Scalable Network Effects Protection Tailored to Unique Naval Engagements (NEPTUNE™) –

A Systems Engineering Approach to Integrated Waterside Security

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Presented By: LTC Jason Reherman
Military Deputy, Weapons and Software Engineering Center
Armament Research, Development and Engineering Center
Port Protection Scenarios (Notional)
NEPTUNE™ Objective

• Establish a systematic process that focuses on the development of an optimized System of Systems solution tailored to specific applications

• Approach addresses:
  – Dynamic management of technology trade space
  – Force Protection technologies to effectively counter threats across the span of current Forward Operating Site (FOS) and future FOS designs
  – Rapid fielding of available and emerging “best of breed” technologies
“Network Effects Protection…  
- A layered approach for warning and protection  
- Awareness through information engagement  

…Tailored to Unique Naval Engagements”  
- Addresses escalating threats from insurgents and piracy  
- Enhances Anti-Terrorism Force Protection (ATFP) of High-Value Assets  
- Tailors effects from scalable lethal force to non-lethal response and area denial
Figure 4-1. Core SoS SE Elements and Their Relationships
Figure 4-3. Relationship between Translating Capability Objectives and Other SoS SE Core Elements
Stakeholder Need: Integrated, Layered Force Protection System

Environment
- Blue water
- Littorals
- Transiting
- Port

Potential Threats to High-Value Assets
- Small Arms
- Indirect Fire
- Maritime Vehicles
- Unmanned/Manned Aerial Vehicles
- Asymmetric Threats

Functional Analysis
- Maritime Situational Awareness
- Active Denial
- Non-Lethal Response
- Scalable Lethal Effects
- Distributed Collaborative Decision Support
Figure 4-8. Relationship between Understanding Systems and Relationships and Other SoS SE Elements
Understanding Systems & Relationships

Market Surveys

• Commercial-off-the-Shelf
• Government-off-the-Shelf

Candidate System Capability Analysis

• Situational Awareness/Detection Sensors
  • Electro-Optical
  • Infrared
  • Thermal
  • Advanced Radar
  • Acoustic
• Lethal/Non-Lethal Weapons
• Unmanned Systems
• Manned Systems
• Decision Support Software
Figure 4-9. Relationship between Assessing Performance to Capability Objectives and Other SoS SE Core Elements
Assessing Performance to Capability Objectives

**Trade Studies**
- Mission Thread Analysis
- Functional Allocation
- Modeling and Simulation
- Metric Based Assessment

**Baseline Systems (Notional)**
- Situational Awareness/Detection Sensors
  - Gunfire Detection System
  - Sniper Optics Detection System
  - Gimbaled E/O Sensor
  - Unmanned Aerial System
  - Sonar
  - Advanced Radar
- Lethal/Non-Lethal Response
  - Manned Maritime System
  - Lethal/Non-Lethal Remote Weapons Station
- Decision Support Software
  Firestorm™ Decision Support Software
Figure 4-13. Relationship between Developing and Evolving an SoS Architecture and Other SoS SE Core Elements
Monitoring & Assessing Changes

Figure 4-15. Relationship of Monitoring and Assessing Changes to Other SoS SE Core Elements
Addressing Requirements & Options

Figure 4-17. Relationship between Addressing Requirements and Solution Options and Other SoS SE Core Elements
Figure 4-18. Relationship between Orchestrating Upgrades to SoS and Other SoS SE Core Elements
• An open architecture which facilitates integration of both foreign and domestic defense and commercial technologies with open interfaces
  – Affords the ability to rapidly integrate mature component systems and to tailor solutions in response to urgent operational needs, driven by dynamic threats
  – Open architecture reduces cycle time and cost

• Ability to provide unbiased system trades
  – Ability to assess emerging technologies and shape future capabilities
  – Honest broker, not influenced by company-owned, proprietary solutions

• Establishment of key strategic partnerships with government, industry, and academia
Back-Up
Firestorm is a U.S. Government owned and maintained family of re-usable, open architecture decision aiding components and tools enabling rapid creation of next generation network centric fire control & full-spectrum effects decision support systems.

**NEPTUNE’s Core Infrastructure**

**Firestorm™**

- Terrain Analysis
- LOS
- Range rings
- Elevation profiles/contour maps
- Digital Mapping/GIS
- 2525B Symbology
- JVMF Msg
- Curser on Target
- Terrain Analysis
- LOS
- Range rings
- Elevation profiles/contour maps
- Collaborative Planning
- Sensor planning/tasking
- Counter IED
- Effects planning/tasking/targeting
- Weapon-Target pairing & de-confliction
- Weapon system knowledge base
- DTOP
- ArcView™ Shape
- ArcInfo™ Exchange
- DXF
- USGS DEM, DLG
- GeoTiff
- US Census Bureau Tiger Line
- CADRG
- ADRG
- CIB 5m & 10m
- DTED 0-2
- VMAP 0-2
- Urban Vector Map

**TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.**
Netted Fires/Tactical Fire Control

Attack Guidance can be tailored to provide prioritized tiered weapon system preferences against target types.
Waypoints given to UAV

Firestorm™ receives georeferenced Target/Image