



# THE NAVY PERSPECTIVE: FUTURE NETWORK WARFARE CONCEPTS

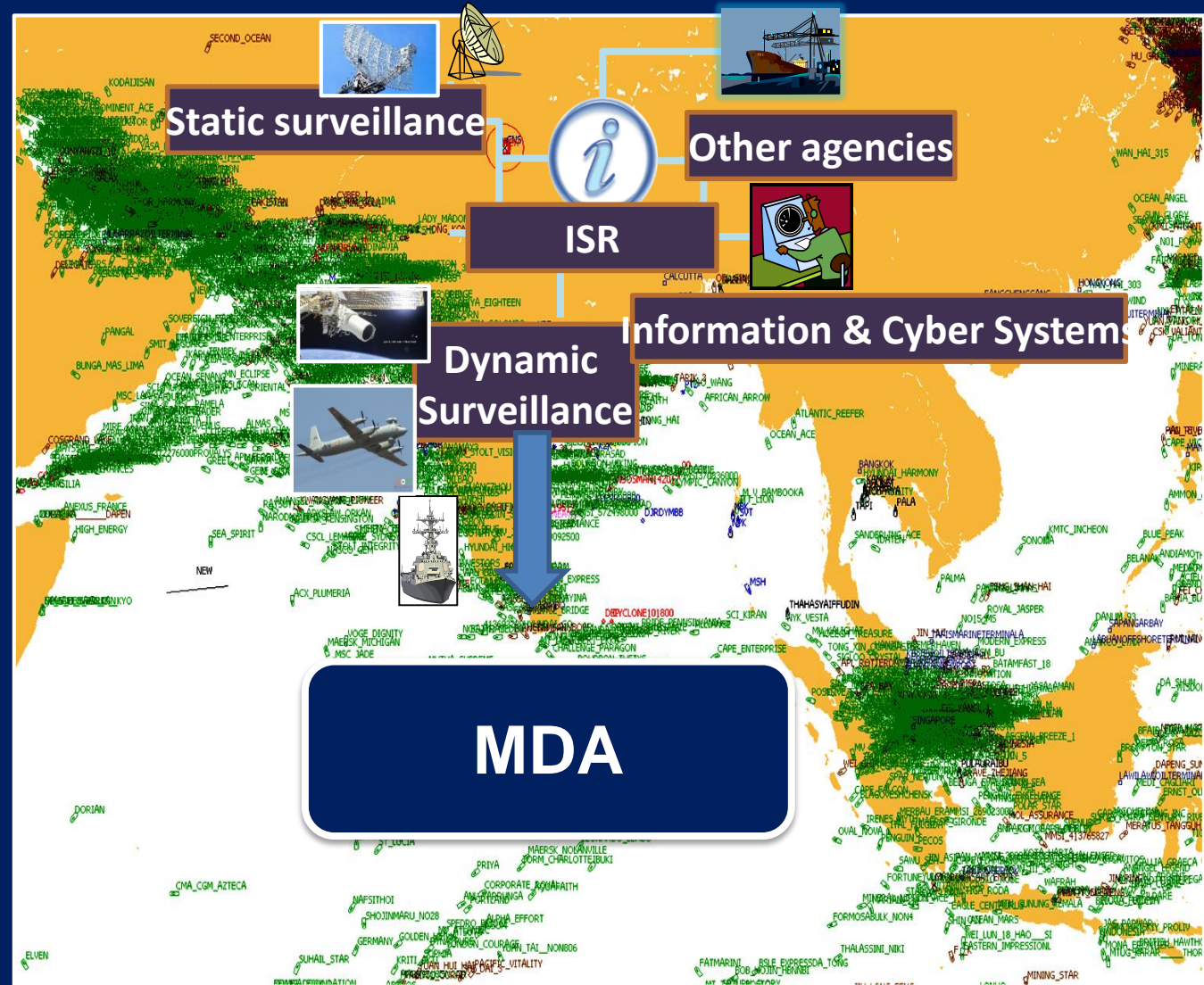
- RAdm Sanjay J Singh

# Maritime Domain Awareness (MDA)



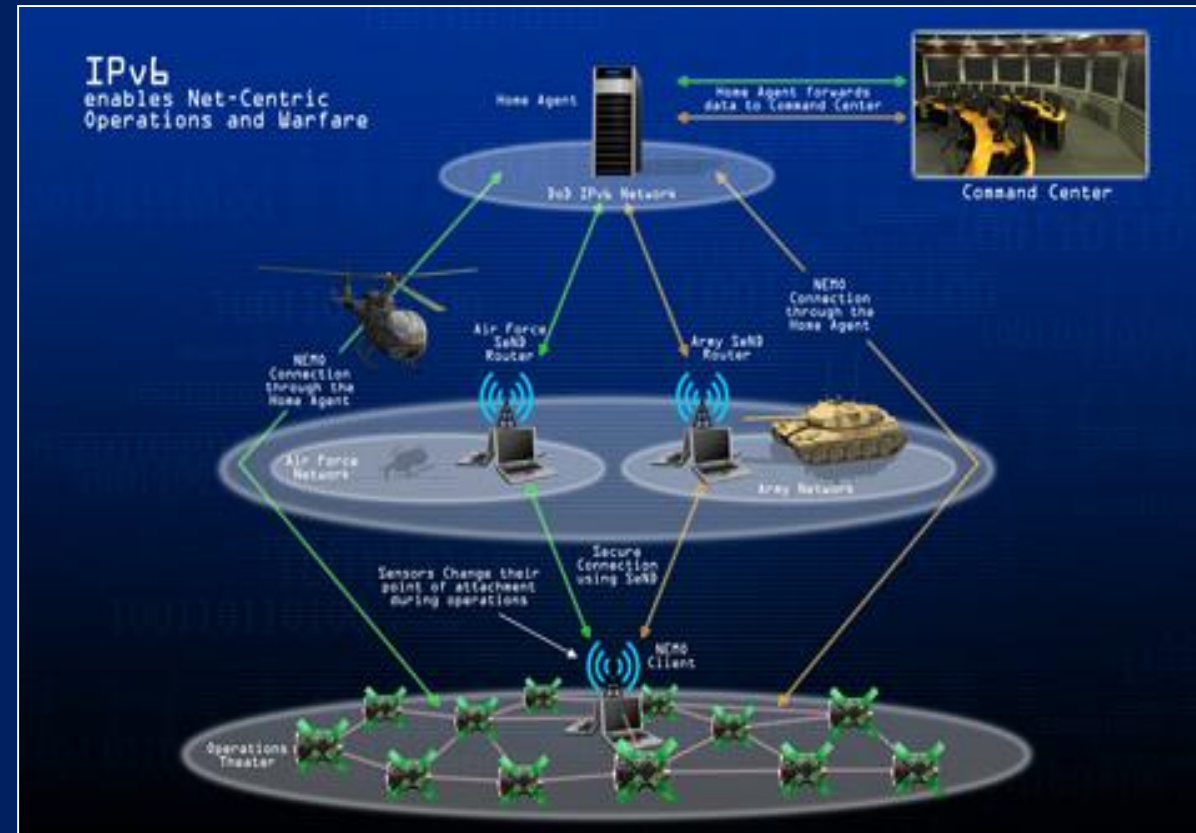
# Maritime Domain Awareness (MDA)

- MDA is developed using static & dynamic surveillance means
  - Surface, Aerospace, Sub-surface
- MDA needs correlation of Information & Intelligence, using Networked systems
- Based on latest ISR & ICT technologies



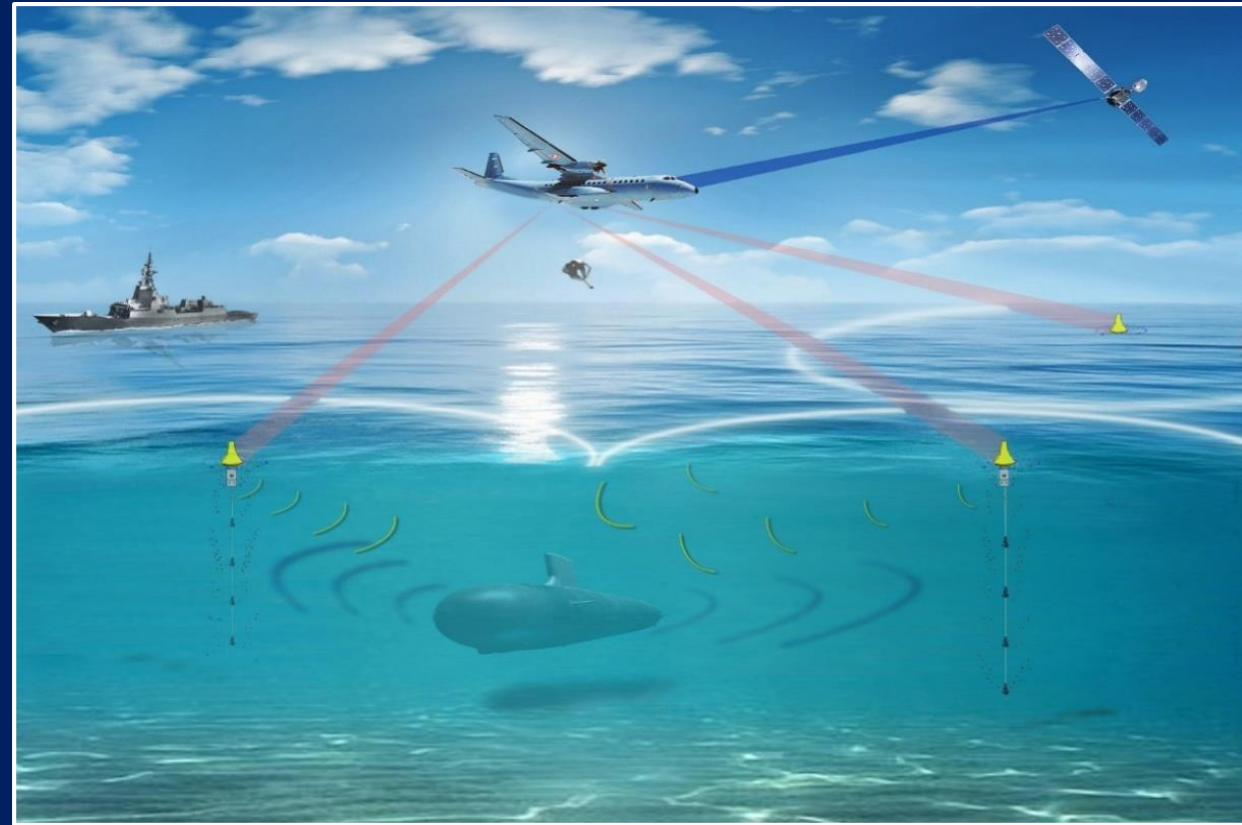
# Networked Operations

- Networking is essential for effective MDA and synergy of operations
- Connectivity across maritime theatre with real-time information correlation and dissemination
- Communication and information exchange across all maritime dimensions key enabler for maritime and joint operations



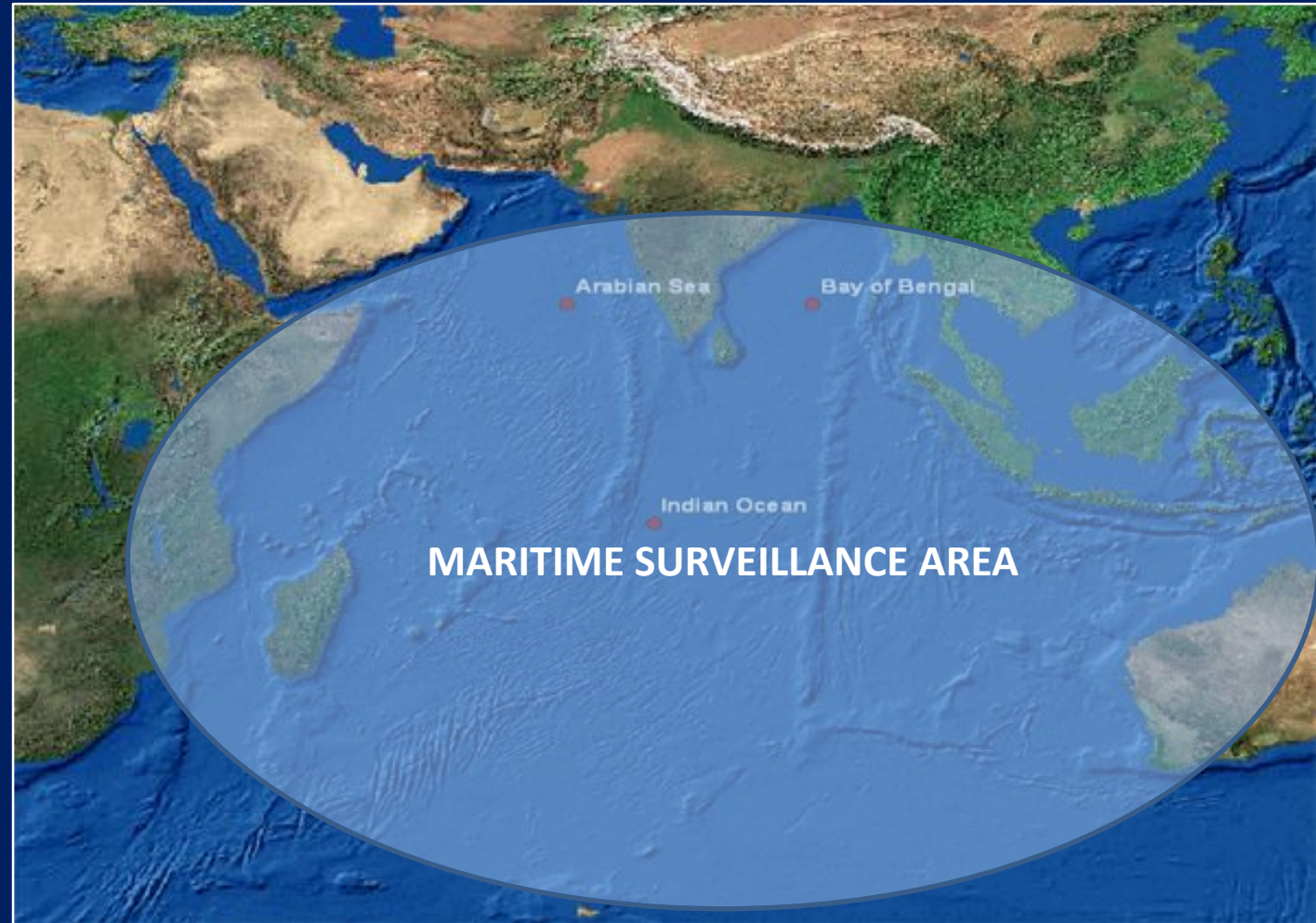
# Network Centric Operations (NCO)

- NCO entails networked operations at higher levels of cohesion & integration, of both surveillance and combat systems, across the force. Aimed at CEC.
- Needs highest levels of speed, accuracy, integrity and security of information gathering and exchange, across maritime dimensions & Area of Operations, in a common/ linked network



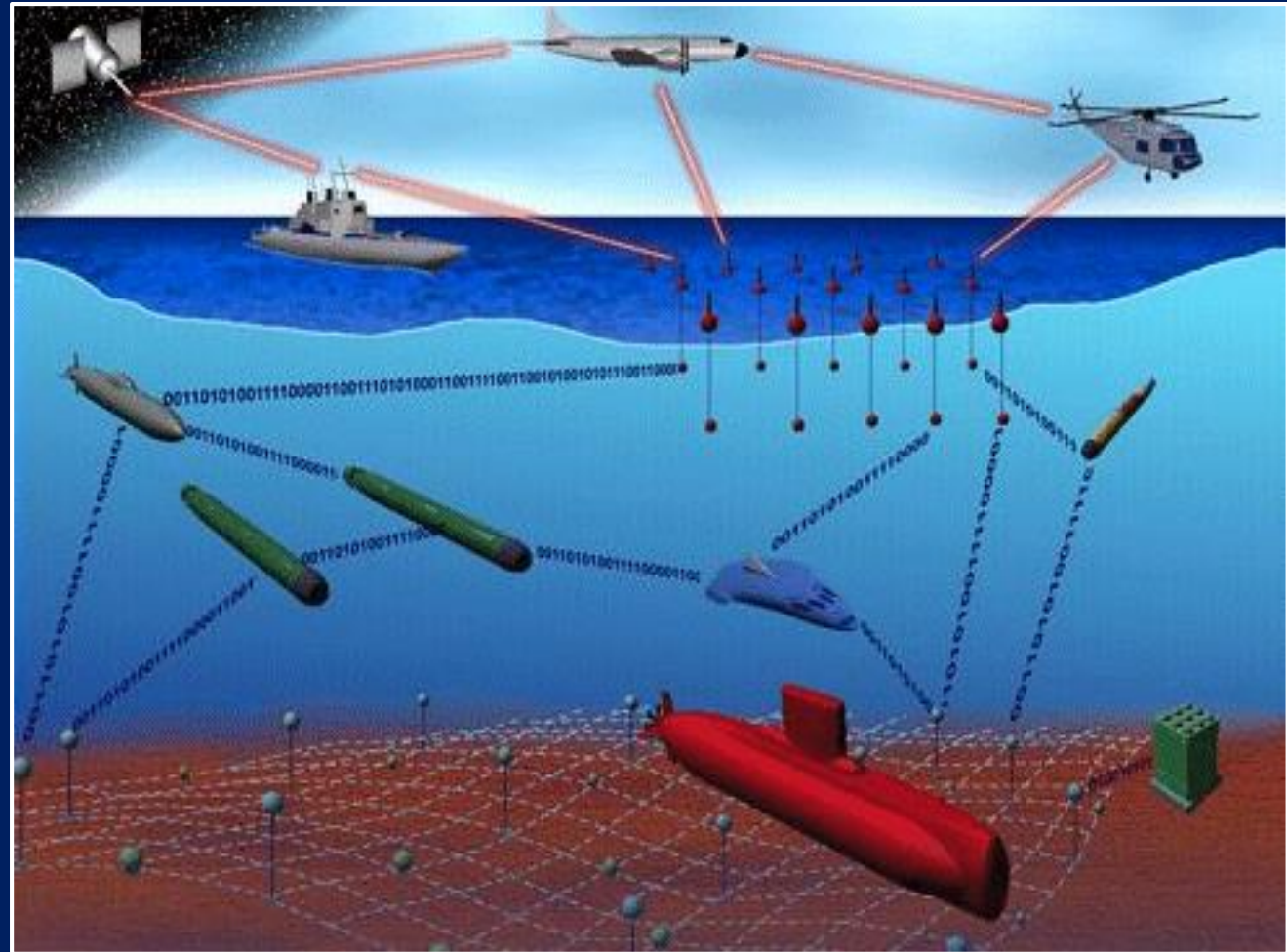
# MDA & NCO Features

- **Cover large area of operations**
  - Surveillance over vast area, at frequent intervals and, at times, continuously
  - Surveillance means must have longer reach: Speed Endurance & Detection
  - Multiple dimensions: air, surface, underwater, cyber, & space
  - Resolution amidst dense traffic



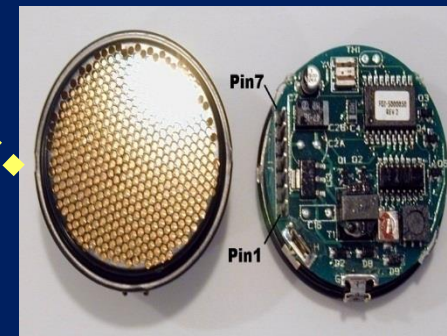
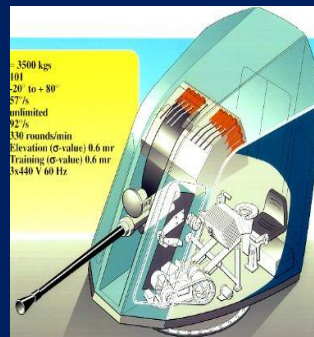
# MDA & NCO Features (2)

- **Networks & Info Exchange**
  - High QoS communications: rapid/ real-time, secure, reliable
  - Adequate bandwidth and capacity to deal with large and fast data flow, across multiple channels, dimensions and platforms
  - System of correlation of information for classification & identification, incl data-basing



# MDA & NCO Features (3)

- Integrating Sensors & Weapons
  - Varying inputs over time & space
  - Data output compatibility with needs of other systems & weapons
  - Correlation required for composite and coherent MDA
  - Multi-Sensor Multi-Platform Data Fusion (MSMPDF)
  - Threat Evaluation & Resource Allocation (TERA) Matrix

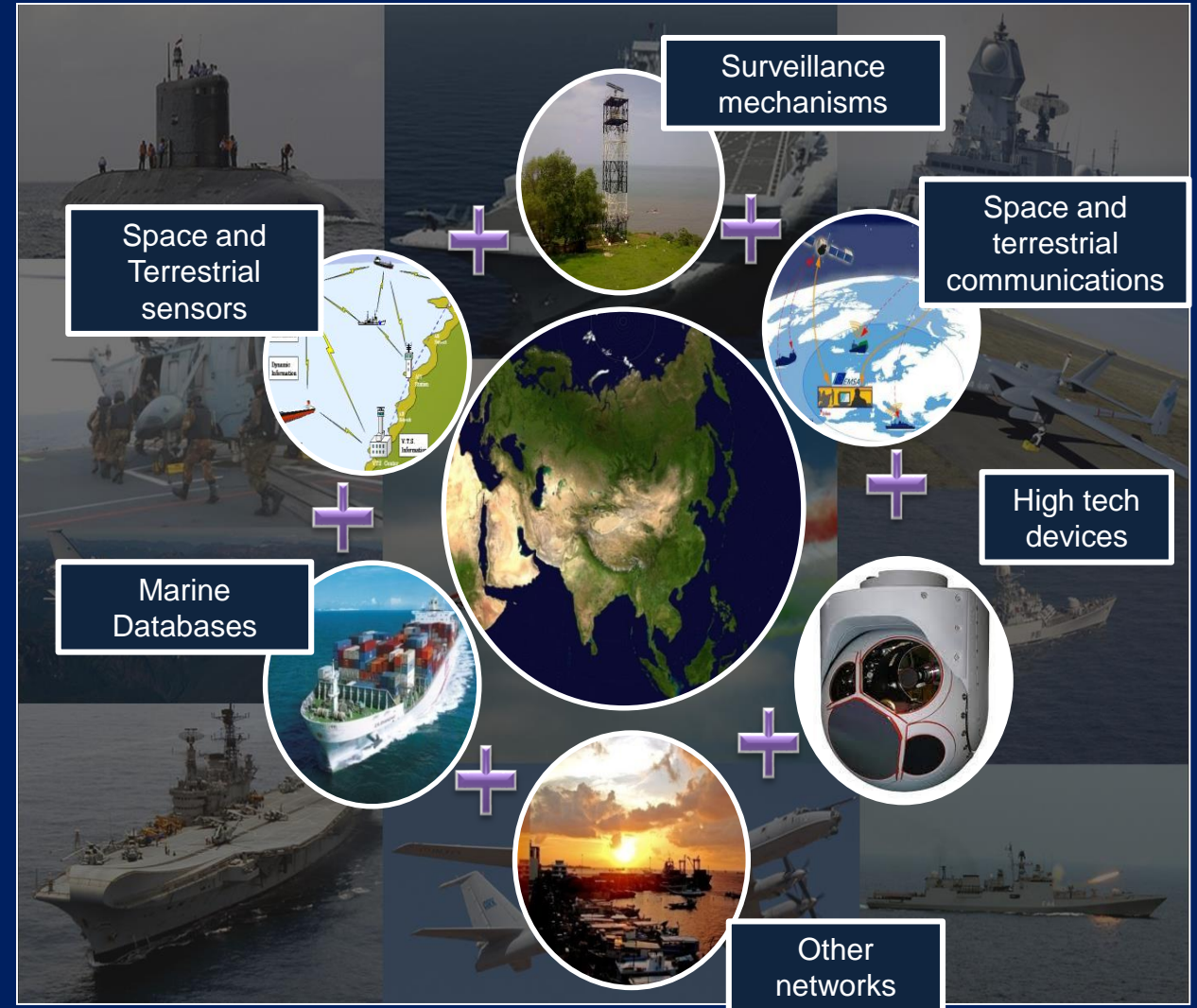


**WEAPON  
SENSOR  
SYSTEM**



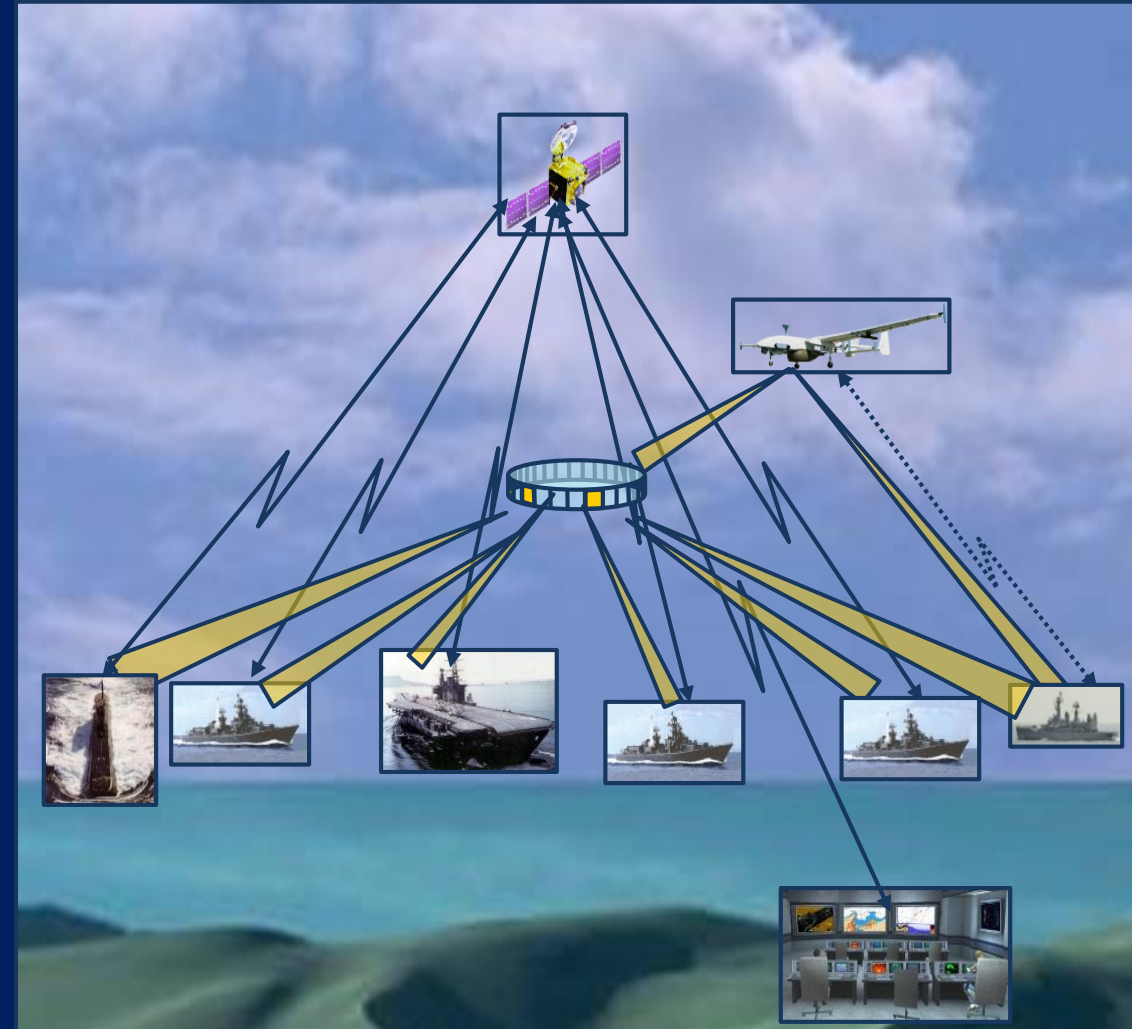
# Indian Navy - Present Status

- Multiple networks have been developed over terrestrial, wireless & space-based media
- Networking of units with real-time/ near real-time exchange of operational information
- Space-based applications
- Networked Enabled Operations



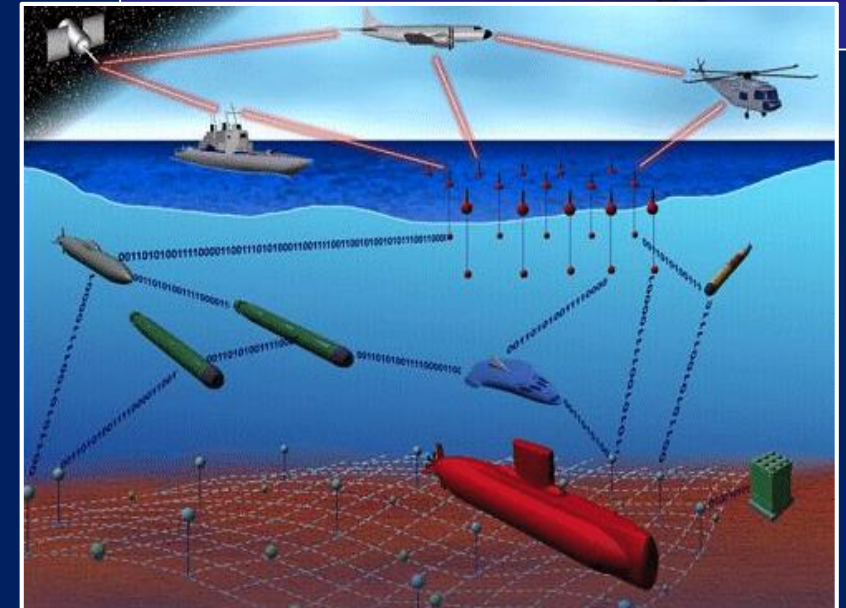
# Indian Navy – Future NCO

- Enhance network centric capability
- Surveillance & Detection systems
- ICT networks: terrestrial & space
- Advanced data-handling systems: data-basing, data-mining, data-analysis
- MPMSDF & TERA technologies
- Combat Management Systems
- Cooperative Engagement Capability



# Role of Industry

- Planned increases in *IN* force levels & upgrades
- Indigenisation is a strategic necessity
- Foreign sources & partnerships
  - Critical technology investments
  - ‘Make in India’
  - Longer term tech & maintenance support
  - Indigenising R&D – IDDM
- Meeting naval force requirements through full life-cycle programmes





**Indian Navy – Ensuring Secure Seas**