

Next Generation Missile Defense

**A New Approach Using Unmanned Systems
to Save Time and Cost to Field an Effective System**

Infinite Dimensions: The Next Generation of Intelligent, Automated Systems

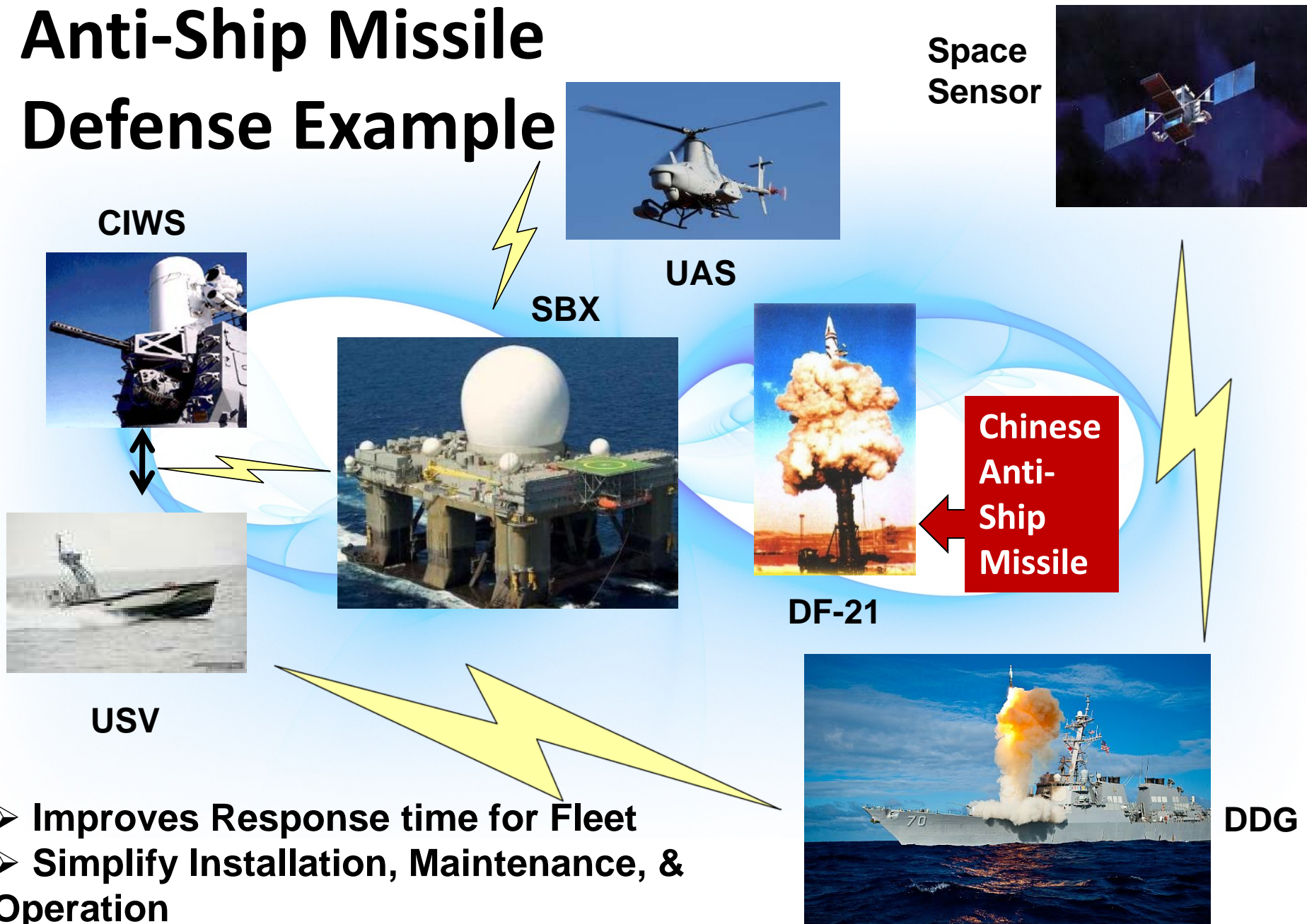
About Infinite Dimensions

- Unique Systems Engineering and Development Capability
 - A distillation of over \$2B in government R&D
 - Addresses both people and technology
 - Partnered with OSD, Joint Chiefs of Staff, the 4 Services, Federally Funded Research and Development Centers, Academia, and others
- Founder solved a foundational physics problem impacting all electronics & funded the invention of the web browser as a government employee
- Solved world-class/grand challenge problems on F-35, CVN-21, drones, robotics, etc.

Missile Defense Challenges

- Critical Battlespace defense gap
- Interactions happening faster than humans can react
- Current Command and Control (C2) is not real-time, performance limited, and the only source of information
- Greatly affects real-time response for kinetic engagement capabilities

Anti-Ship Missile Defense Example



- Improves Response time for Fleet
- Simplify Installation, Maintenance, & Operation

Infinite Dimensions

Solving Tomorrow's Problems Today

Improve Missile Defense

- **Interoperability of UxVs**
 - Manned platforms
 - Sensors
 - Fleet weapons, greater defense in depth
- **Integrate sensors on UxVs**
- **Network UxVs**
 - robotic engagement platforms
 - various C4ISR, weapons & fire control systems
- **Fully integrated and interoperable with fleet and joint C4ISR and fire control**
- **Fast, Flexible Response**

Need for Speed

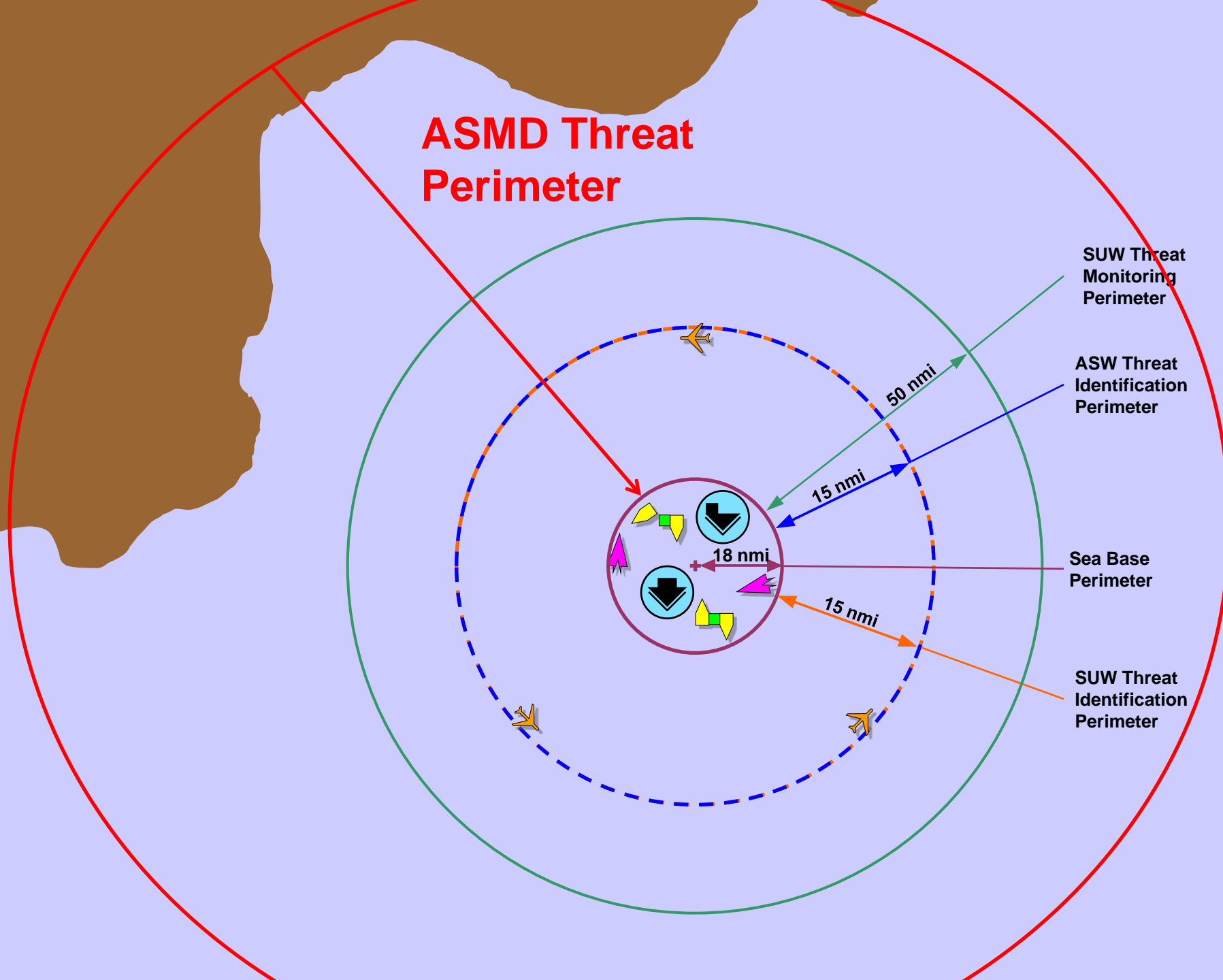
- A different architectural paradigm and C2 systems – a new real-time “engine”
- Need a Missile Defense System “on steroids”
 - Both Offense and Defense
 - Combine characteristics of Missile Defense and Cyberspace systems

Hyperfast networked decision-making in a complex environment

Proposed Solution

- Phase I: High-Fidelity Virtual Analysis of Sensors, Shooters, and Network Combinations (4 months)
 - Builds off novel approach to Modeling and Simulation (M&S)
 - Used to meet stringent government metrics in F-35
 - Permits source code integration of M&S code from different paradigms
 - Next step in the science of M&S reuse
- Phase II: Build the System (14 months)
 - Use Phase I software in Design & Engineering, Validation/T&E
 - Utilize existing infrastructure and chart a course forward
- Phase III: Fleet Integration & Optimization (3 months)

ASMD Threat Perimeter



SUW Threat Monitoring Perimeter

ASW Threat Identification Perimeter

Sea Base Perimeter

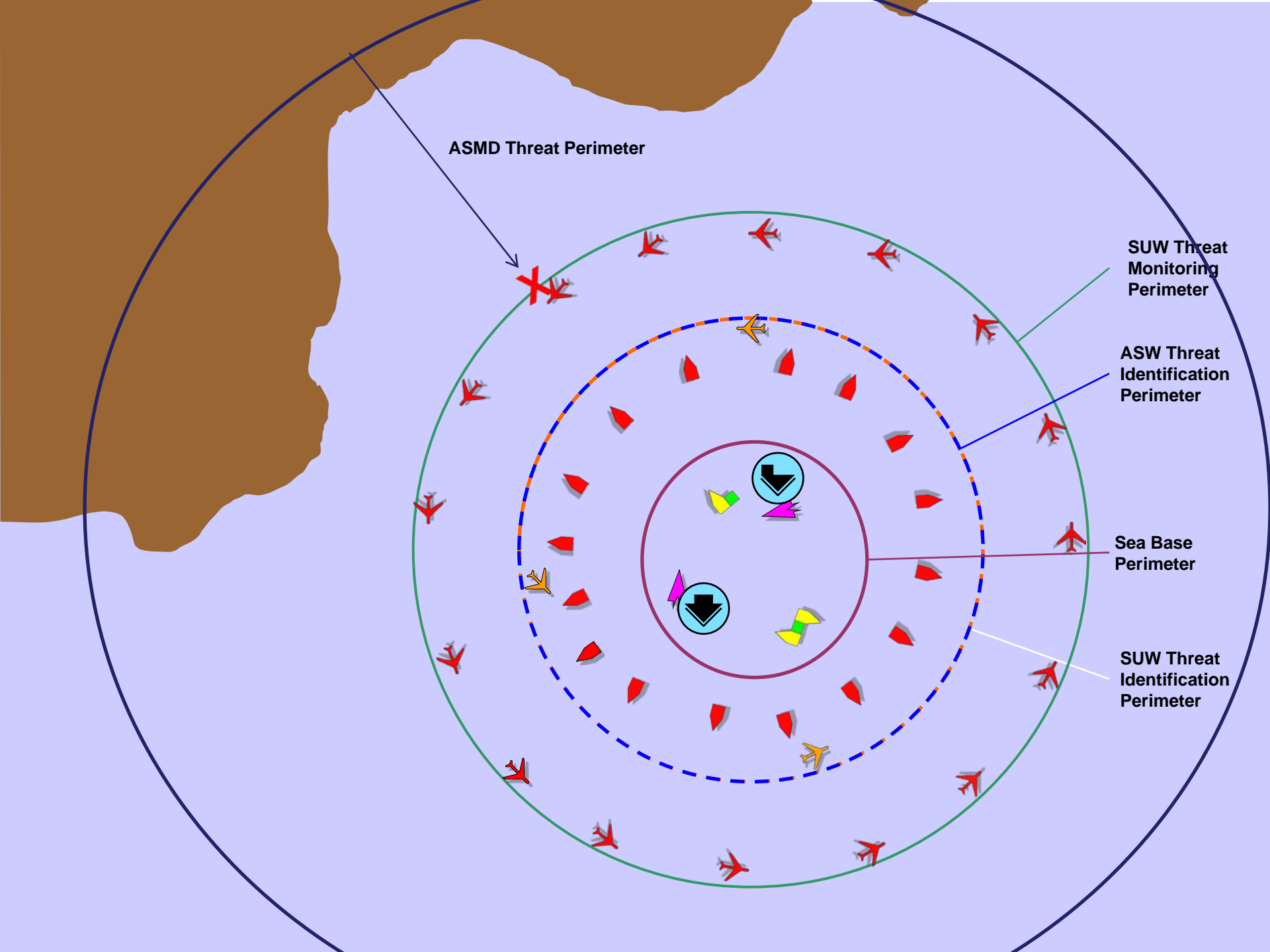
SUW Threat Identification Perimeter

50 nmi

15 nmi

18 nmi

15 nmi



ASMD Threat Perimeter

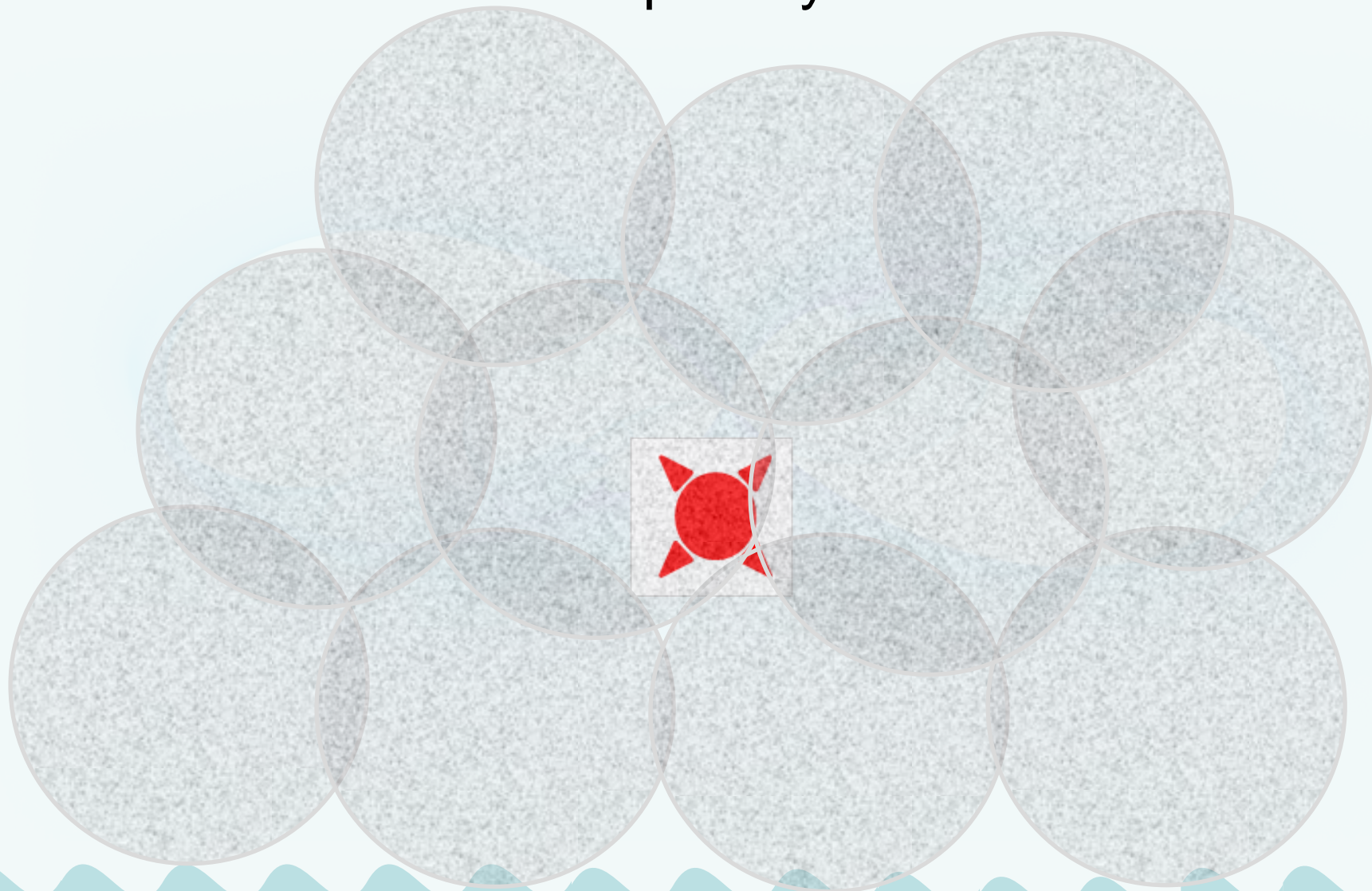
SUW Threat Monitoring Perimeter

ASW Threat Identification Perimeter

Sea Base Perimeter

SUW Threat Identification Perimeter

Probabilistically Defined Cloud of Projectiles From Each USVs Weapon System Creates a Cloud



New Capabilities

- **Semi-Automated Missile Defense Systems**
 - Adaptive & composable
 - Knowledge built into systems
 - Emphasizes speed and flexibility
- **Ability to fuse new information, knowledge, and structures rapidly**
 - Mesh networks and systems
 - Example: Sensor net that automatically refocuses based on accurate real time fused information
- **C2 and fire control moves from weapons platforms to the Network**

Previous Results

- Increased system speed factor is over **100x in “apples to apples infrastructure”**
- Performed novel, unique artificial intelligence, development, integration, & interoperability projects
- Every project is a unique challenge that involves integrating an expert team to solve a time critical problem
 - Vetted by OSD (P&R, AT&L, PAE, DDR&E) & Joint Staff

Infinite Dimensions Provides

- Solution for greater defense in depth quickly
- A flexible, forward looking Architecture
 - Easily accommodate upgrades
 - Fast integration
 - New sensors, shooters, and networks
- Ready incorporation of current and Joint C4ISR and fire control architecture(s)
- Realistic ability to rapidly assemble the team and go

Summary

- Creation of Ad-Hoc Missile Defense Networks
 - Complex, Realistic, & Scalable
 - Semi-/Fully Autonomous UxVs
 - Practical agile, networked systems
- C4ISR and Weapons Systems Adaptation & Evolution
- Ready to begin
 - High Fidelity M & S (Phase I)
 - Build, Integrate & Network Systems (Phase II)
 - Integrate, Optimize & Train (Phase III)