



A Maritime Phase Zero Force for the Year 2020



9 JUNE 2009



- Systems Engineering and Analysis Program
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- Organization/Problem Solving Process
- Phase Zero Background
- Missions
- Perception Mapping
- Modeling Methodology
- Cost Estimation
- Threats to Stability
- Force Structure
- Regional Stability
- Areas of Future Focus



Systems Engineering and Analysis



LT Chet Lee



- The Systems Engineering Analysis (SEA) curriculum provides a unique education bridging the knowledge bases of both Systems Engineering and Operations Analysis.
- Teaches U.S. Navy Unrestricted line officers (and NGSS civilians) how the Navy builds and fights large combat systems.
- Topics of study include technologies (sensors, weapons, information systems, networks, C4I), and techniques (combat simulation, modeling, optimization, project management, fundamentals of systems engineering).



- Supports team-oriented research and analysis that links technical solutions to tactical problems, enhances understanding of the Navy's Requirements-Setting, Planning, Programming, Budgeting and Execution (PPBE) and acquisition processes, and the manner in which they impact warfighting acquisition programs.
- The SEA program focuses on developing solutions to future needs. Past studies Include:
 - UAV systems
 - Future expeditionary warfare systems
 - Command & Control
 - Laser defense technologies
 - Advanced aviation lift
 - Advanced ship design
- SEA Integrated project teams include USN Line Officers, Government Contractors and Temasek Defense Systems Institute (TDSI) students



Project Tasking





- Design a system of systems to employ a **regional Maritime Theater Security Force** to conduct all maritime missions associated with **Phase 0 operations**. Consider **current fleet structure and funded programs** as the baseline system of systems to execute **security and shaping** missions in developing these concept of operations, then develop alternative fleet architectures for platforms, manning, command and control, communication, logistics and operational procedures to evaluate against the current program. A complete redesign of a *naval* force capable of executing phase 0 operations, **employable by 2020**, and using total **procurement and operating costs of \$1.5B (FY08 constant dollars) per annum**, should be one of the alternatives.



- **All maritime missions associated with Phase Zero operations**
- **Consider current fleet structure and funded programs as the baseline system of systems to execute security and shaping missions**
- **Employable by 2020 (life-cycle through 2050)**
- **Total procurement and operating costs of \$1.5B per year**



- **Force Selected:**

- **JMSDF DDH**

- (7) CH-53K

- (6) RQ-8

- **JHSV**

- **Visby**

- (3) RQ-8

- **LPD-17**

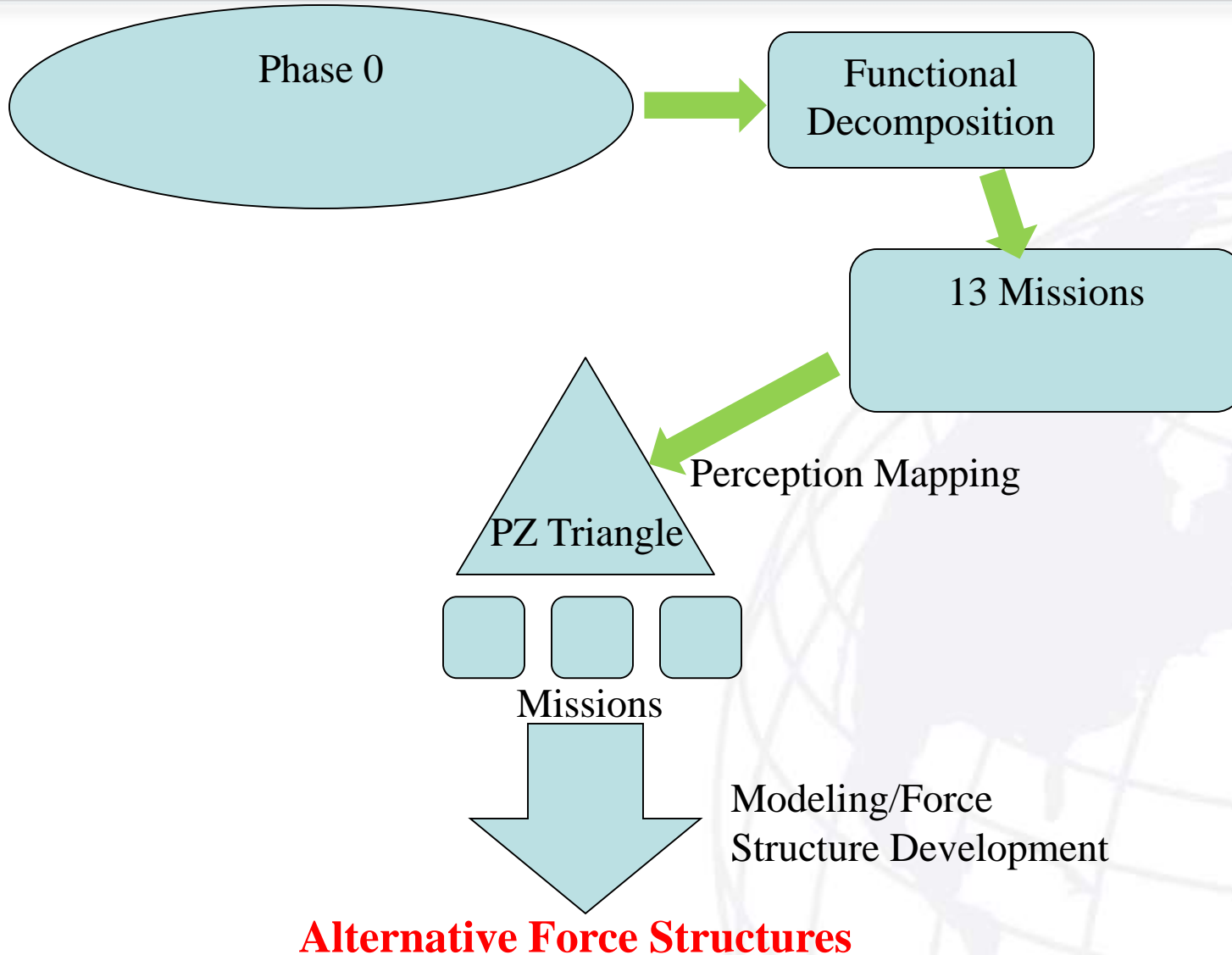
- (2) SH-60

- (3) RQ-8

- (2) M-80 Stiletto

Annual Cost: \$305 million





Organization/Problem Solving Process



Organization/Problem Solving Process





SEA-15/TDSI Integrated Project



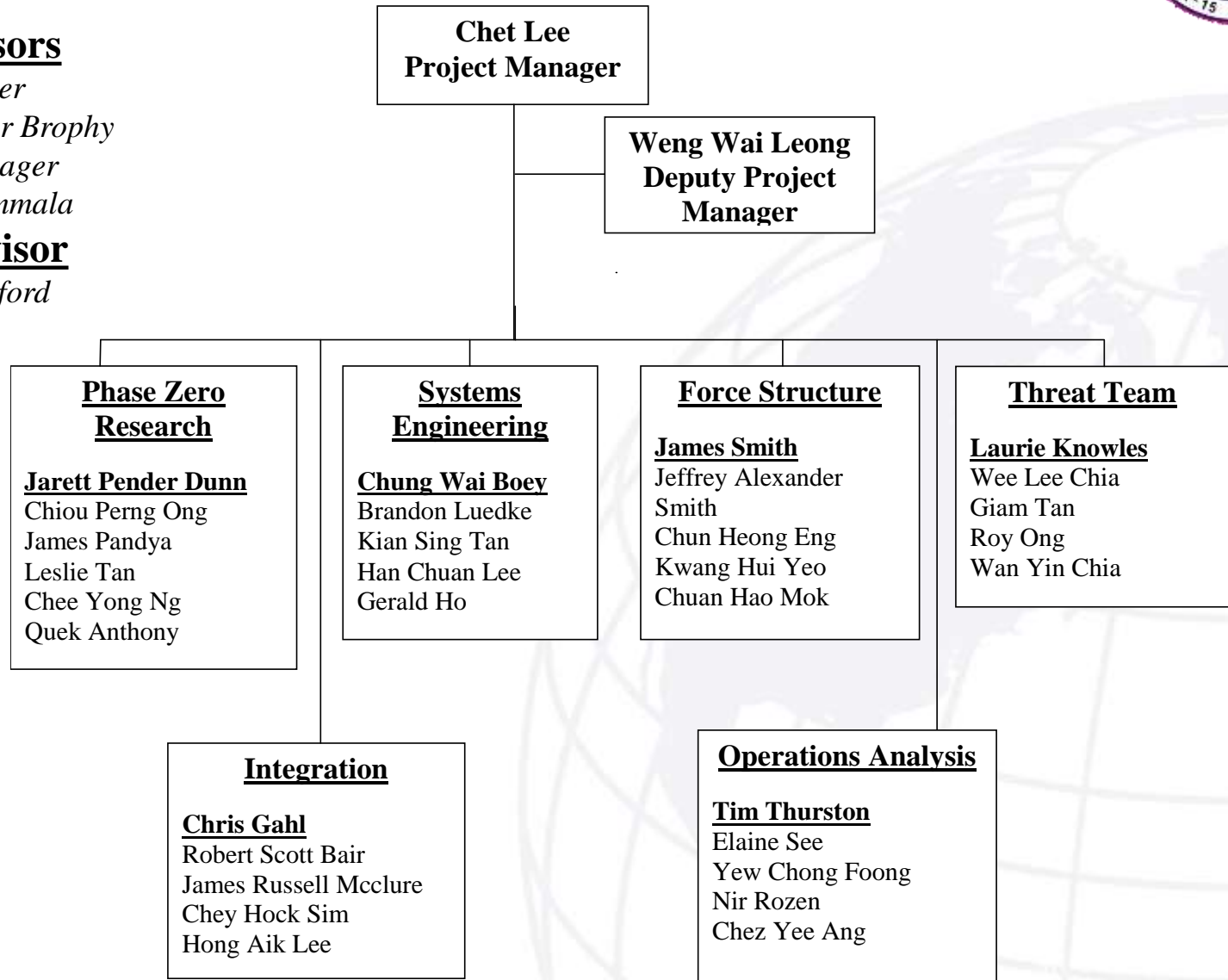
33 Students

Track Advisors

- Prof David Meyer*
- Prof Christopher Brophy*
- Prof Bard Mansager*
- Prof Murali Tummala*

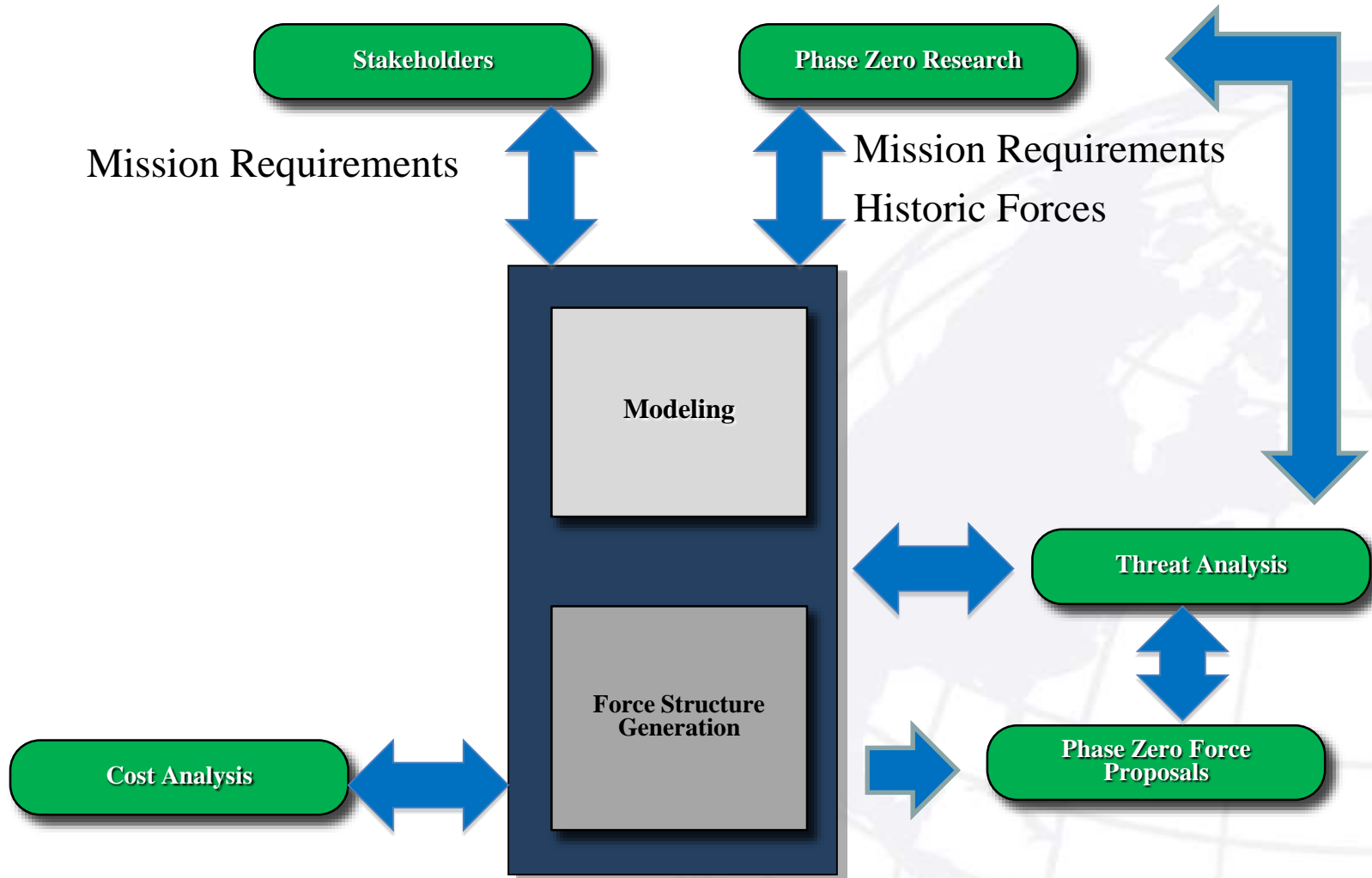
Project Advisor

- Prof Gary Langford*





Problem Solving Process





- N-81 RADM McCarthy (Ret.) *
- Component Commanders – SOUTHCOM *
- US Aid Organization
- World Bank *
- Foreign Navies *
- Red Cross *
- 4th Fleet *
- State Department
- Department of Homeland Security *
- N-86 – RADM Myers
- NAVSURFOR – VADM Curtis
- J9 USJFCOM – RADM Davenport
- US Fleet Forces – RADM Busby



Phase Zero Background





Maritime Strategic Imperatives

Regionally Concentrated, Credible Combat Power

Deter major power war

Win our nation's wars

Limit regional conflict

Secure Our Homeland, Citizens, and Interests around the World

Contribute to homeland defense in depth

Foster & sustain cooperative relationships

Prevent or contain local disruptions

The bottom "egg" is new

Globally Distributed, Mission-Tailored Maritime Forces


US Naval War College



- To enhance the stability of a region
- Changing role of the military
- Significant opportunities for cost savings
 - Opportunities for reductions lives and equipment lost
- Build Coalitions
- Increase probability of interdiction of drug trafficking from South America to U.S.



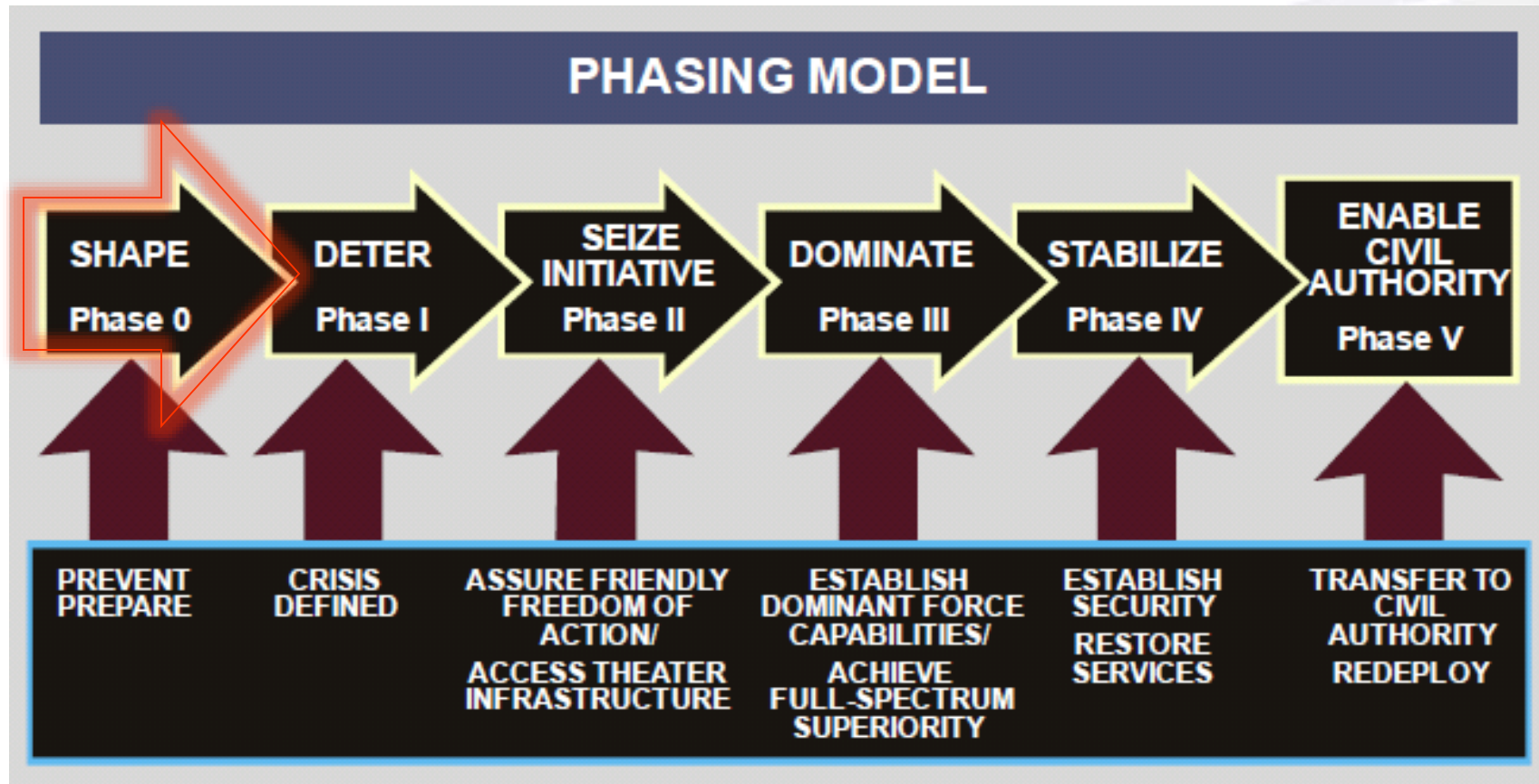
- Joint Publication 3 (2008)
 - Shaping guidance
- Joint Publication 5 (2006)
 - Multi-national emphasis
- National Security Strategy 2005
- National Defense Strategy 2008
- Naval Operations Concept 2006
- Quadrennial Defense Review Report 2006



Continued focus on the U.S. military's role in influencing regional stability in order to prevent large scale conflicts



- Joint Publication 3





- Actions that are necessary for a phase zero force to be able to accomplish to sustain itself but are not phase zero missions
- Actions that are not typically thought of a shaping actions but enhance stability
- Examples:
 - Self Defense
 - Anti-Piracy
 - Anti-Smuggling



- A phase zero force will work closely with multinational, interagency and other partners to maintain or enhance stability, prevent or mitigate crises and set the conditions for access and responsive crisis intervention.

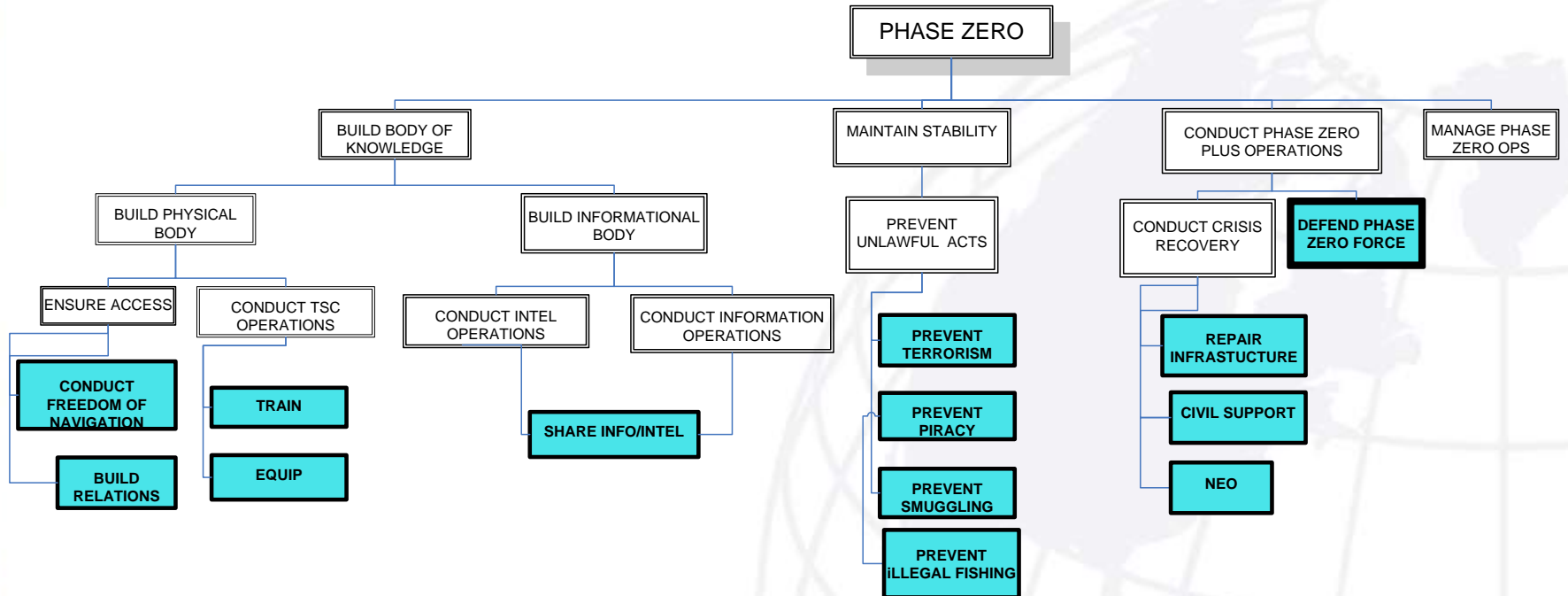


Missions of Phase Zero





Functional Decomposition





The Phase Zero force must be able to fulfill the following missions requirements:

1. Enforce **freedom of navigation**
2. **Build relations** with local governments
3. **Train** local defense forces
4. Support the **equipping** of the local defense forces
5. **Share intel/info** within the force and with local governments
6. Conduct **anti-terrorism** operations
7. Conduct and support **anti-piracy** operations
8. Support **anti-illegal fishing** operations
9. Assist local government in **restoring critical infrastructure** (shelter, power and sanitation)
10. Provide **civil support** in case of crisis (water, food and medical)
11. **Defend itself** against threats
12. Support **anti-smuggling** operations
13. **Non-combatant evacuation operations**



How to Address all 13 Missions



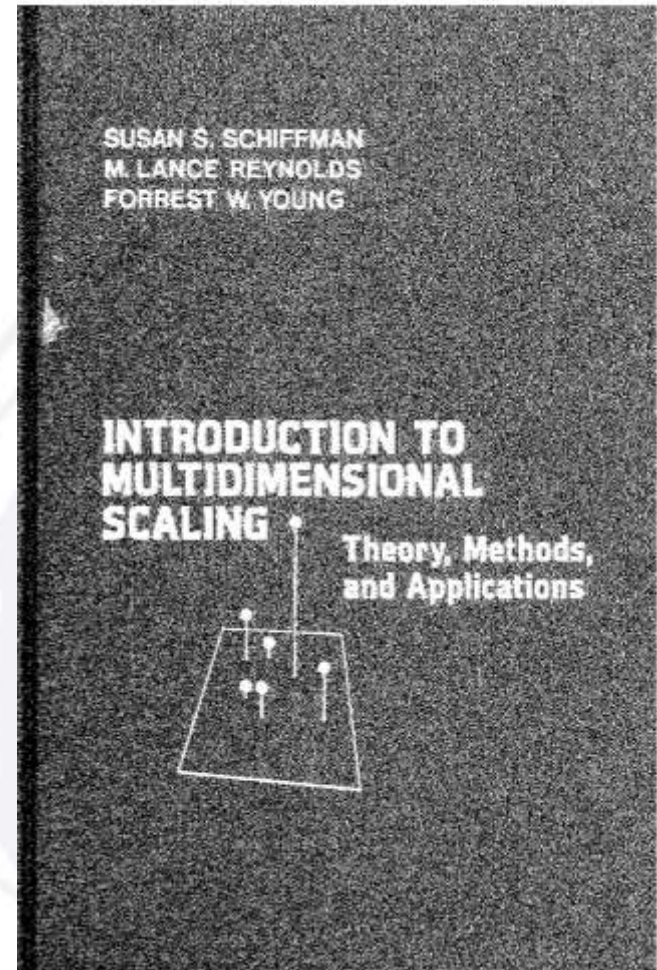
- Many of the missions overlap
- Commonalities in tools and methods for completing each mission
- 3 missions that are different enough from each other
- A force that can conduct 3 critical missions can also accomplish all 13 of the Phase Zero missions

Perception Mapping



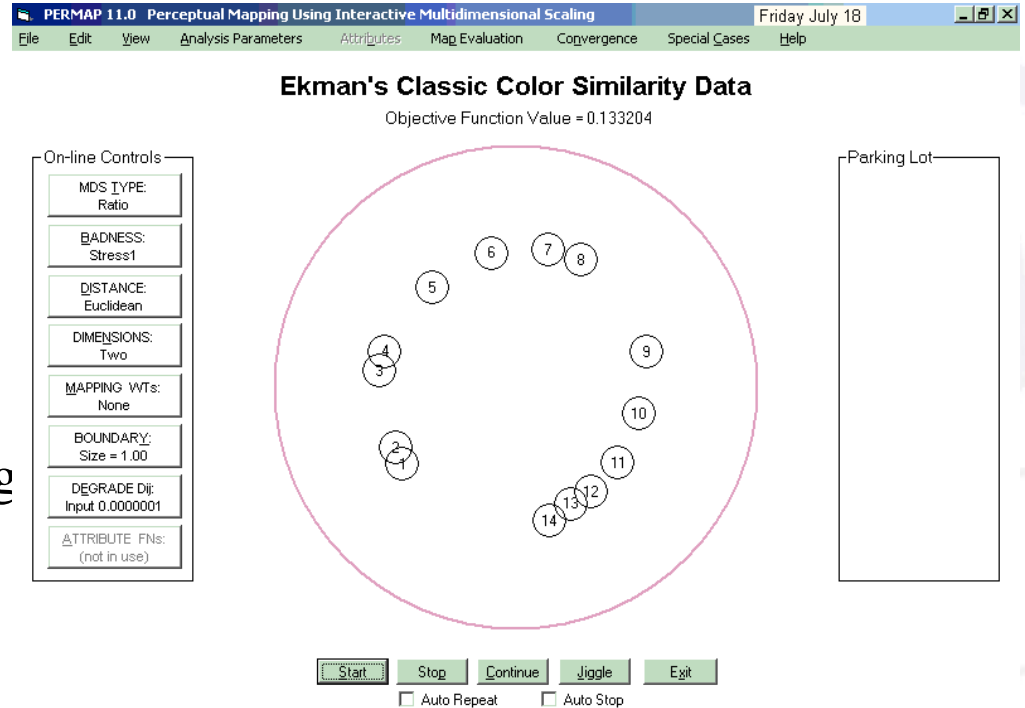
LT Tim Thurston

- Used in information visualization for exploring similarities or dissimilarities in data
- Algorithm starts takes input of item-item similarity matrix
- Assigns a location to each item in N-dimensional space
- For small N, resulting locations may be displayed in a graph





- Free
- Windows-based
- Real-time
- Interactive
- Metric and non-metric MDS
- Up to 8 dimensions
- Adjustable Variable Weighting
- Missing Values Allowed



*Developed by Dr. Ronald B. Heady, University of Louisiana at Lafayette
and Dr. Jennifer L. Lucas, Agnes Scott College*



PERMAP MDS Example



	SEA	LAX	PHL	MIA	HOU	DEN	MSP	ATL	TUS	CLE
SEA	0									
LAX	961	0								
PHL	2384	2409	0							
MIA	2738	2352	1021	0						
HOU	1903	1394	1341	961	0					
DEN	1028	865	1562	1718	888	0				
MSP	1403	1541	983	1511	1064	683	0			
ATL	2189	1938	669	600	698	1203	912	0		
TUS	1224	453	2062	1908	948	643	1304	1546	0	
CLE	2026	2059	364	1089	1113	1204	624	559	1733	0



PERMAP MDS Example

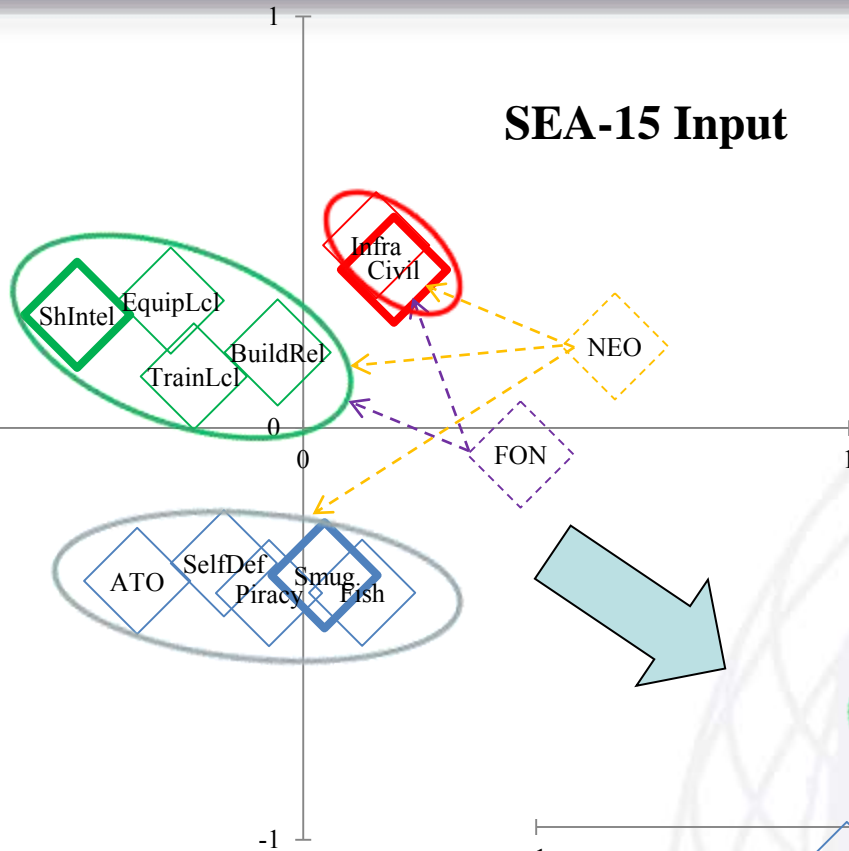




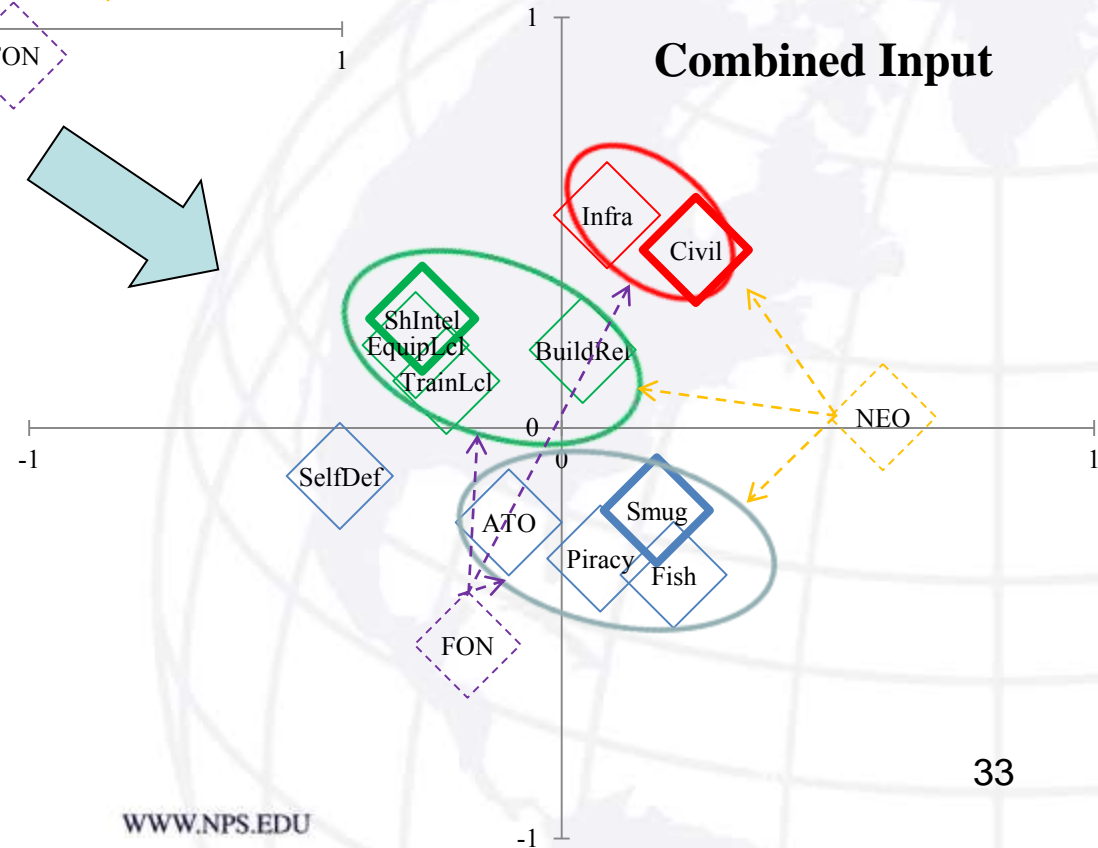
PERMAP MDS Example



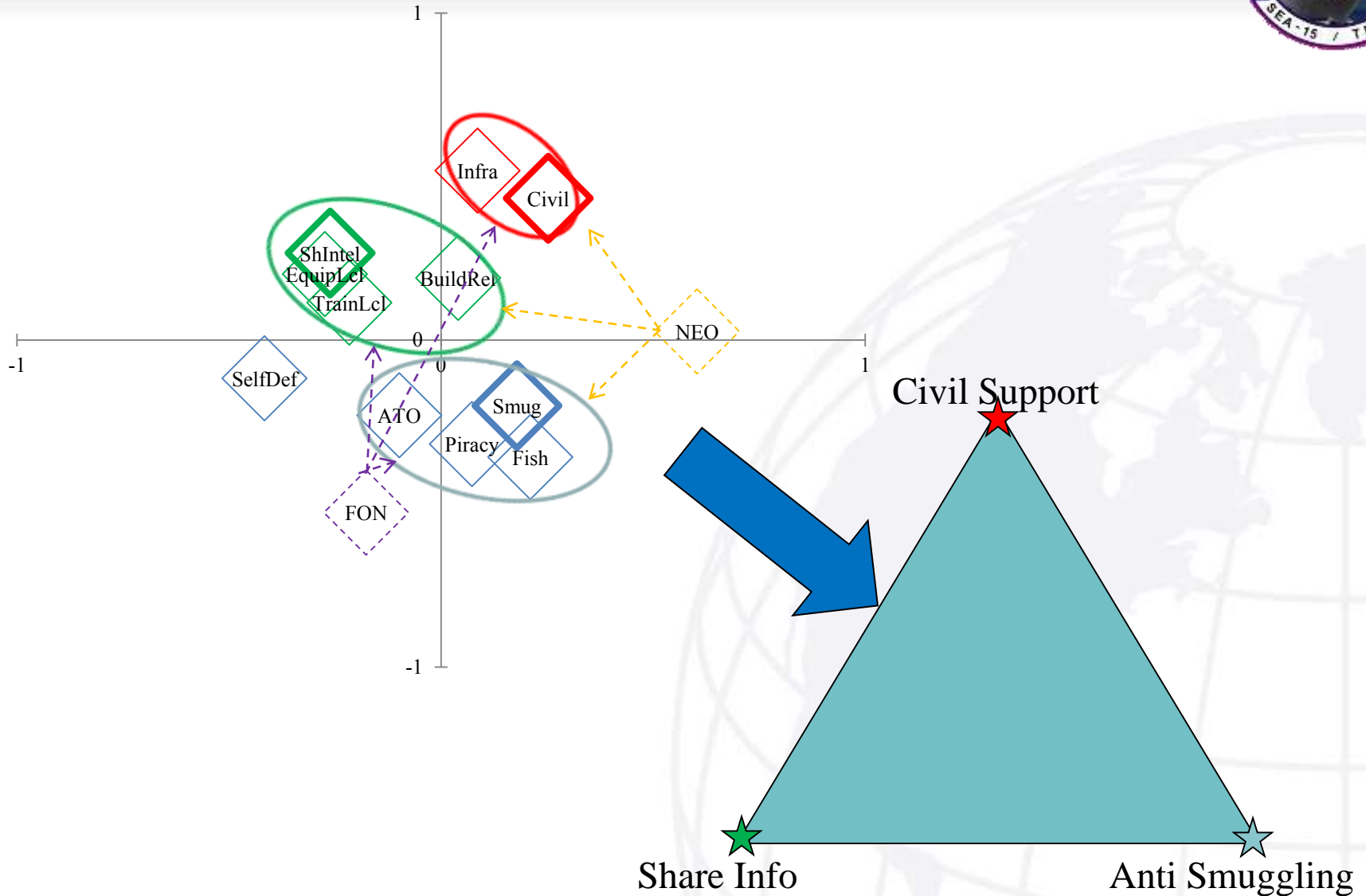
SEA-15 Input



Combined Input



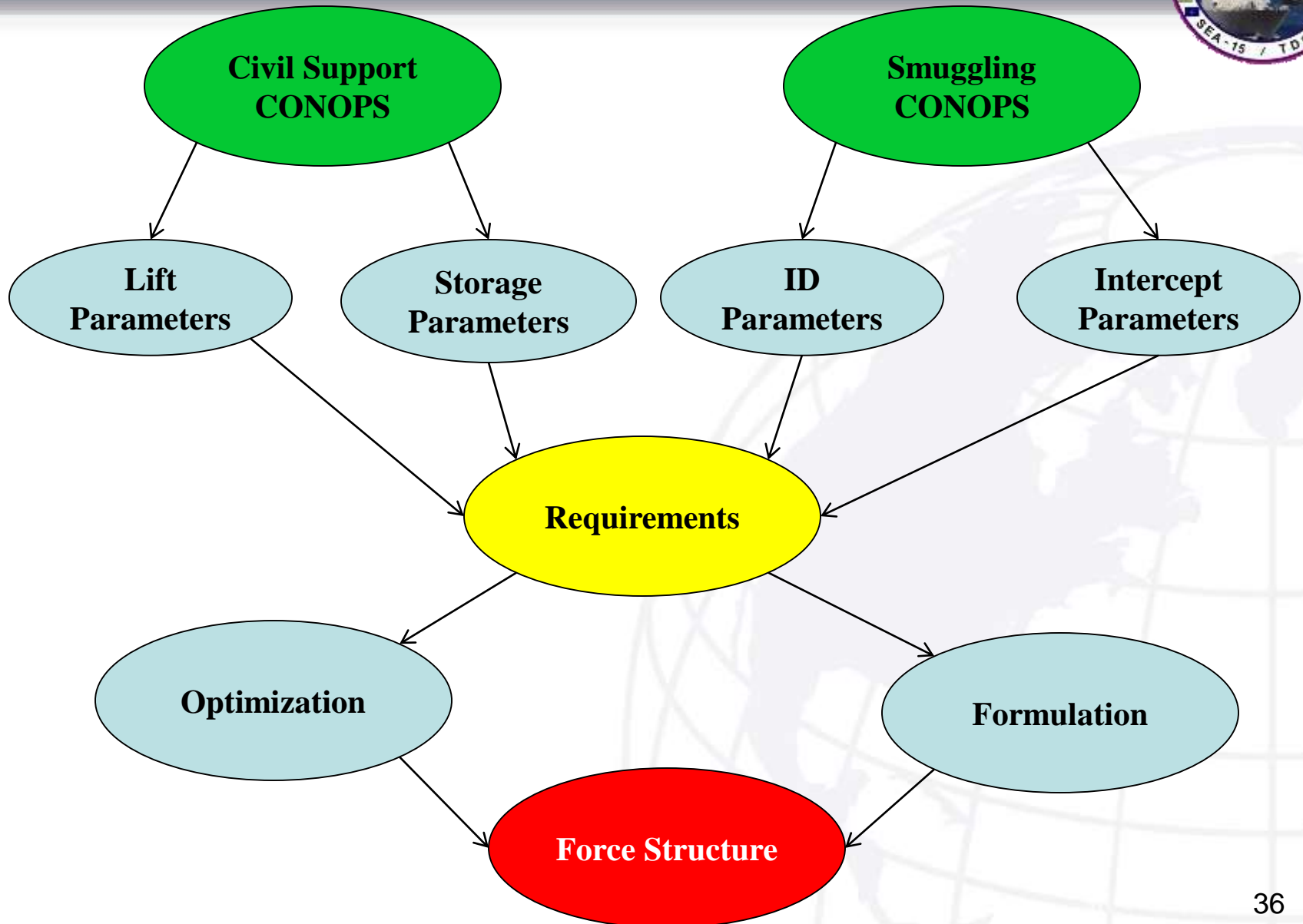
Phase Zero Triangle





Modeling Methodology







Transit

“Worst Case” Concept

- No harbor or beach landing area available
- 100% lift by aircraft
- Water produced aboard ship
- All supplies and equipment delivered via slung load
- SH-60 not capable of carrying a HMMWV
- Daylight flight operations only

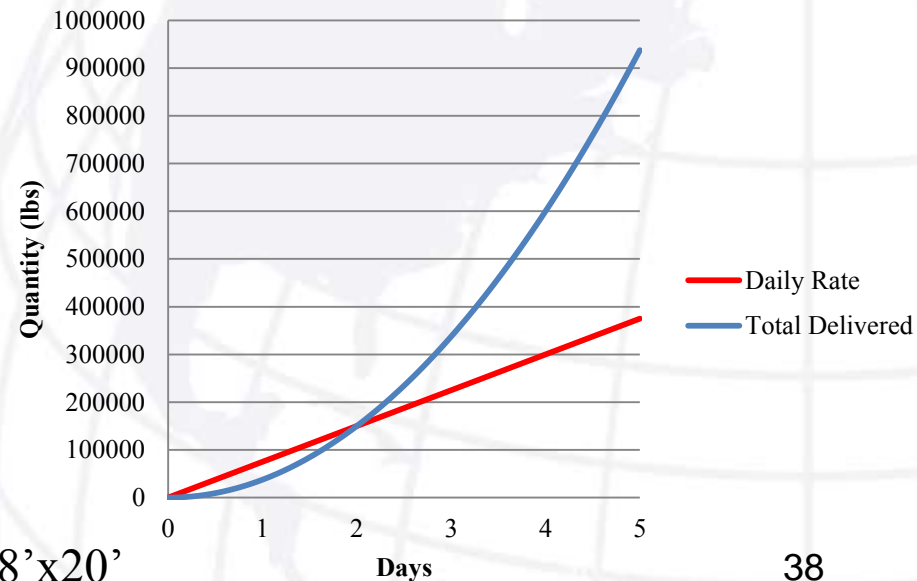




Civil Support: Assumptions



- SH-60
 - Delivery speed = 80kts, return Speed = 146kts,
Mission time = 9hrs/day, 1 piece of equipment/sortie
- MV-22
 - Delivery speed = 100kts, Return speed = 241kts,
Mission time = 10hrs/day, 2 pieces of equipment/sortie
- MH-53
 - Delivery Speed = 100kts, Return Speed = 170kts,
Mission time = 9hrs/day, 2 pieces of equipment/sortie
- Water is carried in collapsible, variable volume bladders for maximized sortie capacity
- 85% availability for all aircraft
- Slung loads and personnel take 1 and 5 minutes for pickup/dropoff respectively
- Force Delivers first supplies after 24 hours
- Supply rate ramps up to full capacity after 5 days
- Standard shipping container measures 8'x8'x20'





Modeling: Civil Support Inputs



Parameters	Scenario Severity	Low	Mean	High
Number affected:		50,000	100,000	150,000
Number injured:		2,500	5,000	7,500
Number of "camp" sites:		3	5	8
Number of "camp" sites containers		15	30	45
Penetration:		0	25	50
Time to full capacity (days):		5	5	5

Total Delivered	Scenario Severity	Low	Mean	High
Food (lbs):		313,000	625,000	938,000
Food (ft^3):		12,800	25,500	38,300
Food (pallets):		219	439	658
Water (gal):		62,500	125,000	188,000
Bladders:		84	167	250

Maximum rate	Scenario Severity	Low	Mean	High
Food (lbs/day):		125,000	250,000	375,000
Water (gal/day):		25,000	50,000	75,000
Water (lbs/day):		208,000	415,000	623,000
Other (Medical, Camp sites lbs/day):		81,100	161,000	241,000
Total (lbs/day):		414,000	826,000	1,240,000

Medical	Scenario Severity	Low	Mean	High
Doctors:		7	13	19
Nurses:		25	50	75
Surgeons:		4	7	10
Assistants:		7	13	19
Total Medical Personnel:		43	83	123

Marines	Scenario Severity	Low	Mean	High
Devil Dogs:		127	209	383
Quadcons:		8	10	12
HMMWVs:		11	18	31
Floodlight Sets:		6	10	16
Generator Sets:		6	10	16



Modeling: Civil Support Inputs



Total Delivered	Scenario Severity	Low	Mean	High
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Generator Sets:		6	10	16

Storage	Scenario Severity	Low	Mean	High
Food (lbs):		313,000	625,000	938,000
Camp sites (lbs):		375,000	750,000	1,130,000
Doctors/nurses (lbs)*:		10,500	19,500	28,500
Surgeons/assistants (lbs):		20,000	35,000	50,000
Total (lbs):		718,000	1,430,000	2,140,000
Food (ft ³):		12,800	25,500	38,300
Camp sites (ft ³ **):		19,200	38,400	57,600
Doctors/nurses (ft ³):		428	796	1,163
Surgeons/assistants (ft ³):		816	1,43	2,040
Water Bladders (ft ³):		168	334	500
Total (ft³):		33,400	66,500	100,000



"Vehicle" Storage	Scenario Severity	Low	Mean	High
Marine Quadcon (ft ²):		320	400	480
HMMWVs (ft ²):		1,540	2,520	4,340
Floodlight Sets (ft ²):		180	300	480
Generator Sets (ft ²):		180	300	480
Total (ft²):		2,220	3,520	5,780



Modeling: Civil Support Inputs



Maximum rate	Scenario Severity	Low	Mean	High
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Generator Sets:		6	10	16

SH-60S	Scenario Severity	Low	Mean	High
Cargo Trip Time (hrs):		0.13	0.61	1.10
Cargo Sorties/day:		92	184	276
Personnel Trip Time (hrs):		0.24	0.58	0.92
Personnel Sorties/day:		3	5	9
Equipment Trip Time (hrs):		0.13	0.61	1.10
Equipment Sorties/day***:		7	10	15
Number required:		2	16	43
<u>MV-22</u>				
Cargo Trip Time (hrs):		0.10	0.46	0.81
Cargo Sorties/day:		42	83	124
Personnel Trip Time (hrs):		0.21	0.42	0.62
Personnel Sorties/day:		2	3	5
Equipment Trip Time (hrs):		0.10	0.46	0.81
Equipment Sorties/day***:		4	5	8
Number required:		1	5	13
<u>MH-53K</u>				
Cargo Trip Time (hrs):		0.11	0.51	0.91
Cargo Sorties/day:		16	31	46
Personnel Trip Time (hrs):		0.23	0.52	0.81
Personnel Sorties/day:		1	2	2
Equipment Trip Time (hrs):		0.11	0.51	0.91
Equipment Sorties/day***:		4	5	8
Number required:		1	3	7



Modeling: Civil Support Inputs



Storage	Scenario Severity	Low	Mean	High
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Doctors/nurses (ft^3):		428	796	1,170
Surgeons/assistants (ft^3):		816	1,430	2,040
Water Bladders (ft^3):		168	334	500
Total (ft^3):		33,400	66,500	100,000



Cargo
Storage

2.1M lbs
100k ft^3

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Cargo Trip Time (hrs):		0.13	0.61	1.10
Cargo Sorties/day:		92	184	276
Personnel Trip Time (hrs):		0.24	0.58	0.92
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Equipment Trip Time (hrs):		0.11	0.51	0.91
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Number required:		1	3	7



Vehicle
Storage

5.8k ft^2

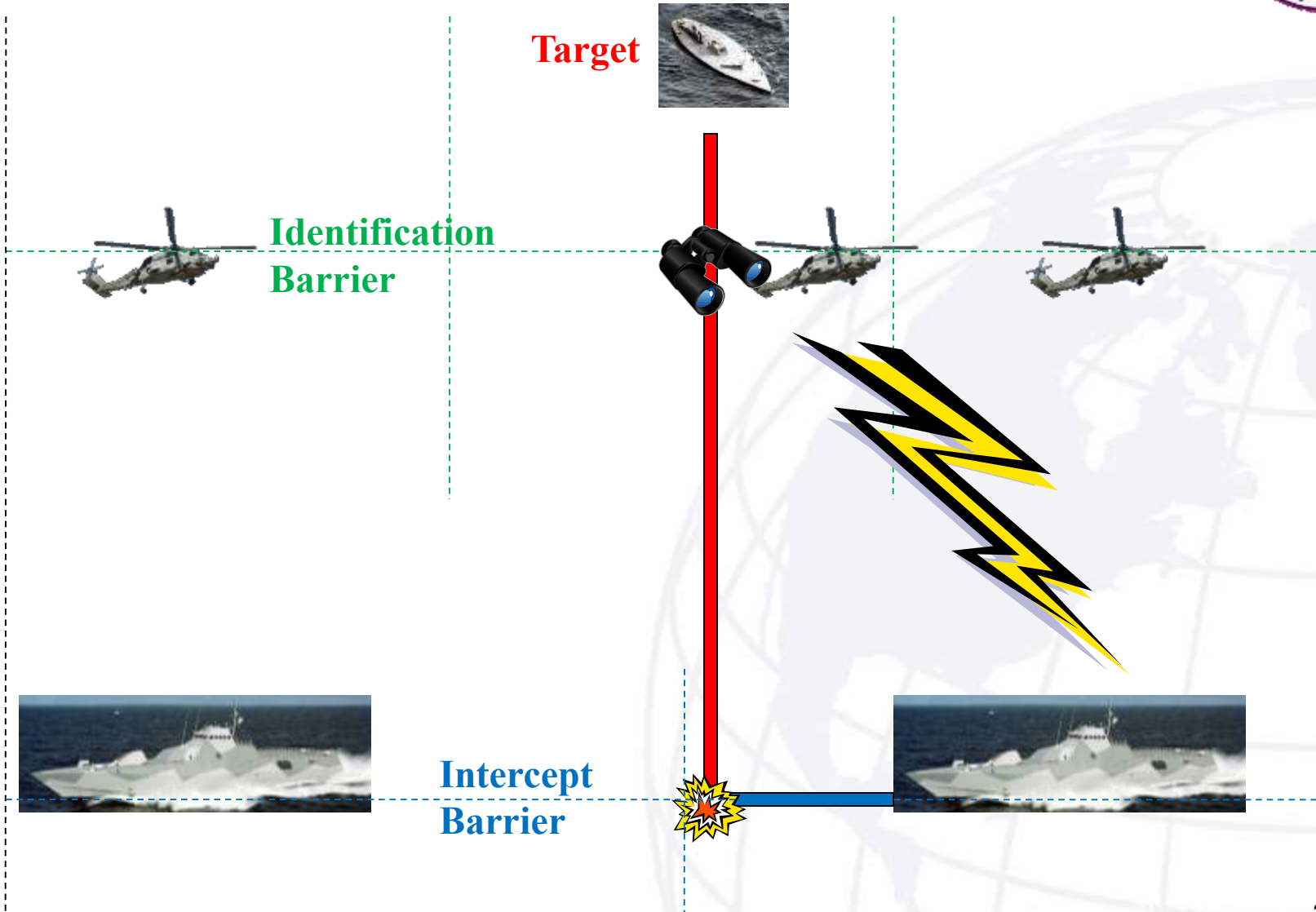
**FORCE
STRUCTURE**

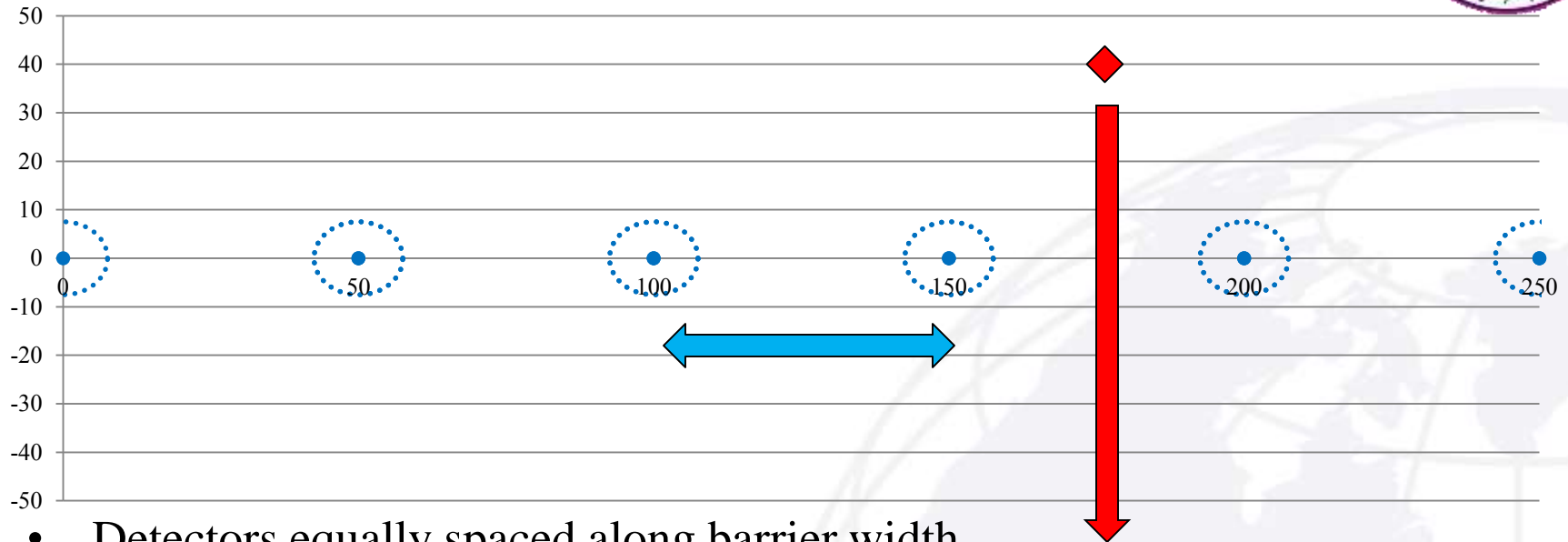
43 SH-60
13 MV-22
7 MH-53

Aircraft

"Vehicle" Storage	Scenario Severity	Low	Mean	High
Marine Quadcon (ft^2):		320	400	480
HMMWVs (ft^2):		1,540	2,520	4,340
Floodlight Sets (ft^2):		180	300	480
Generator Sets (ft^2):		180	300	480
Total (ft^2):		2,220	3,520	5,780







- Detectors equally spaced along barrier width
- Total barrier width = 250nm
- Distance between identification and intercept barriers set at nominal range of the RQ-8B Fire Scout (110nm)
- Target start position uniformly distributed along barrier
- Target transits perpendicular to barrier axis
- Target maintains course and speed
- Detector moves back and forth along its section of barrier
- Detector start position is uniformly distributed in barrier section

- “Go-fast” Vessels

- Worst case for speed evasion
- Radar and EO/IR identification
- Large wake more susceptible to optical detection
- Max Speed = 80kts



- Semi-Submersible Low Profile Vessels (SSLPV)

- Worst case for stealth evasion
- Low profile and fiberglass construction yields little to no radar cross section (RCS)
- EO/IR identification only
- Max Speed = 12kts

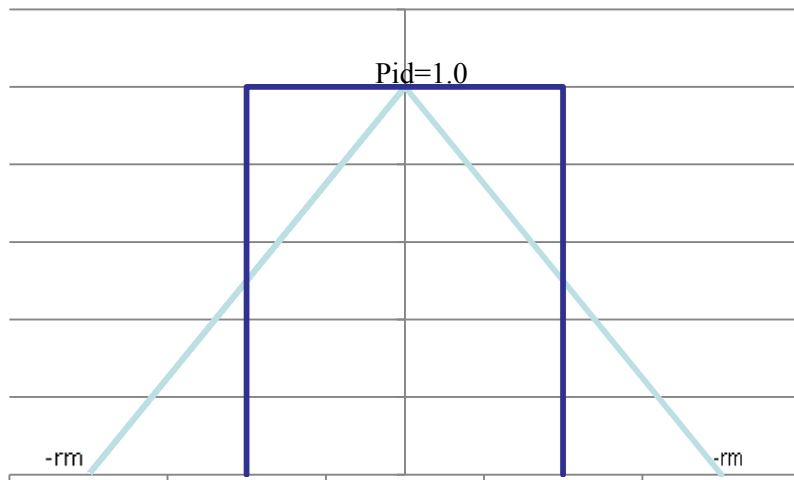


- Unmanned Aerial Vehicles

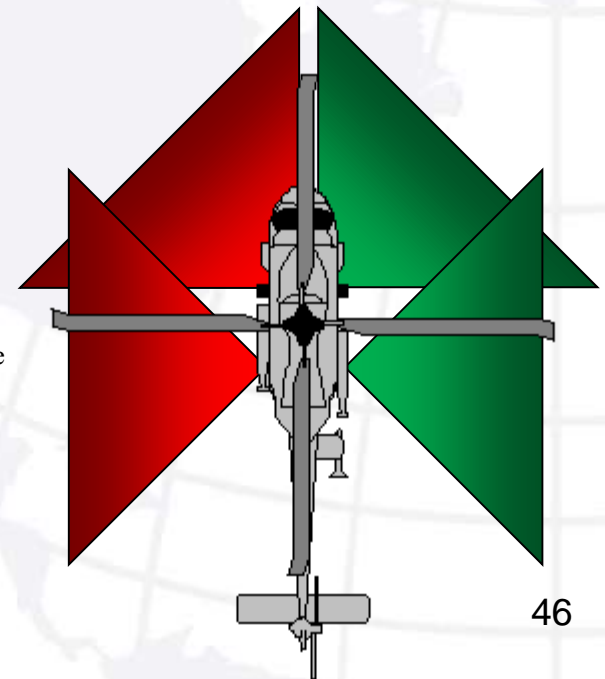
- EO/IR field of view (FOV) = 30deg
- EO/IR sweep width = 5nm
- Radar sweep width = 37.5nm
- Speed = 92kts IAS
- Altitude = 5,000ft MSL
- “Cookie cutter” sweep width based on triangular lateral range curve

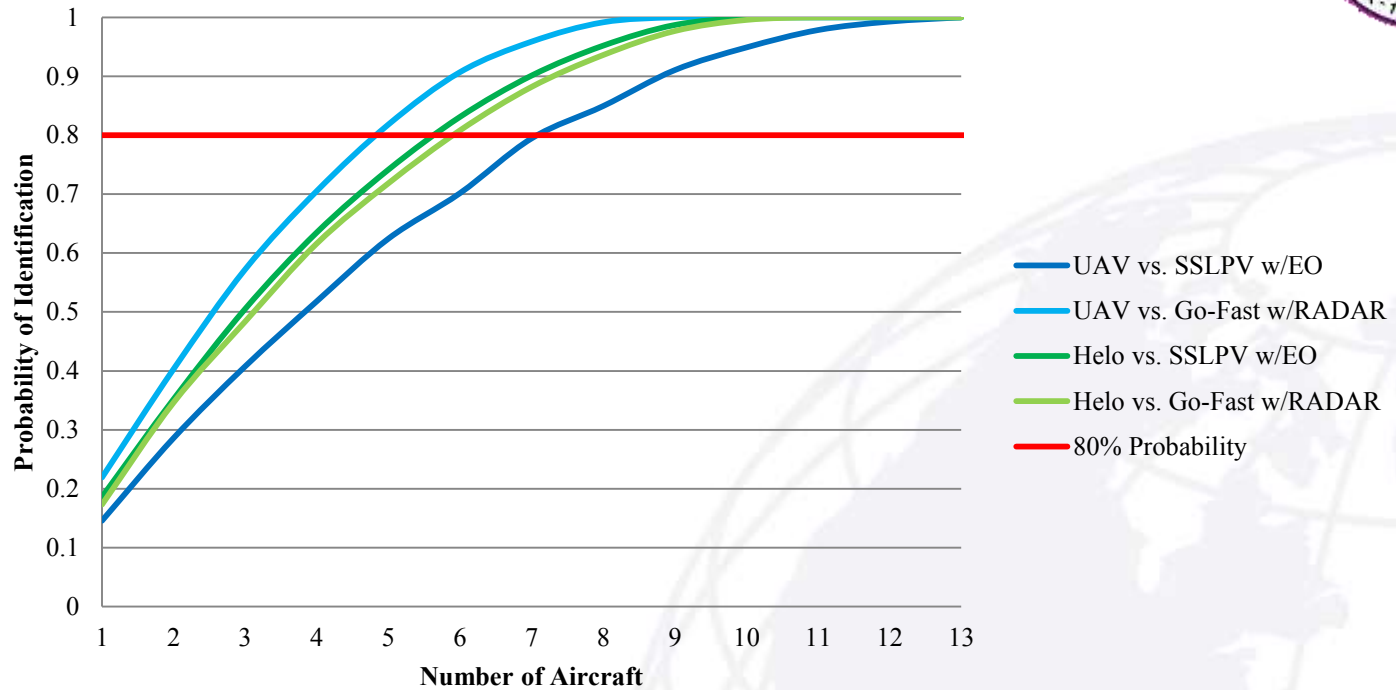
- Helicopter Aircraft

- EO/IR FOV = 240deg
- EO/IR sweep width = 9.6nm
- Radar sweep width = 27.5nm
- Speed = 60kts IAS
- Altitude = 500ft MSL
- “Cookie cutter” sweep width based on triangular lateral range curve



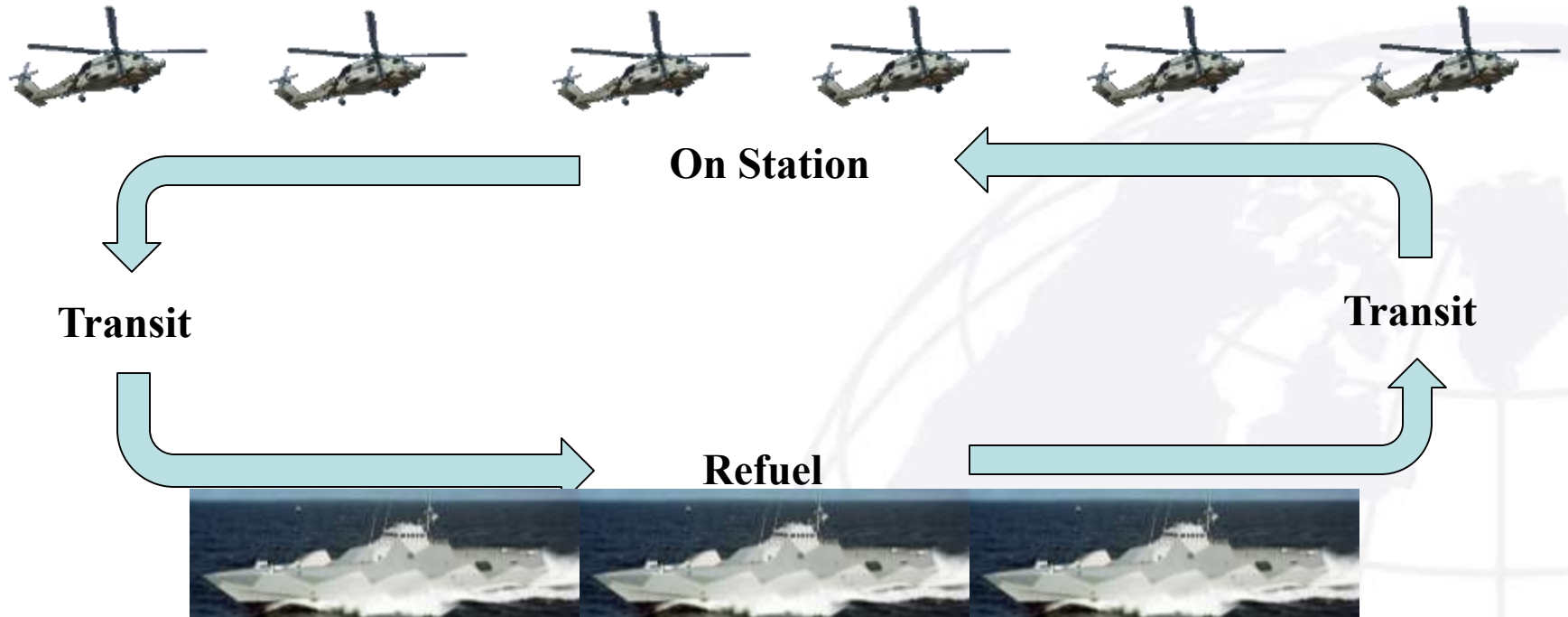
— Lateral Range Curve
— Sweep Width





- Limiting case for UAV is SSLPV
- Limiting case for Helo is Go-Fast
- 6 Helos required on station continuously
- 7 UAVs required on station continuously

Smuggling: On Station Relief



Method

- Discrete event simulation
- Transit times, on station time, and fueling time accounted for



Smuggling: On Station Relief



SH-60

Time	Event
0.00	#1 on station
0.28	#2 on station
0.56	#3 on station
0.83	#4 on station
1.11	#5 on station
1.39	#6 on station
1.67	#1 off station, #7 relieves #1
1.94	#2 off station, #8 relieves #2
2.22	#3 off station, #9 relieves #3
2.50	#4 off station, #10 relieves #4
2.58	#1 lands
2.78	#5 off station, #11 relieves #5

Fire Scout

Time	Event
0.00	#1 on station
0.74	#2 on station
1.49	#3 on station
2.23	#4 on station
2.98	#5 on station
3.72	#6 on station
4.47	#7 on station
5.21	#1 off station, #8 relieves #1
5.95	#2 off station, #9 relieves #2
6.41	#1 lands
6.66	#1 launches
6.70	#3 off station, #10 relieves #3

Assumptions

- SH-60: cruise speed = 146kts IAS, refuel time = 15mins, mission endurance = 3.5hrs, on station = 1.7hrs
- RQ-8B: cruise speed = 92kts IAS, refuel time = 15mins, on station = 5.2hrs
- 85% availability for all aircraft

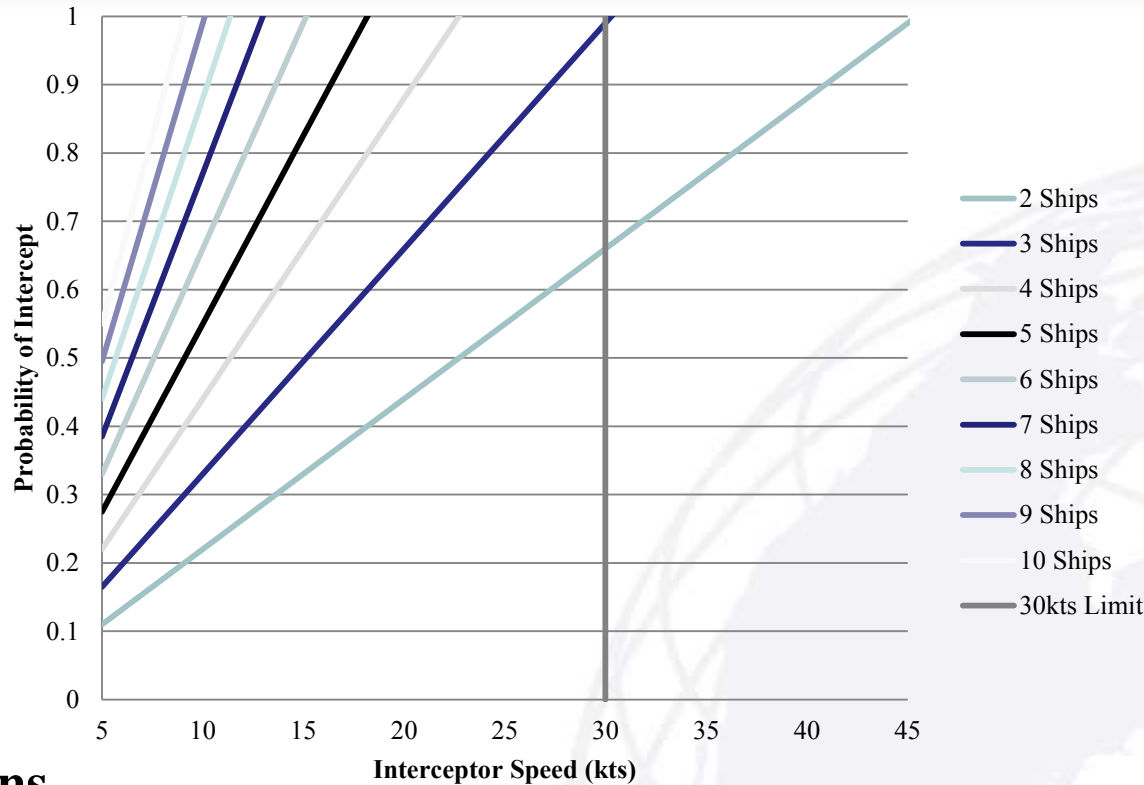


Smuggling: On Station Relief



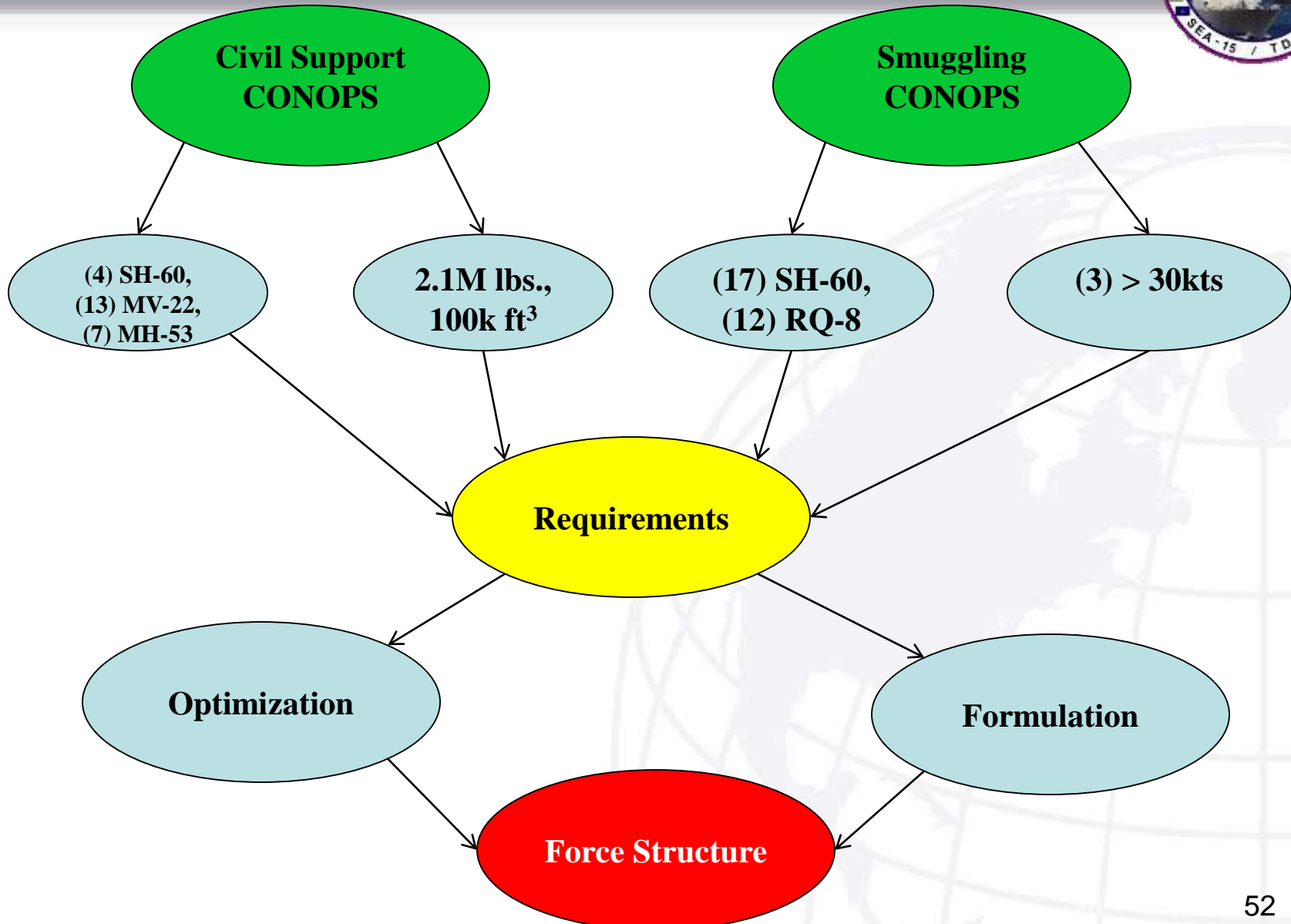
Results

- SH-60: Total of 17 required to maintain 6 on station continuously
- RQ-8B: Total of 12 required to maintain 7 on station continuously



Assumptions

- Interceptors equally spaced along intercept barrier width (250nm)
- Interceptor moves upon identification at identification barrier (110nm)
- Tail chase precluded
- “Intercept” is defined as closing with the target
- Interceptor must be able to launch a RHIB or be small enough to close with target
- Interceptor moves laterally on intercept barrier, perpendicular to target track





Cost Estimation





- “...using total **procurement** and **operating** costs of \$1.5B (FY08 constant dollars) per annum...” –SEA-15 Project Tasking
- **Procurement Cost:** “Equal to the sum of the procurement cost for prime mission equipment, the procurement cost for support items, and the procurement cost for initial spares.”-Defense Acquisition University (DAU)
- **Operating Cost:** “Those program costs necessary to operate and maintain the capability. These costs include military personnel and Operations and Maintenance (O&M) costs.”-DAU



Procurement Cost: Sources



- U.S. General Accounting Office (GAO) Assessments of Selected Weapons Programs
- GAO Reports to Congress
- GAO Reports to Congressional Committees
- Office of the Secretary of Defense (OSD) Acquisition, Technology and Logistics (AT&L) Selected Acquisition Reports
- Congressional Reporting Service (CRS) Reports to Congress
- Defense Acquisition University (DAU) Publications
- RAND's National Defense Research Institute Reports
- GlobalSecurity.org



- Current Ships
 - Navy Visibility and Management of Operating and Support Costs online query
- Future and Foreign Ships
 - Linear regression of current ship data based on personnel and displacement





- Yearly inflation factor computed based on historical consumer price index (CPI)
- Inflation factor added to then-year procurement dollars
- All VAMOSOC queries in constant FY2008 dollars

Class	Then Year Procurement	FY	Inflation Factor	FY08 Dollar				
				Procurement	Annual O&S	Service Life	Overall PO&S	Amortized PO&S
DDG-51 Burke	\$1,031,667,188	2001	1.204	\$1,242,439,806	\$41,951,110	40	\$2,920,484,206	\$73,012,105



- Assumptions
 - Entire Marine Corps is representative of force cross section
 - Selected Marine additional qualification designators (AQDs) representative of medical personnel
- AQD Selection
 - “doctor” equivalent to AQD 6FA, Field Medicine Marine Corps Medical Officer (AQD 6FA) O3-O8
 - “surgeon” equivalent to Trauma Surgeon (AQD 6CM)
 - “nurses” equivalent to general E5
 - “surgeon assistant” equivalent to Field Medical Marine Corps Medical Officer (AQD 6FA) O1-O2





- Food
 - World Food Programme standard food ration (\$4.50/ration)
- Medical Supplies
 - Based on \$7,000,000 worth of pharmaceutical and medical supplies delivered to Aceh Province, Indonesia assisting 1,854,876 people (\$3.77/person)
- Tents
 - Based on 24sqft per person housed in 50ft square "solar system" tents (\$4,027/tent)



Threat Influences



Laurie Knowles, Northrop Grumman Shipbuilding



Threats are not new to Navy experience:

- 16 most common threats were identified in 4th Fleet AO
- Threat prevalence was ranked as low-medium-high to provide a concise assessment to the Force Structure Team
- Standard scaling laws were applied to each threat, in order to assess their impact to a Phase Zero force between 2020 and 2050



Common Threats in 4th Fleet AO



- Threat assessment of low-mean-high; average across 4th Fleet AO.

Description of Threat	H-M-L
Drug Smuggling	High
Natural Disasters	High
Money Laundering	High
Arms Smuggling	High
Human Trafficking	Medium
HIV/AIDS	Medium
Crime	Medium
Disease (other than AIDS)	Medium
Terror Organizations	Medium
Environmental Issues	Medium
Lack of Human Rights	Medium
IUU Fishing	Medium
Kidnapping	Medium
Lack of Comms Infrastructure	Medium
Social Instability	Low
Piracy	Low

High	High Threat Prevalence
Medium	Medium Threat Prevalence
Low	Low Threat Prevalence



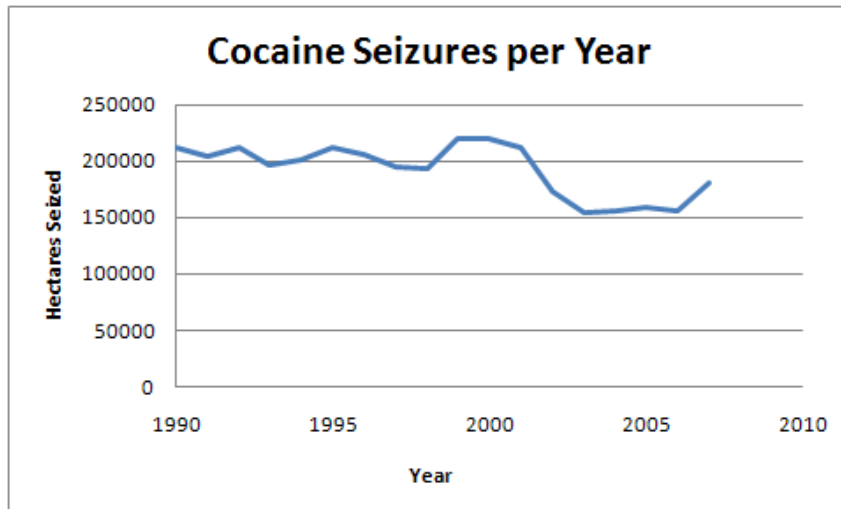
Scaling laws were applied to predict the nature of the most common threats between 2020-2050

- Trend data was collected for each threat, if available
- Data was plotted with a trend line and a correlation coefficient was calculated
 - If the data supported a linear correlation the threat was projected using a linear trend
 - If the data showed no linear relationship, patterns were used
 - If no linear relationship *or* other patterns were revealed, underlying causal factors were used



Scaling Results

Drug Smuggling



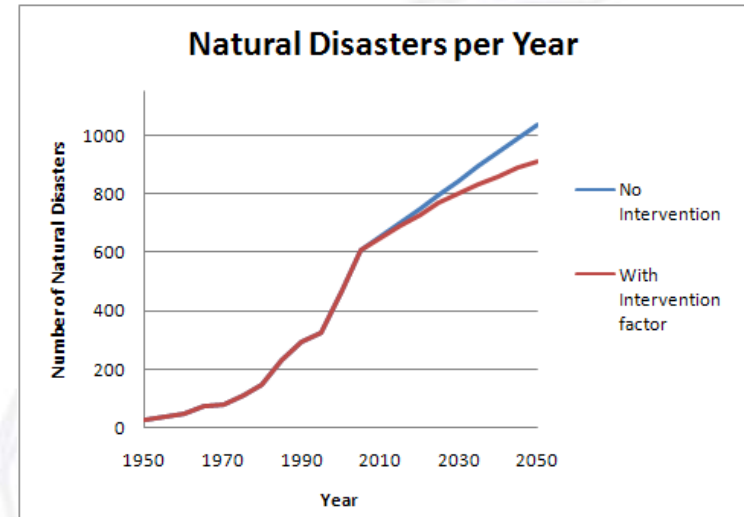
$r = 0.701$

No linear trend

No clear patterns

Focus on causal factors

Natural Disasters



$r = 0.931$

Linear trend – slope $\sim +10/\text{yr}$

Re-run with intervention improvement factor (10%/decade)

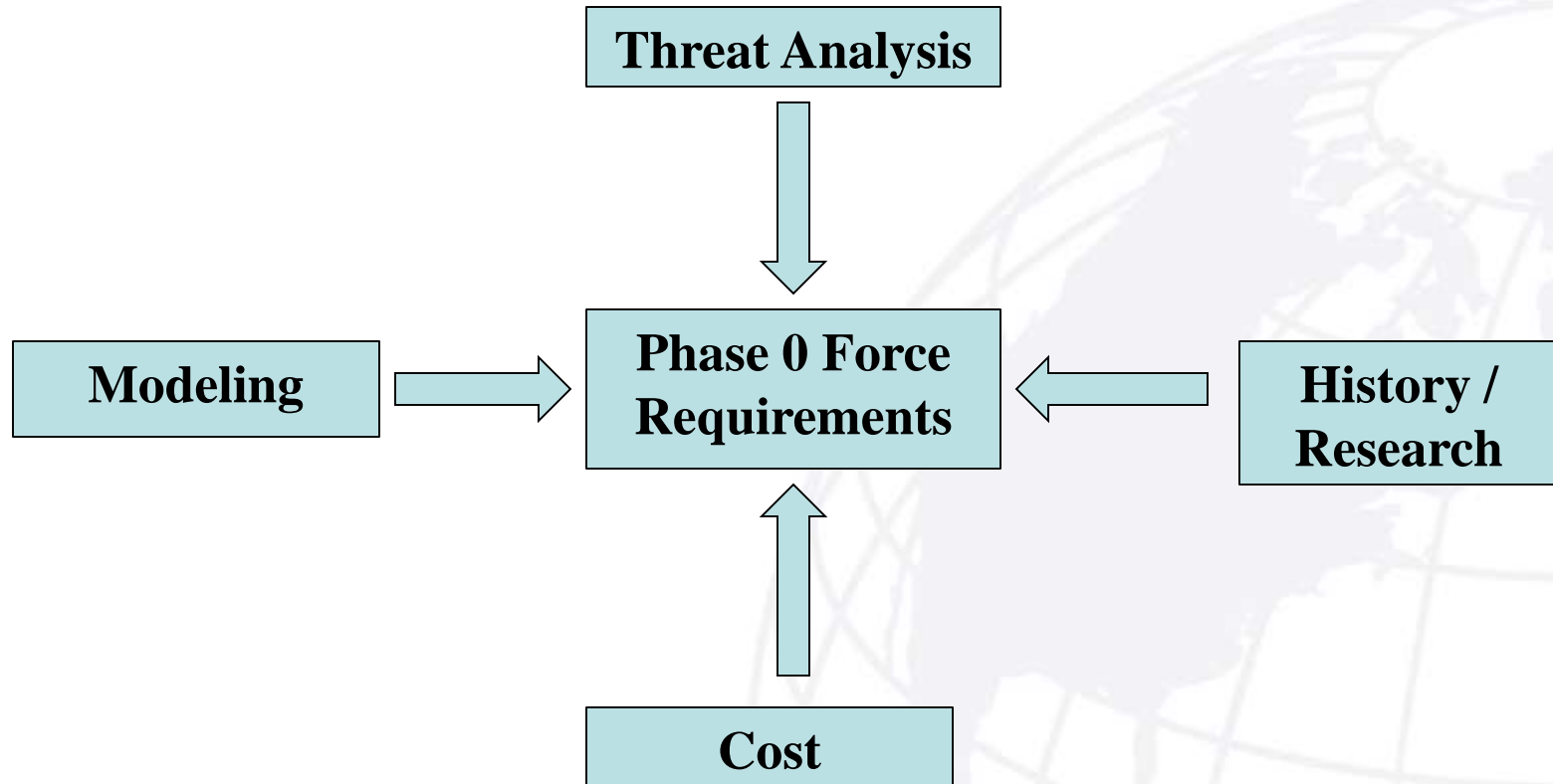
Anticipate between 910-1040 events in 2050 (17% in 4th Fleet AO)



Deriving the Phase Zero Force



LT James Smith





- Consolidate current and future ship capabilities
- In conjunction with modeling team:
 - Develop mission scenarios
 - Develop mission requirements
 - Develop cost data for all current and future ships
- Perform a gap analysis for Partnership of the Americas 2007 against requirements developed during modeling and develop lessons learned that can aid in the force selection process



- Develop current and future force structures that can meet all requirements for the lowest cost
 - Construct three possible force configurations, corresponding to mission severity (low, mean, high) using only current ships
 - Construct three possible force configurations, corresponding to mission severity using a mix of current and future ship
 - Develop a recommended current and future force
- Compare the recommended current and future force and select a single force best suited to perform regional phase zero operations



Mission Requirements



Scenario Severity	Low	Mean	High
Number affected:	50,000	100,000	150,000
Number injured:	2,500	5,000	7,500
Penetration:	0	25	50
Storage Requirement (ft ³):	33,400	66,500	99,600
Vehical Storage Requirement (ft ²):	2,080	3,880	6,080
Water (gal/day):	25,000	50,000	75,000
Marines Required:	115	276	368
Total Medical Personnel:	43	83	123
Scenario Severity	Low	Mean	High
SH-60's required:	2	17	43
MV-22's required:	1	5	13
CH-53's required:	1	3	7
Anti-Smuggling Mission SH-60 required	17		



- Partnership of the Americas 2007 consisted of the following force:
 - USS Pearl Harbor (LSD 52)
 - Units of 24th Marine Regiment and Assault Craft Unit 1
 - USS Mitscher (DDG 57)
 - USS Samuel B Roberts (FFG 58)
 - (2) SH-60 from HSL 48
 - Chilean frigate Almirante Latorre (FFG 14)
 - (1)SH-32 “Super Puma”.
- POA 2007 annual cost: \$264 million





Historic Force Gap Analysis



	Required	Available	Deficit	Requirement Met
Cargo Capacity	99500 ft ³	40600 ft ³	59000 ft ³	40.7%
Aircraft Lift Capacity	1240000 lbs/day	60300 lbs/day	1180000 lbs/day	4.9%
Water Production capacity	75000 gal	61400 gal	13600 gal	81.9%
High Severity Civil Support Mission Requirement Gap				
	Required	Available	Deficit	Requirement Met
Cargo Capacity	66500 ft ³	40600 ft ³	25900 ft ³	61.0%
Aircraft Lift Capacity	826000 lbs/day	132000 lbs/day	694000 lbs/day	16.0%
Water Production capacity	50000 gal	61400 gal	-11400 gal	123%
Mean Severity Civil Support Mission Requirement Gap				
	Required	Available	Deficit	Requirement Met
Cargo Capacity	33400 ft ³	40600 ft ³	-7200 ft ³	122%
Aircraft Lift Capacity	414000 lbs/day	623000 lbs/day	-209000 lbs/day	151%
Water Production capacity	25000 gal	61400 gal	-36400 gal	246%
Low Severity Civil Support Mission Requirement Gap				



Gap Analysis Lessons Learned



- POA 2007 would only be able to meet the requirements of the low severity Civil Support mission. The limiting requirement was primarily airlift.
- POA 2007 could not meet anti-smuggling mission requirements. The limiting requirement was primarily number of aircraft required.
- DDG annual cost is ~\$13 million more than FFG with little additional benefit in phase zero operations.



Force based on the following assumptions:

- Will only be required to perform Civil Support mission or Anti-smuggling mission at a given time
- Force must meet all mission requirements
- LCS and JHSV are considered to be future ships
- Total annual cost of the force will be for procurement and operating costs of the ships and aircraft
- Must have at least one heavy lift helicopter in force
- Must have at least one SH-60 in force

- Force selection driven by four key factors:
 - Cargo capacity required
 - Airlift capacity required for Civil Support mission
 - Number of air assets required for Anti-smuggling mission
 - Number of intercept ships required

- Forces Selected

- LHD 1 class
 - (5) CH-53
 - (11) SH-60B
- (3) FFG 7 class
 - (6) SH-60B





Current force (High) Capabilities



Parameter	Requirement	Capability	Fulfillment rate
Storage Requirement (ft3):	99,600	109,000	109%
Vehicle Storage Requirement (ft2):	6,080	20,900	344%
Water production(gal/day):	75,000	132,000	176%
Medical/Marine personnel	491	1690	343%
Airlift capability: (lbs/day):	1,240,000	1,634,000	132%
Personnel/day:	99	99	100%
Equipment/day:	16	16	100%
SH-60 required for Anti-smuggling	17	17	100%

Annualized cost: \$432 million



Force based on the following assumptions:

- Platforms currently built by other nations may be selected
- If platform is currently produced in another nation it can be produced in the U.S. for approximately the same cost
- Platform must be capable of being produced and fielded by 2020
- All assumptions from current force selection in effect



- Force selection driven by four key factors:
 - Cargo capacity required
 - Airlift capacity required for Civil Support mission
 - Air assets required for Anti-smuggling mission
 - Number of intercept ships required
- Forces Selected:
 - JMSDF DDH
 - (7) CH-53K
 - (6) RQ-8
 - LPD-17
 - (2) SH-60
 - (3) RQ-8
 - (2) M-80 Stiletto
 - JHSV
 - Visby
 - (3) RQ-8

Annual Cost: \$305 million



- Displacement: 20,000 tons
- Speed: 30+ kts
- Draft: 22 ft
- Crew: 371
- Sonar: Bow mounted
- Aircraft: Up to 8 CH-53K
- Weapons: 16 Cell VLS
Sea Sparrow
2 Phalanx CIWS
- Radar: FCS-3
OPS-20

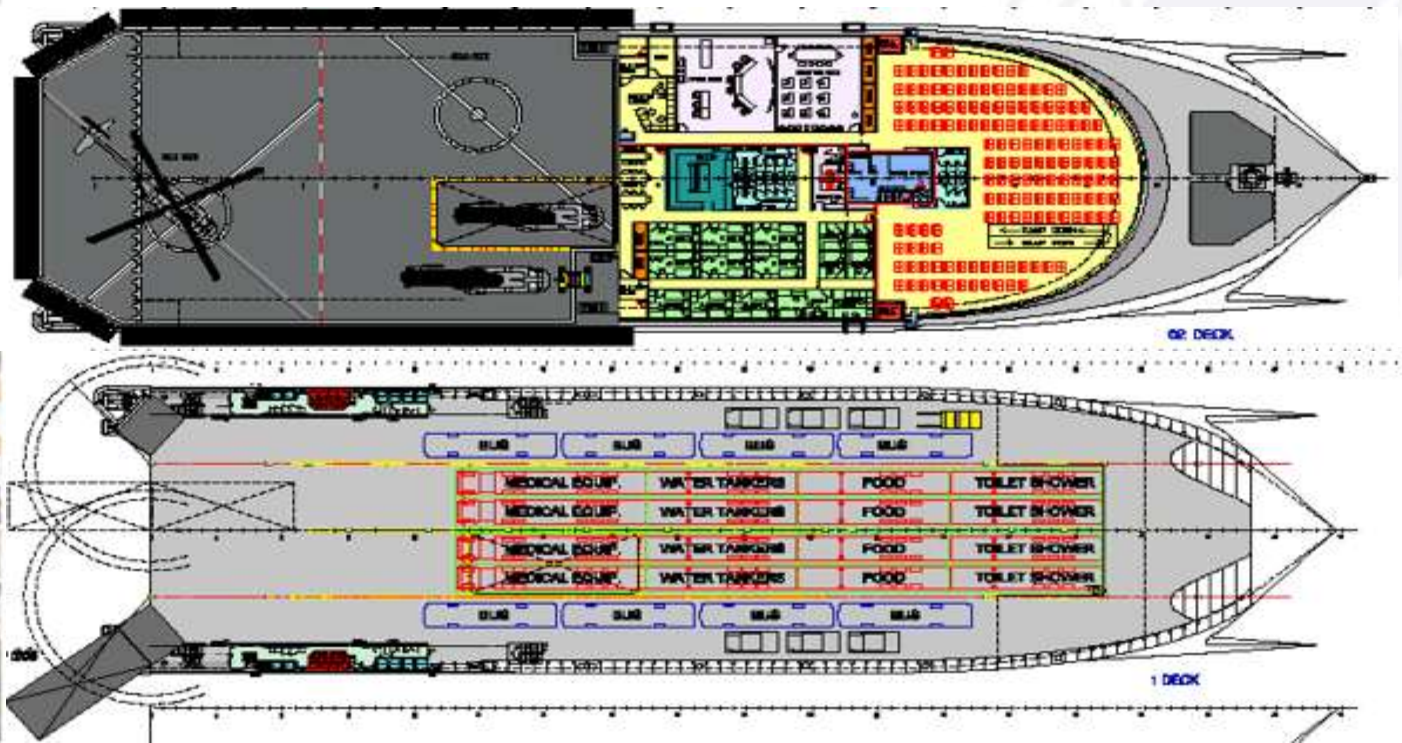




- Displacement: 25,000 tons
- Speed: 22 kts
- Draft: 22 ft
- Crew: 352
- Well Deck: 188 x 50 x 31
- Aircraft: 2CH-53K or 4SH-60
- Storage: 25,000 ft³ Cargo
25,000 ft² Vehicle
- Troops: 700



- Displacement: 1900 tons
- Speed: 35 kts full load
- Draft: 13 ft
- Crew: 30
- Aircraft: 2SH-60 spots
- Storage: 28,740 ft² Vehicle
- Reconfigurable mission deck





- Displacement: 1500 tons
- Speed: 35+ kts
- Draft: 9.5 ft
- Crew: 43
- Sonar: Towed array
- Aircraft: 1 SH-60 or 3 RQ-8
- Weapons: 57mm gun
Anti-ship missiles
- Radar: Air search, Surface search and fire control



- Displacement: 45 tons
- Speed: 50 kts
- Draft: 3 ft
- Crew: 3
- Aircraft: UAV capable
- 88 ft long 40ft wide 18.5 high
- Cargo capacity: 20 tons, 1900 ft²
- Organic 7m RHIB





- Cruise speed: 125+ mph
- Endurance: 8 hours
- Service ceiling: 20,000 ft
- Three spot in one SH-60 spot





Future Force (High) Capabilities



Parameter	Requirement	Capability	Fulfillment rate
Storage Requirement (ft³):	99,600	100,000	100%
Vehicle Storage Requirement (ft²):	6,080	28,300	465%
Water production(gal/day):	75,000	77,500	103%
Medical/Marine personnel	491	880	179%
Airlift capability: (lbs/day):	1,240,000	1,670,000	135%
Personnel/day:	99	99	100%
Equipment/day:	16	16	100%
RQ-8 required for Anti-smuggling	12	12	100%

Annualized cost: \$305 million



- Both Current and Future force meet all mission requirements
- Current and Future force have approximately equal cargo and vehicle space
- Current force has more medical facilities onboard and greater troop carrying ability
- Future force is scalable and flexible and will be able to transition between phases of operations easily
- The future force has a smaller logistical footprint
 - current force needs to be refueled/resupplied every 3 days
 - future force can last 7 days between resupply.
- Future force accomplishes the same mission for \$305 million vice \$432 million and savings of \$127 million or ~30%



Regional Stability



LT Chet Lee



- Failed State Index
 - Foreign Policy Journal
- United Nations Development Programme (UNDP) Early Warning Report
 - United Nations Report
- Country Policy and Institutional Assessment
 - World Bank Study
- Political Risk Services
 - Political Risk Services Group



- Program on the Geopolitical Implications of Globalization and Transnational Security
 - Dr. Nayef R.F. Al-Rodhan, et al.
 - Combines many of the other indexes
 - Over 250 indicators that are measured by reputable sources internationally
 - Indicators are lagging
 - 18 month window to detect effectiveness



- Societal sector
- Political sector
- Economic stability
- Environment
- Military and security



- Direct effect on 45 factors
 - May be measurable in the short term
 - Example
 - Crime rate
 - Regional conflicts
- Indirect effect on many factors
 - Example
 - The Anti-smuggling mission can reduce black market transactions which, in turn, increases GDP



(Broad Sector) Variables	Freedom of Navigation	Relation With local govt	Training Local forces	Equipping	Info-sharing	Anti-terrorism	Anti-Piracy	Anti-illegal fishing	Restoration Critical Infra	Life-sustenance	Force Protection	Non Combat Evacuation	Anti-smuggling
(Economy)													
Black Market				1			1	1		1			1
Living Standard	1	1			1			1	1	1			1
Conflict Induce Poverty	1								1	1			
(Environmental)													
Natural Disasters					1								
Natural Resource Dispute	1	1											



Future Studies





- A more detailed analysis of the additional 10 missions
- A more in depth study of Phase Zero effects on stability
- Measures of effectiveness for a Phase Zero force
- Integration of command and control with Coalition partners



- Maritime Phase Zero force structures
- 13 missions of maritime Phase Zero
- Phase Zero missions projected to 2020 through 2050
- Phase Zero triangle
- Critical platform capabilities needed to accomplish the maritime Phase Zero mission
- Tailored command and control architecture



Bullard 100 Computer Lab 1230

- Background/Stability (RM A)
- Force Structure/Modeling/Cost Analysis (RM B)
- Threat Team (RM C)

If you would like a copy of the brief and the final paper, please provide LT Chet Lee with your mailing address