US Navy's Display Considerations

"Sea Power to the Hands of Our Sailors"

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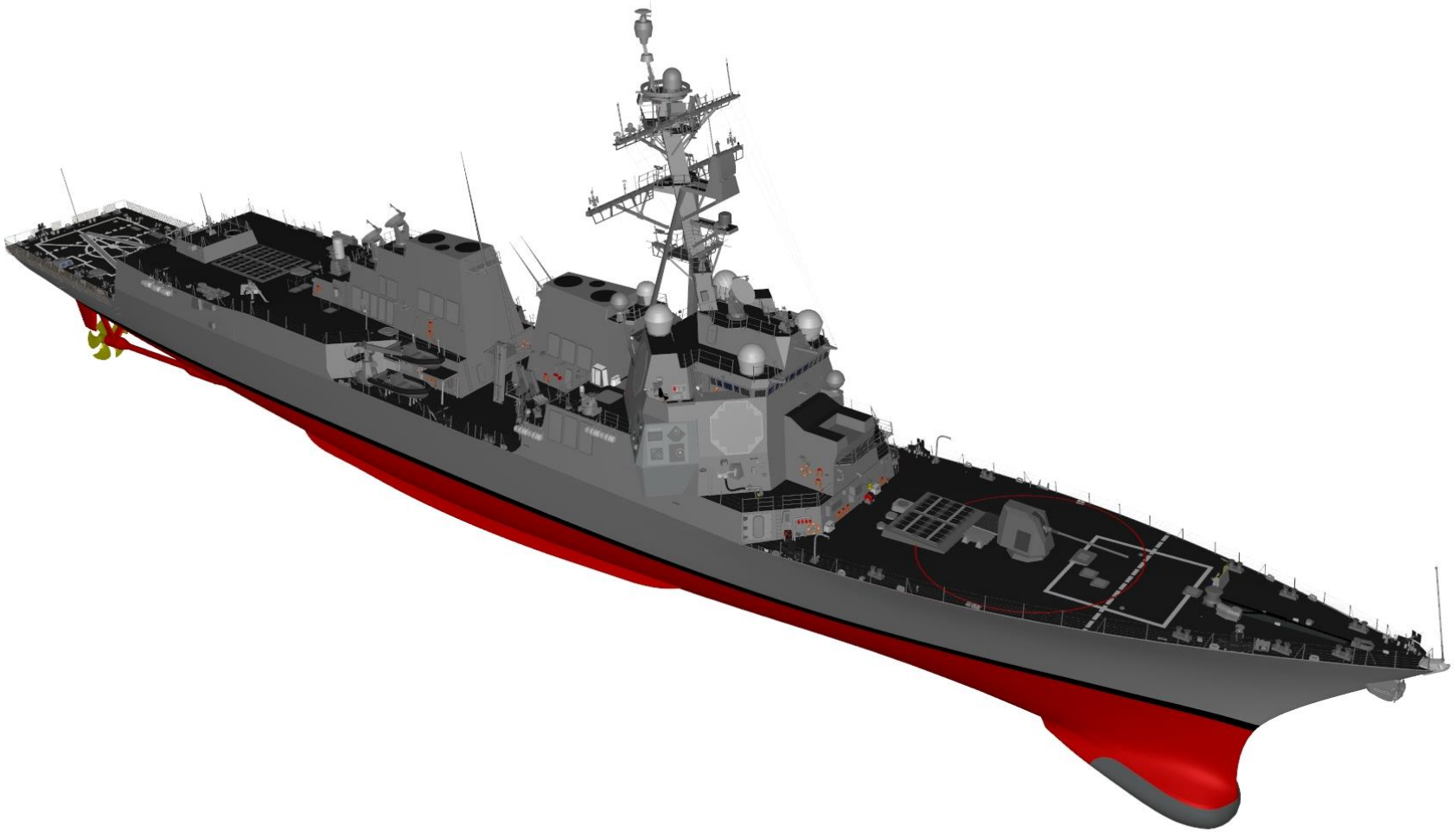
Discussion

- Warfighter's Workload
- Today's Display
- Future Display Technologies
  - Situational Awareness
  - Decision Making Ability
  - Rapid Response

DDG 51 ARLIEGH BURKE Class Destroyer



Increasing Missions and Complexity

Operational Environment

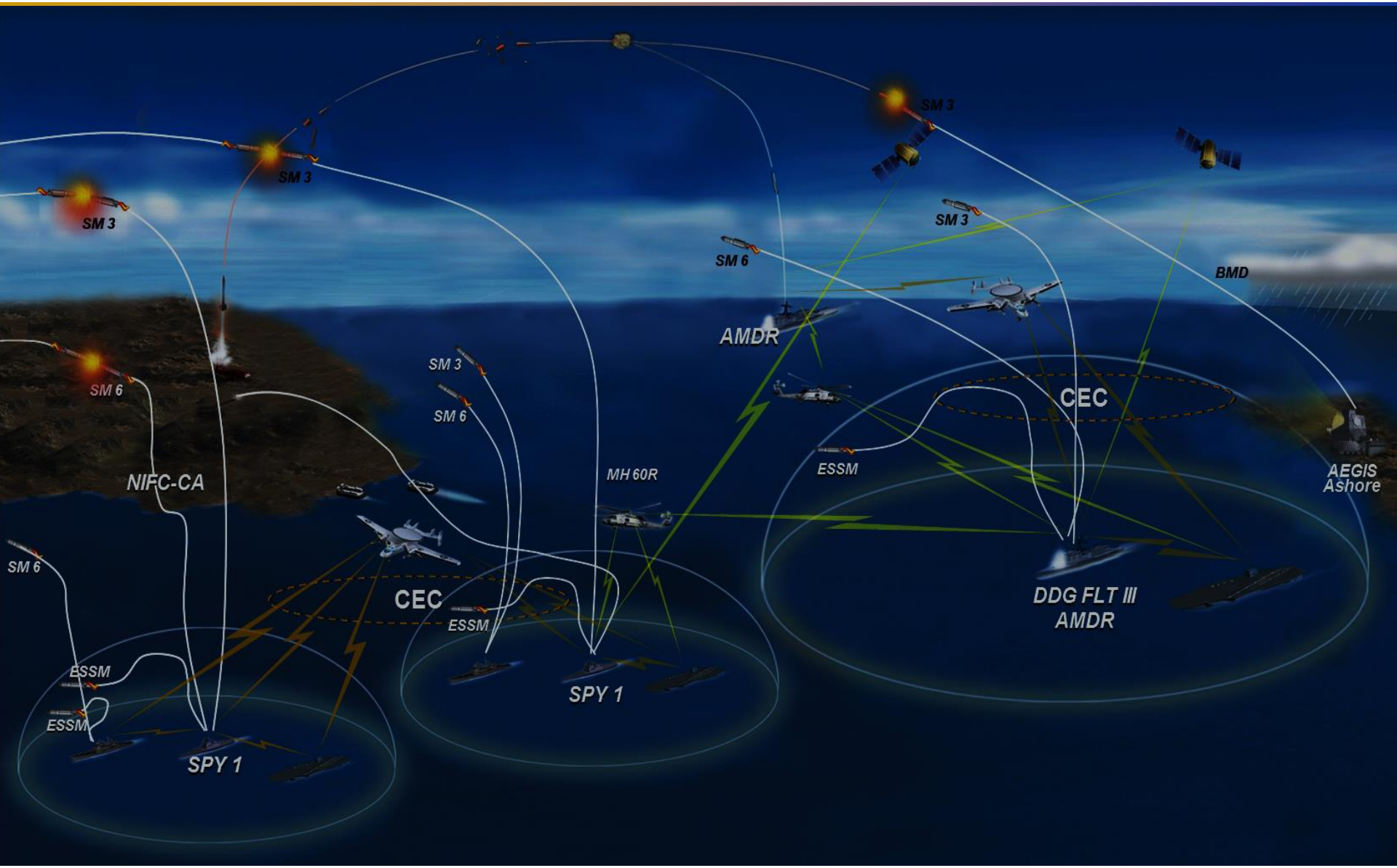
- Humanitarian Assistance
- Super-Sonic Anti-Air & Anti-Surface Missile
- Advanced Super-Sonic Anti-Air & Anti-Ship Missiles
- Short and Medium Range Ballistic Missiles
- Simultaneous Raids Across Multiple Mission Areas
- Anti-Piracy
- Disaster Relief
- Mines
- Persistent ISR
- Small Boat Attacks
- Torpedoes
- Stealth Under-Sea
- Complex Threats: Employing Advanced Technology in Challenging Environments
- Cyber Warfare
- Anti-Ship Ballistic Missiles

Capability Advancements

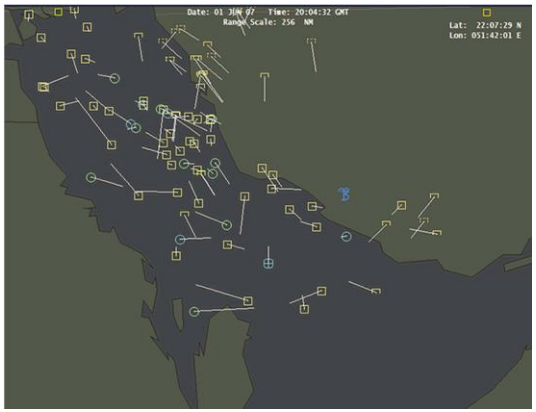
- Integrated AAW & Situational Awareness
- Area Air Defense In Clutter Environments
- High Data Rate Battle Group Networks
- Over Land Defense
- Improved Self-Defense
- Integrated Air and Missile Defense
- Space Based BMD Tracking
- Enhanced Shipboard Sensors (Radar+ ES/EA)
- Multi-Ship Resource Coordination
- Cyber Defense
- UAV Integration
- Directed Energy
- Rail Guns

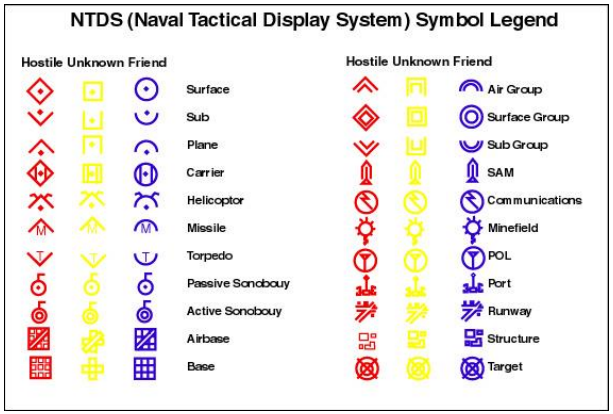
Increasing Warfighter's Workload

Overview



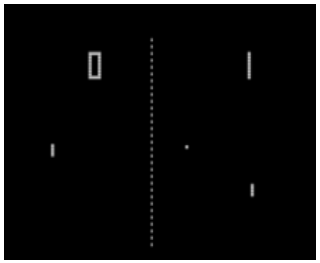
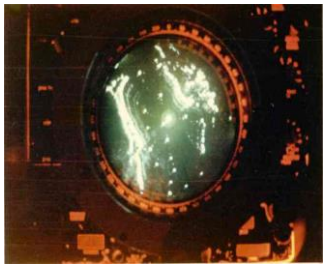
What is Displayed Today?





- Display Show Air Tracks Flying Around a Geographical Area With Course and Speed
- Not Readily Displayed Are:
  - Altitude
  - Changes in Altitude Or Speed (Increasing or Decreasing)
  - Type of Aircraft or Type of Ship
  - Ranges of Sensors and Weapons
  - Link Connectivity

Technology Growth

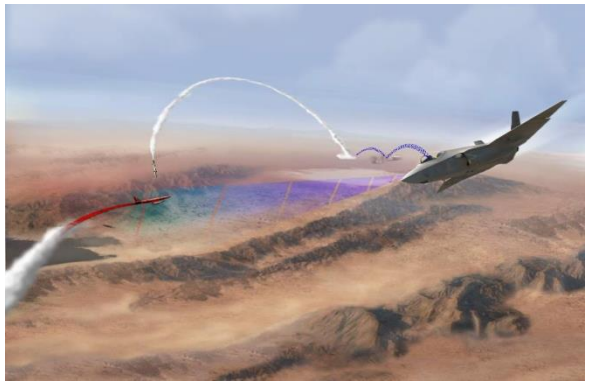
	1970's	1990's	2010's
Commercial Console			
Commercial Display			
Navy Console			
Navy Display			

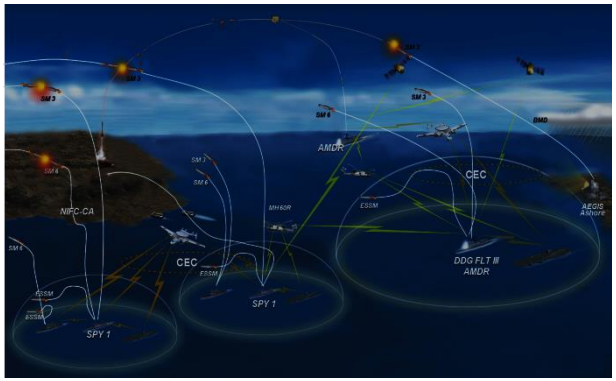
3D Display Improvements

- Track Attributes
- Track History
- Platform's Limitations (Sensor/Weapons Coverage, Cutouts, Blockages Zones)
- Real Time Systems Status
- Links Coverage
- Quality of Services
- Local and Theater Environment
- Platform Point of View (POV)
- Decision Aids

3D Tracks

- Track Attributes
  - Course/Bearing, Range, Elevation, Speed
  - Assignments
- Track History
  - Track History Provides a Story of a Ship, Aircraft, Submarine or Other Contact of Interest
  - Intent - Where the Track Has Been, What Maneuvers Has It Made, Do the Maneuvers Make the Track a Possible Threat

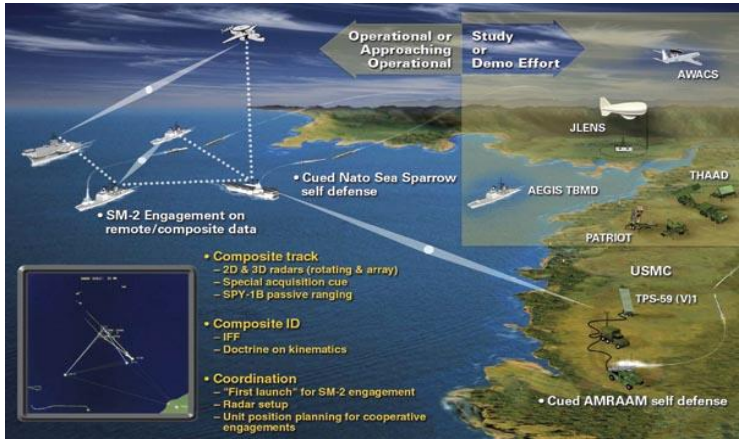




Naturally Intuitive for Improved Human Performance

3D Platform Overlays

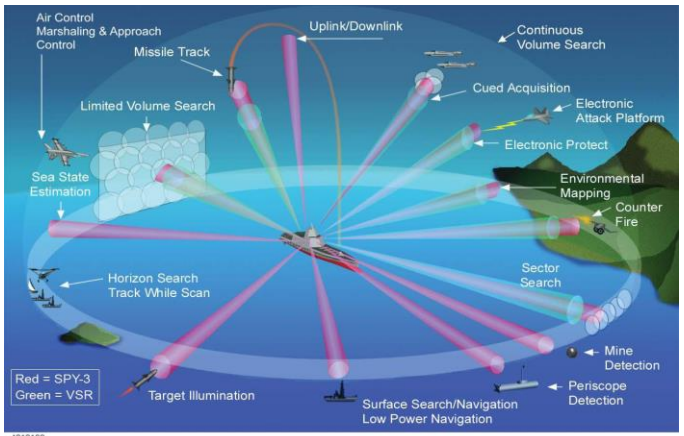
- Platform Structural Cutouts and Blockage Zones
  - Weapons
  - Sensors
  - Communications
  - Visual
- Coverage Zones and Performance Envelopes
  - Weapons
  - Sensors
  - Communications
  - Visual
- Tactical
  - Air Lanes 3D “Pipe” In the Sky
  - Sea Lanes
  - Land and Undersea Topology
  - Weather

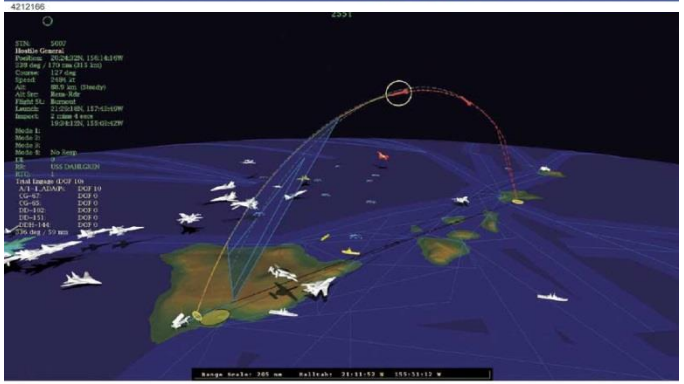


3D Overlays Will Increase Situational Awareness and Rapidly Aid in the Decision Making Process

3D Real Time System Performance

- 3D Provides The Warfighter a Real Time Visual Awareness and Assessment of Sensor, Weapon, Ship's Systems and Tactical/Strategic Performance
- Status:
  - On/Off
  - Min/Max Range
  - Tracking
  - Searching
  - Illuminating
  - Target pairing
  - Datalink Connectivity
  - Non-Radiating Zones





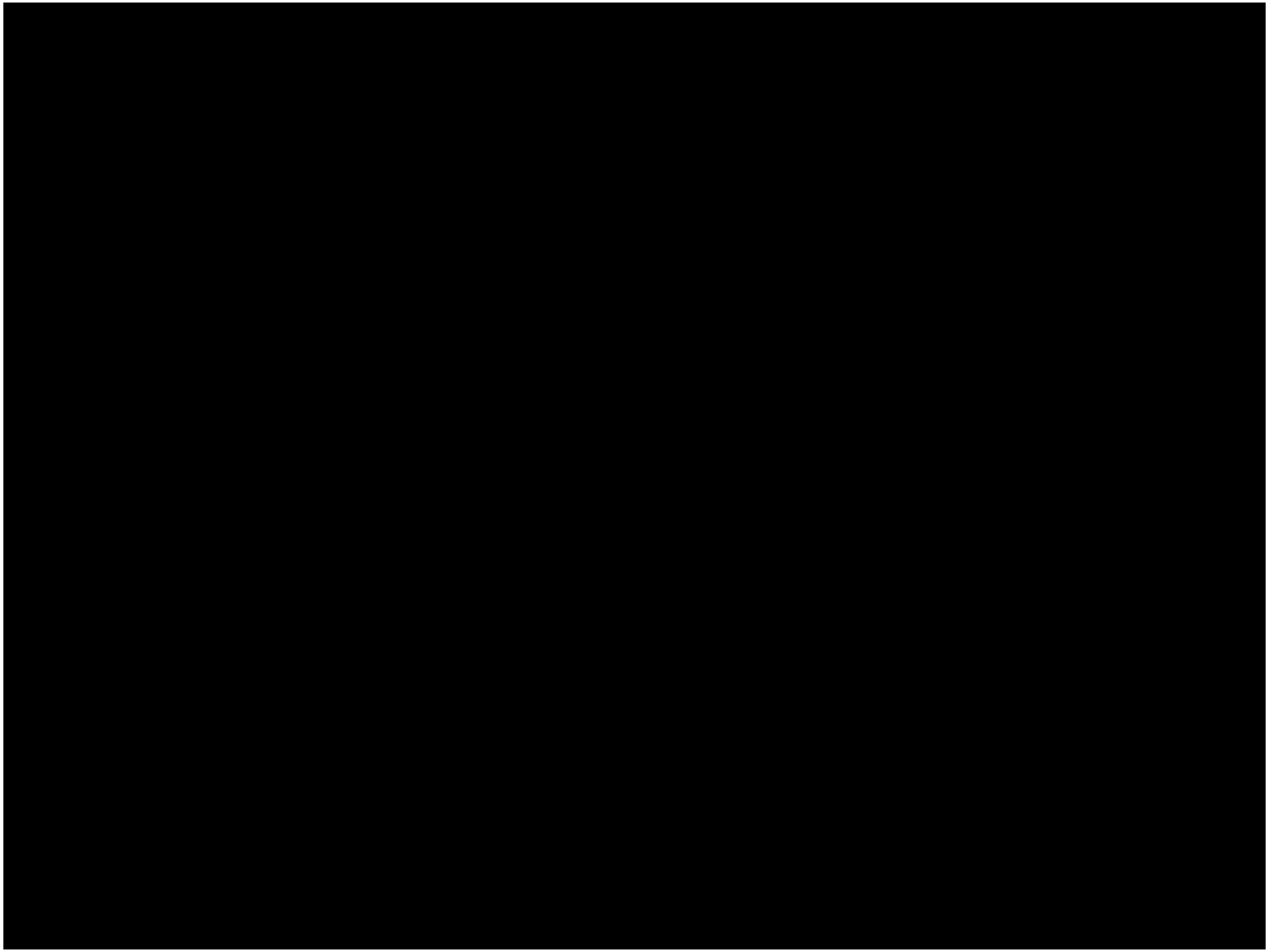
Source: March/April 2001 Surface Warfare Magazine

3D Real Time Visual Ship and/or System Performance Would Provide Operators with Full Situation Awareness of The Battlefield

Others Benefits

- Quality of Services
- Local and Theater Environment
- Platform POV
- Tactical Decision Aids
- Other Uses Cases
  - Training
  - Maintenance
  - Logistics
- More…

https://youtu.be/KyW1RP-WVHY



Displays and Today's Warfighters

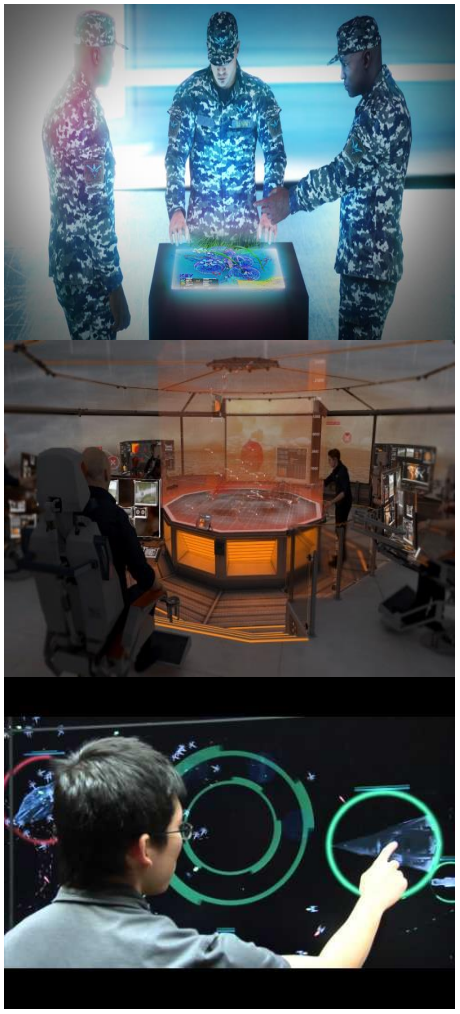
- Tactical Visualization Has Not Kept Pace With Technology to Support Today's Warfighters
- Situational Awareness is Paramount for Warfighters to Combat Exponential Increasing Complexity and Speed of Threats
- Current "Hunt and Peck" for Data and Tactical Significant Information Does Not Leverage the Technical and Gaming Skills of Today's and Tomorrow's Warfighters
- 3D Displays will Enhance the Warfighters Ability to Operate in Today's Data (Information) Filled Battlefield. Visually Showing Real Time Data and Tactical Situations Faster and In-Depth, Giving the Warfighter the Information they Need to Better Assess the Situation and Make Faster Informative Decisions

Future Display Technology

1970's

Today

Future



2020's and Beyond

- Naturally Interactive
- Real Time Information Management Environmental
- Scalable and Selectable Situational Awareness
- Decision Aids

SUMMARY

- Today's Warfighter is Still Using 1970's 2D Displays in a Time Where Everything is Faster and More Lethal
- In Order to Be Successful to Fight and Win, We Have to Win the Data (Information) War
- 3D Displays will Enhance the Warfighters Ability to Operate in Today's Data (Information) Filled Battlefield. Visually Showing Real Time Data and Tactical Situations Faster and In-Depth Will Give the Warfighter the Information They Need to Better Assess the Battlespace and Make Faster Informative Decisions