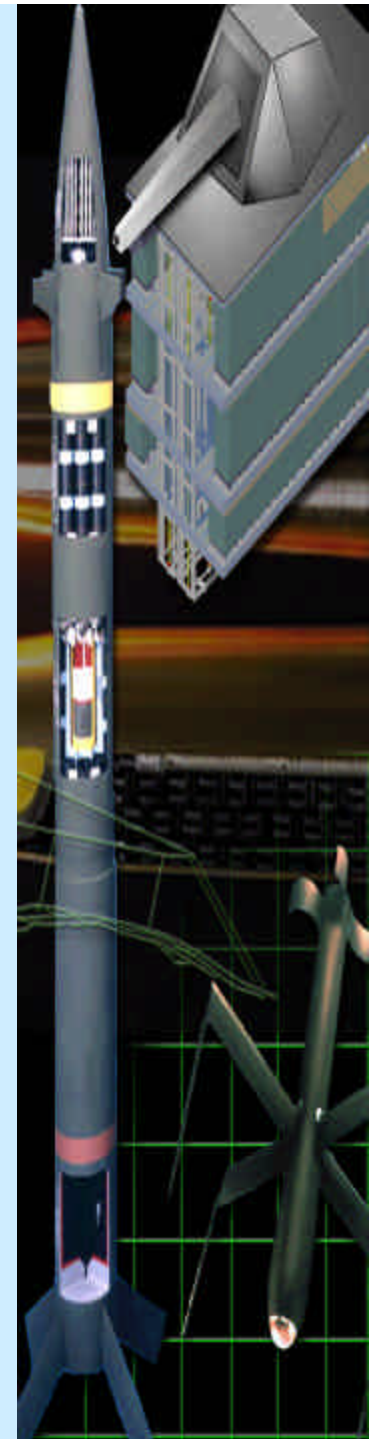
Shipboard mission planning and control



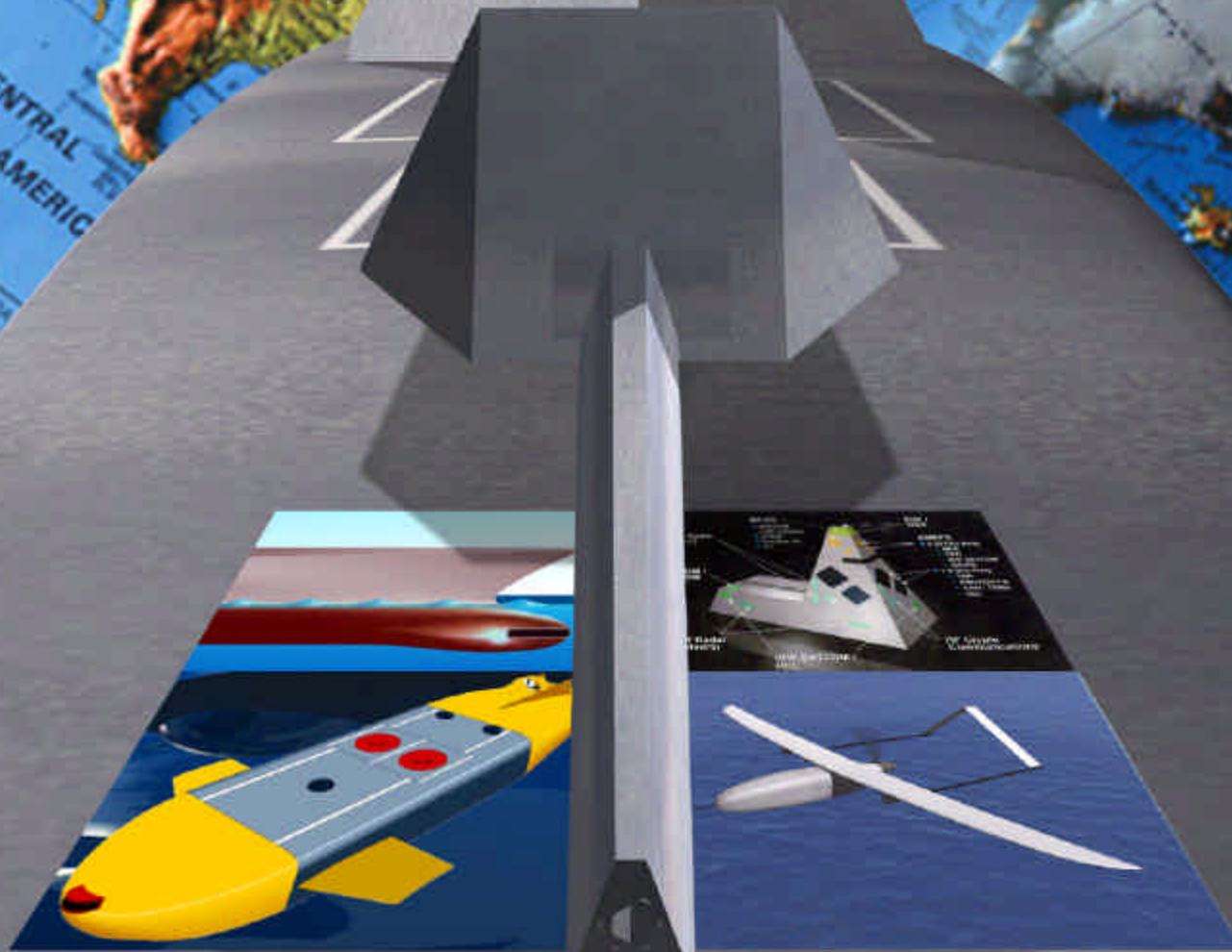
DD 21's Advanced Gun System will provide the volume of fires and sustainability, improved lethality, and increased range needed for 21st century warfare. It will provide extremely accurate sustained fires using precision-guided Naval and Joint Service munitions with nearly 10 times the range of current shipboard guns. The Advanced Gun System will expand on the Army and Marine Corps 155MM gun and will leverage existing ordnance technologies (e.g., 5" ERGM, Army XM982 155MM projectile, SADARM / Unitary warheads, Army Crusader program).

Built by United Defense, the advanced gun will meet the Marine Corps surface fire support requirements. Additionally, the gun system will support other DD 21 requirements.

- *Reduced manning.* The advanced handling system will be fully automatic and unmanned.
- *Reduced signatures.* The gun design, with its above deck structure, will meet the stealth requirement of DD 21.
- *Reduced O&S Costs.* The entire system will have reduced maintenance requirements.



Maritime Dominance



A prerequisite for land attack

Another DD 21 primary operational capability is maritime dominance - the seagoing component of Joint Vision 2010's tenet of dominant maneuver. Maintaining maritime dominance demands better situational awareness, full spectrum offensive engagement capability, robust self defense, and sufficient mobility to employ multi-dimensional forces to provide a decisive advantage over an enemy at sea.

Maritime Dominance is a prerequisite for land attack operations which allows naval forces to first control and then extend the littoral battlespace inland. The effect is to provide Joint and combined forces unimpeded access to strategic and tactical areas of interest ashore.

DD 21 will establish and maintain superiority over the surface, subsurface, and local air battlespace by performing a variety of maritime missions including air, surface, submarine, mine, and special warfare, and other fleet support operations.



Maritime dominance provides Joint and combined forces unimpeded access to strategic and tactical areas of interest ashore

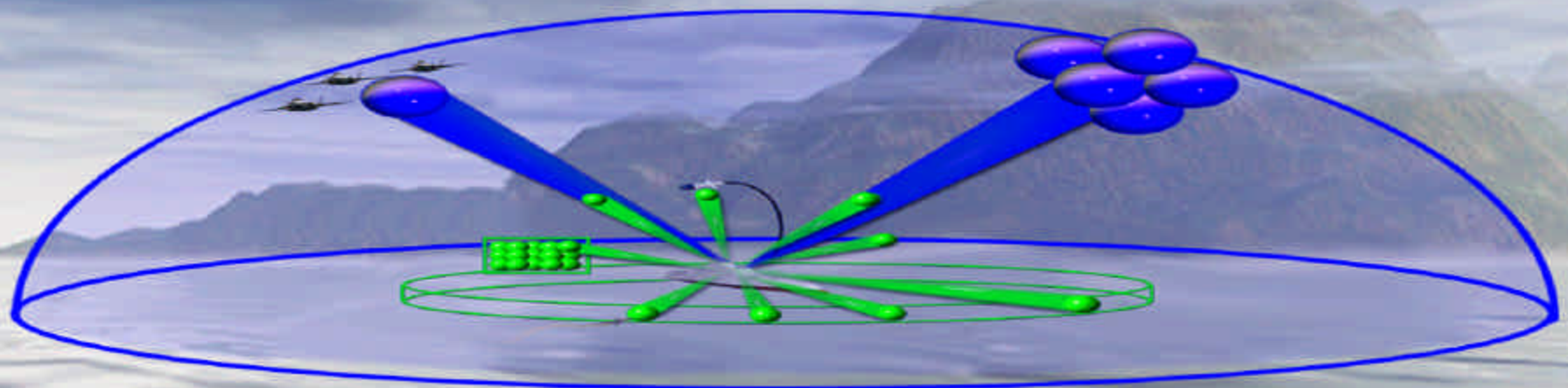
Air Dominance

Modern radars tailored for littoral operations

- Multi-function radar
- Volume search radar

Surface - to - air missiles

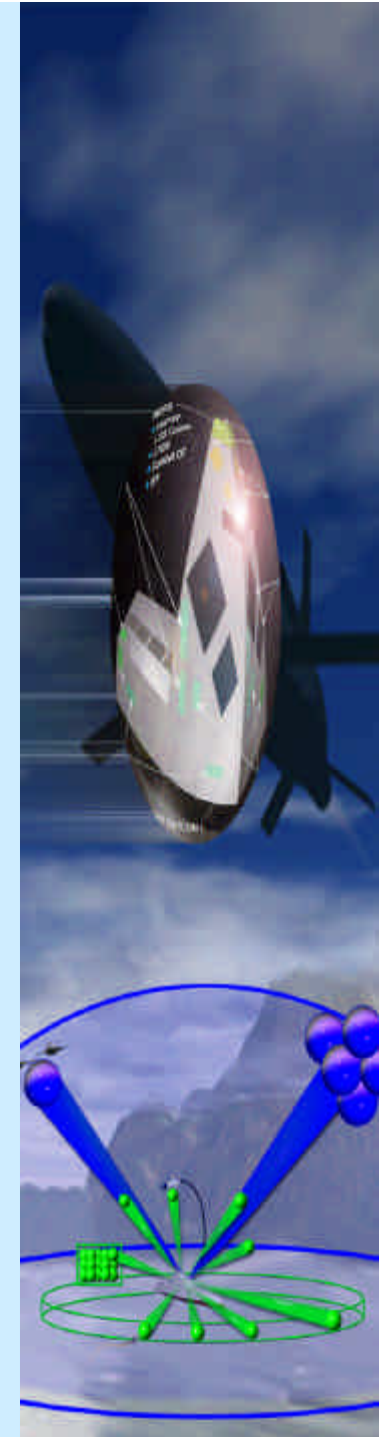
Cooperative engagement capability



For air dominance, DD 21 will employ a leading edge radar suite tailored for littoral operations. This radar suite combined with surface-to-air missiles and cooperative engagement capability will support the requirement to establish and maintain local area air superiority.

The Multi-function Radar (MFR) is a key part of the next generation AAW System. As low elevation air threats continue to evolve in capability, advances in radar technologies become essential to support operational and manning requirements. MFR, to be designed and built by Raytheon Systems Corporation, is a solid state active array radar system. This radar is more than a cruise missile defense radar. It must provide multi-function surveillance that can meet the performance requirements in all related mission areas. The Volume Search Radar (VSR) will complement the MFR. It will provide situational awareness, air control, track identification and counter battery locating data. The VSR will provide cue quality track data to the MFR and complement MFR for ship self defense.

Of equal importance, both radars will enable reductions in manning, life cycle cost, and topside signature.



Surface Dominance

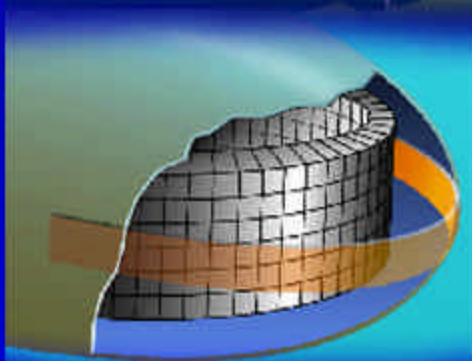


"United Defense"

DD 21 will ensure surface dominance to support regional expeditionary, Joint and Allied force operations. The Advanced Gun System, along with a full family of extended range precision guided munitions, will be a major contributor to surface dominance. The ship will also be capable of supporting and employing armed helicopters and tactical unmanned aerial vehicles to search, localize, target and destroy enemy surface platforms well beyond the effective range of the enemy's weapons.



Undersea Dominance



Allows DD 21 to operate in shallow littoral waters

In-stride mine detection and avoidance

Advances in

High frequency bow sonars

Broadband variable depth sonars

Remote minehunting systems

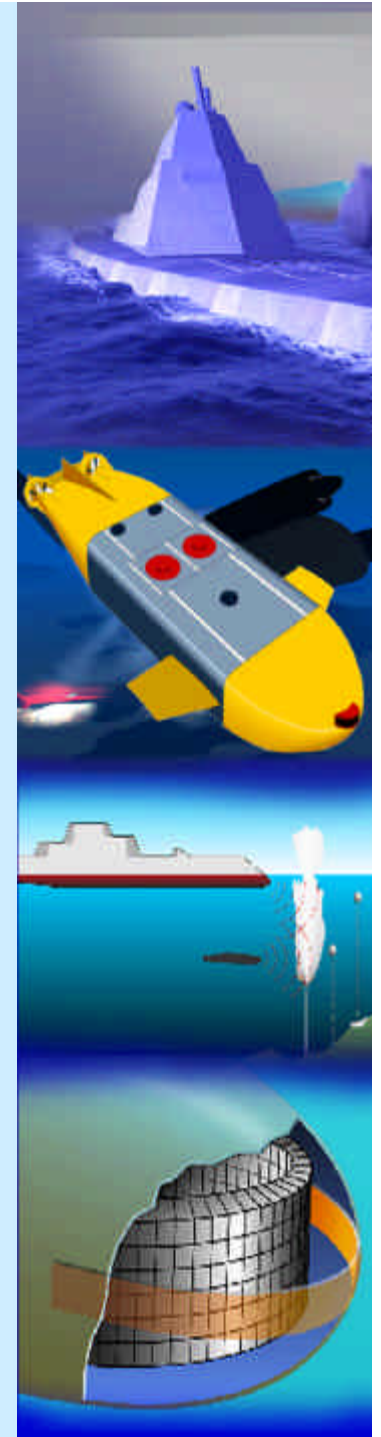
Acoustic countermeasures

Advanced degaussing

DD 21 will have an advanced integrated undersea warfare suite that encompasses:

- Ship quieting
- Torpedo countermeasures
- A hull-mounted sonar with mine-detection capability
- An advanced variable-depth sonar and multi-function towed array
- A command and display system providing 360 degree sensor coverage
- A highly capable anti-submarine torpedo

DD 21 will operate and support LAMPS helicopters and remote minehunting systems as well as broadband sonars. These organic systems will support a variety of littoral missions including battlespace surveillance, over-the-horizon identification and targeting, in-stride mine avoidance, and localization and destruction of enemy submarines.



DD 21 Enabling Technologies

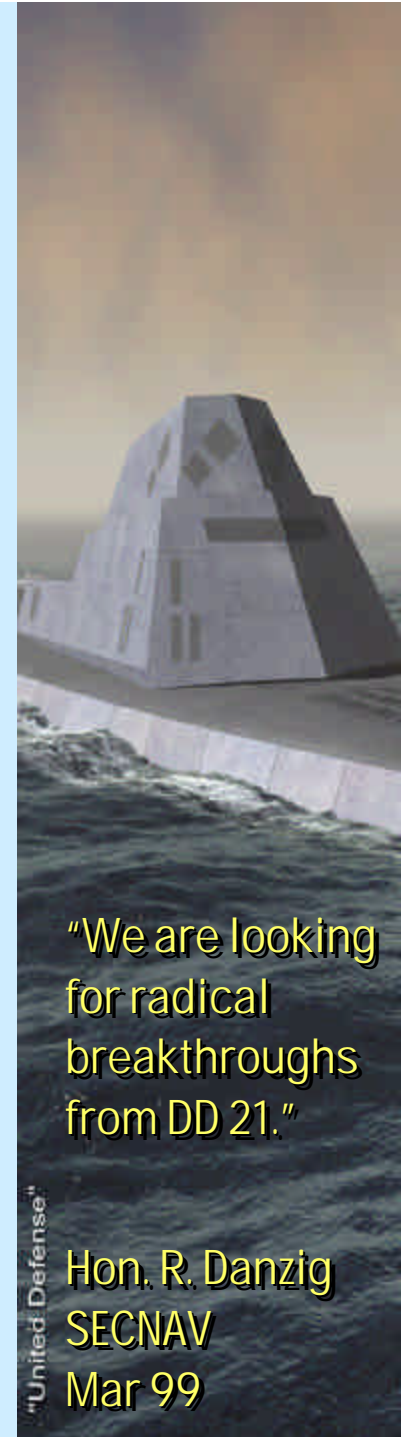
Survivability
and Stealth

Joint
Interoperability
and
Net-Centric
Warfare

Total Ship
Computing

In order to fight and win in the demanding littoral threat environment, DD 21 will take advantage of:

- Advanced survivability features and stealth technologies
- The ability to interact, coordinate, and share information with other units in a Joint task force
- A commercially based, open-system computing environment distributed ship-wide for both tactical and non-tactical use

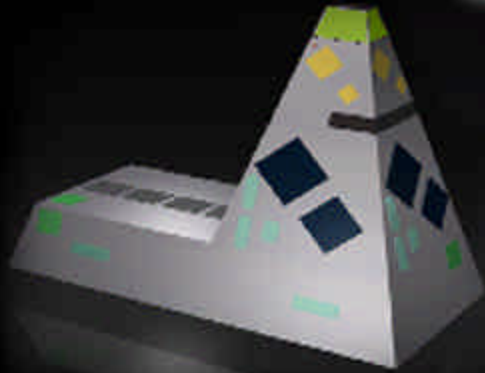


"We are looking for radical breakthroughs from DD 21."

Hon. R. Danzig
SECNAV
Mar 99

"United Defense"

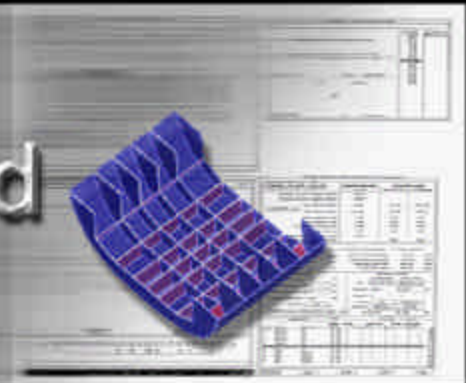
Ship Survivability



Revolutionary
signature reduction



Advanced
superstructure and
apertures



Automated damage
control systems

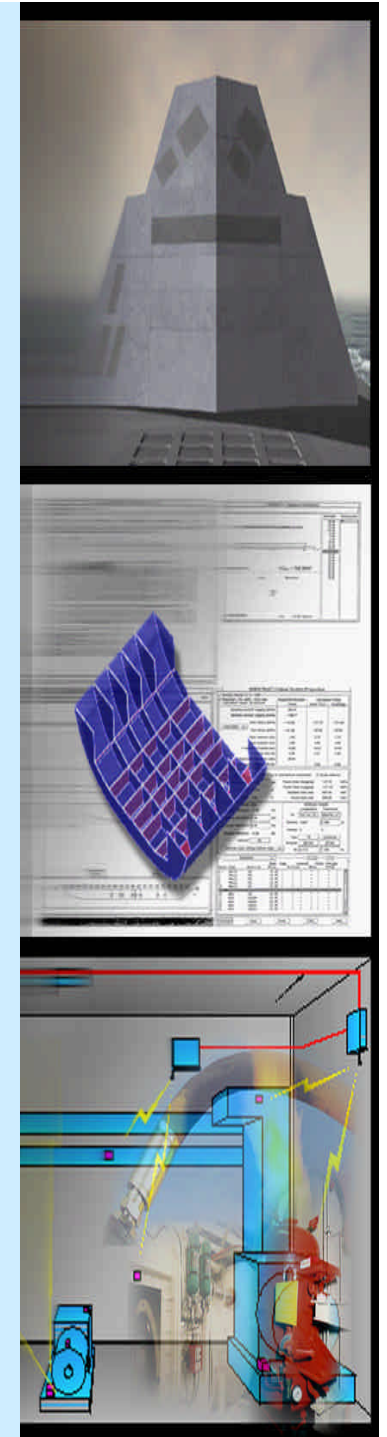


Operating in the littoral environment involves unique environmental challenges, such as radar clutter, congested air and sea traffic lanes, and poor acoustic conditions, as well as diverse threats like sea mines, diesel-electric submarines, anti-ship cruise missiles fired from shore batteries, and highly maneuverable missile patrol craft.

To improve survivability in this complex and dynamic environment, DD 21 will be designed with “stealth” technologies to reduce its visual, radar, infrared, acoustic, and magnetic signatures. DD 21 will have an integrated topside design with an advanced superstructure and advanced multi-function apertures. In addition to improving self-defense, DD 21’s revolutionary signature reduction will greatly enhance its offensive capabilities by allowing it to operate closer to shore despite threat conditions.

Technologies being developed for potential inclusion in a damage-tolerant DD 21 design include a shock-resistant hull, a robust electrical power distribution system, and an integrated magazine protection system.

DD 21 survivability performance must support damage control operations in a reduced manning environment. This may be satisfied with advanced automation, sensors and control, and systems such as robotic fire-fighting. Automated systems will be used to pre-configure and reconfigure systems for combat; monitor equipment status; and detect and counter smoke, fire and flooding.



Joint Warfighting Environment

Situational awareness

Battlespace deconfliction

Joint force ID / location / allocation

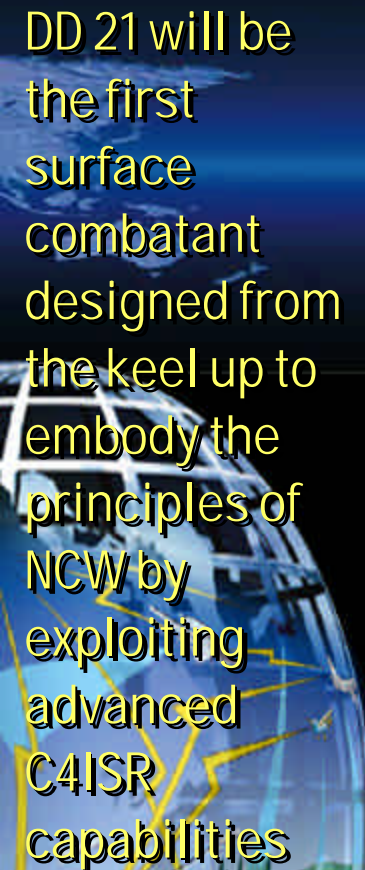
Ordnance on target



Joint interoperability - the ability to interact, coordinate, and share information with other units in a Joint task force is another key enabling capability of DD 21. Increasingly, “time” is recognized as a precious and valuable commodity that must be accounted for when designing new weapon systems. The need for rapid and informed responses to warfare tasking has led the Navy to develop the concept of “Net”-Centric Warfare (NCW) and to increase emphasis on Information Warfare.

Under this concept, synergies are created in the areas of sensing and detecting, information exchange and coordination among all task force elements, and in the conduct of maneuvers. These synergies yield dramatic improvements in warfighting.

Operating seamlessly with other U.S. or allied forward-deployed forces, DD 21 will achieve the effects of mass, or concentration of combat power, without having to physically mass forces as in the past. DD 21 will be the first surface combatant designed from the keel up to embody the principles of NCW by exploiting advanced C4ISR capabilities. The “Sensor-to-Shooter” connectivity envisioned for DD 21 will provide Naval or Joint task force commanders the range of firepower options needed to match a given target set with the best combination of hard and soft-kill weapons, thus increasing overall Joint combat effectiveness.



DD 21 will be the first surface combatant designed from the keel up to embody the principles of NCW by exploiting advanced C4ISR capabilities

Total Ship Computing

Warfighting Enabler

Distributed processing

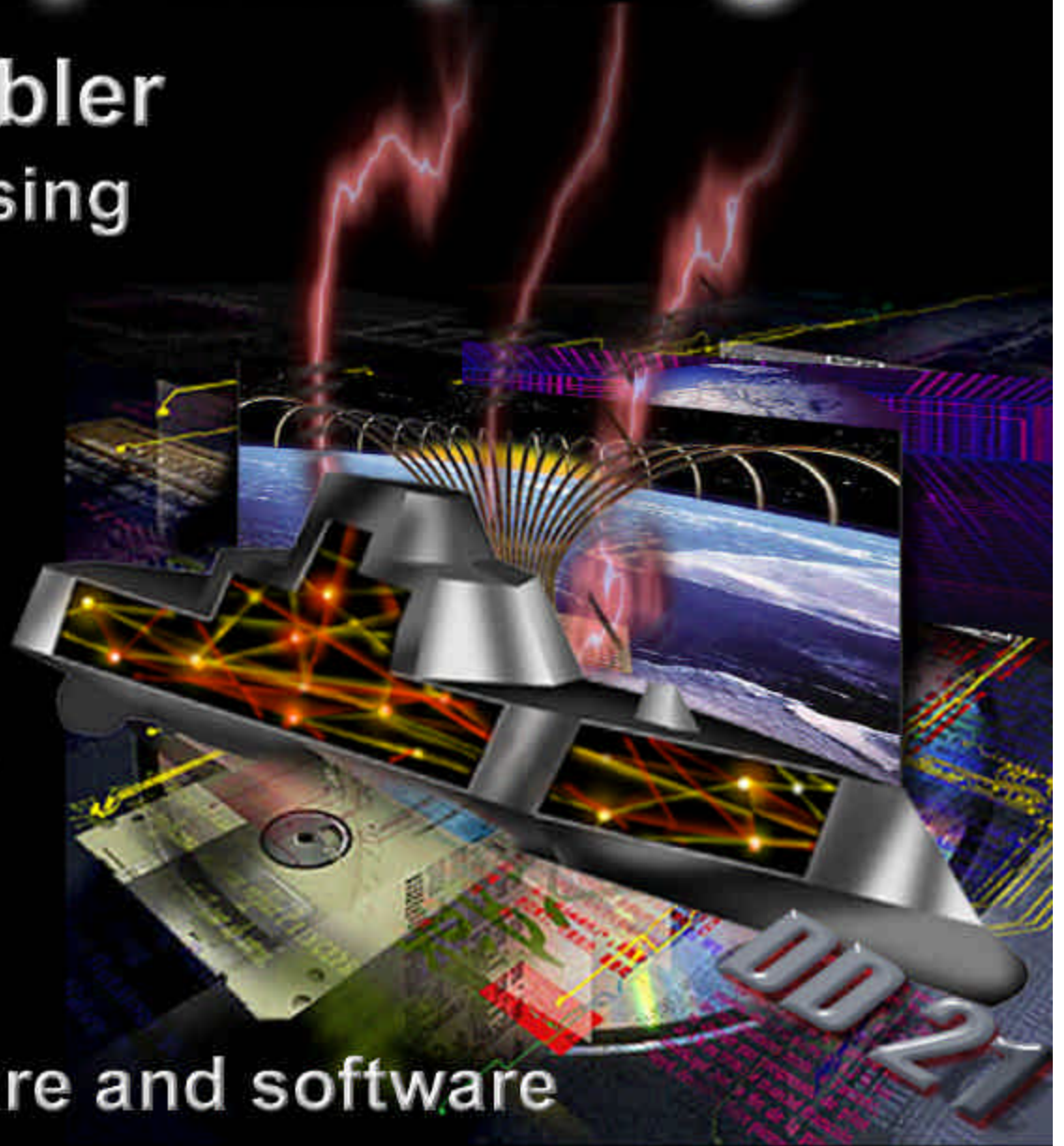
Single information architecture

Real-time, non-real time integration

Multi-level security

COTS based

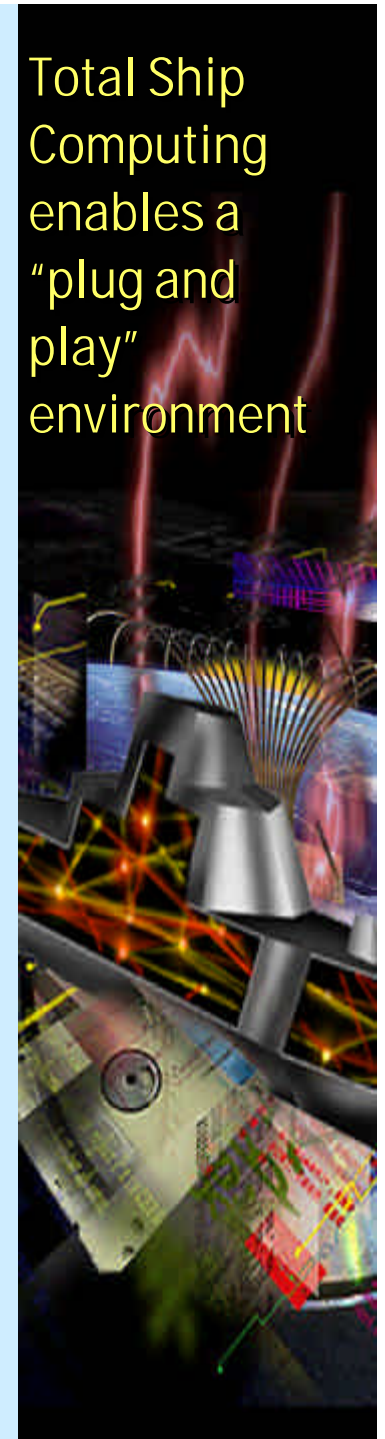
De-couples hardware and software



Total Ship Computing (TSC) is another key enabling capability for all DD 21 warfighting missions and shipboard functions. TSC is a commercially based, open system computing environment distributed ship-wide for both tactical and non-tactical use. “Open System” specifications for interfaces, services, and supporting formats enable components to be used across a wide range of systems with minimal changes by providing interoperability with other components on local and remote systems in a way that facilitates portability.

By taking advantage of commercial advances in computer processing power, distributed / integrated data networks, and software development, TSC enables a “plug and play” environment for all internal and external user systems. The TSC ship control architecture will also enable rapid and cost-effective software development, upgrade, integration, test, certification, and delivery.

Total Ship
Computing
enables a
“plug and
play”
environment



The Result...

Y
T
-
V
-
T
-
C
M
Z
Z
O
C



Data / Information

*Filtered
Correlated
Relevant
Knowledge*

Knowledge Engineering

Consistent with *Joint Vision 2010*'s emphasis on information superiority, TSC capability will support DD 21's Integrated Command Environment to provide tactical commanders a "fused battle picture" on panoramic displays. Information (e.g., maps, environmental data, target identification) can be "pulled" from shipboard and off-board (theater and national) sensors.

DD 21 will provide tactical decision makers with knowledge - rather than simply data or information of the surrounding battlespace, while sharing that knowledge with others using direct, interactive communication networks.

