Naval Surface Warfare Center, Dahlgren Division

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Standard Form 298 (Rev. 8-98)  
Prescribed by ANSI Std Z39-18
Surface Warfare Evolution

Needs
- Counter Air
- Weapon Range
- Agile Targets

Technologies
- Small Electronics
- Precision Guidance
- RADAR

Needs
- Agile Targets
- Swarming Threats
- Engagement Time
- Cost-Per-Shot
- Graduated Kill

Technologies
- Energy Storage
- Energy Distribution
- Cryogenics
- Rail Gun
- High Power Laser
- Directed Energy

Gun Strategy

Age of the Battleship
- Dreadnaught
- Man-of-War
- Battleship
- Aircraft Carrier
- AEGIS

Age of the Missile Shooter
- WWII
- Standard Missle
- Tomahawk
- Tartar
- Talos
- Terrier
- ESSM & RAM
- AEGIS

Age of the Electric Ship
- WWII
- Guns
- Missiles
- Low Power Laser
- AEGIS
- DDG-1000
- Rail Gun
- Next Gen Combatant
- DDG FLT XX
- High Power Laser
- 20XX

Two Dimensions – Missiles & Guns

Three Dimensions – Missiles & Guns & Electric Weapons
Capability Evolution

Increasing capability, capacity, and integration complexity
Directed Energy Weapon (DEW) Tactical Situation

System State Transition from Sensor to Weapon to Sensor

- **Sensor**
  - High quality sensor utilizing beam director optics

- **Identification ID/Assess**
  - Active interrogation utilizing non lethal mode to determine intent

- **Weapon**
  - Lethal engagement

- **Sensor**
  - Battle damage assessment

**TACSIT Actors**

- Track Supervisor (Track Sup)
- Tactical Action Officer (TAO)
- Weapons Control Officer (Weps)
- Commanding Officer (Captain)
DEW TACSIT / t = 0
Our Future

• Limited footprint aboard ship
  – Requires efficient use of available space
  – Multi-function systems (Sense, ID, Scalable effects) help manage top side requirements

• Next generation systems with high-resolution imagery will enable extremely precise track and ID, to include assessment of intent

• Electric weapons conserve kinetic assets

• Power generation, storage and conversion technologies will need to change to support next-generation weapon systems
  – Need continued technology advancements in these areas
  – Requires power management and integration to be more closely linked in future ship/weapon designs