WHAT WE DO TODAY
Current Concept of Operations

- **FOB** (Forward Operating Base)
- **CAMP**
- **FOB / COP** (Combat Outpost)
- **PB / OP** (Patrol Base / Observation Point)

**ENTRY POINT** → **BUILD-UP OF FORCES** → **EXTEND FORWARD PRESENCE** → **TAKE THE FIGHT TO THE ENEMY**
Challenges with PBs and OPs

- Large areas of operation
- Long duration patrols (8-10 days)
- Critical dependence on radios
- Carry 1-2 days + of supply
  - chow / ammo / batteries / water
- Battery resupply every 48 hours
- Re-supply ties patrols to convoys, stalling operational momentum
MRAP pushes a mine roller during a five-day convoy to provide resupply. During one resupply convoy it took nearly 40 hours to travel a 70 miles.
WHAT WE WILL DO TOMORROW
Future Concept of Operations

FOB / COP

PB / OP

ESTABLISH FORWARD PRESENCE

TAKE THE FIGHT TO THE ENEMY
Transportability Constraints

• **Space and Weight** are at a premium due to lift restrictions
  
  – Air
  
  – Sea
  
  – Land

• **Unique transportation requirements**
  
  – All equipment must be capable of deploying via ship, air or tactical vehicle
  
  – Equipment must survive coming through surf and cross-deck loading
  
  – Electromagnetic interference from shipboard systems
  
  – Special restrictions for shipboard stowage / transport (Lithium Batteries)
  
  – Supply / resupply is from the Naval / Pre-Positioned Forces
Individual Marine (carried): Assault Load < 75#, Existence < 150#

Lifted by Marines / Loose Cargo: One person lift – 44 pounds

Requiring Forklift / Material Handling: > 400 pounds

HMMWV Trailer Towable: > 2700 pounds

Medium Tactical Truck Carried: < 7 tons (off road), 10 tons (on road)

Heavy Tactical Truck Carried: < 16 tons (on road)

MV-22 Tilt-Rotor Lift: < 4 tons (internal)*, 7.5 tons (external)

CH-53 Helicopter Lift: < 5 tons (internal)*, 14 tons (external)

* psi limitations apply
Framing the Problem Growth

**1980s**

- **M151**: 2,450 lbs. / 66 SQFT
- **M998**: 5,060 lbs. / 106 SQFT
- **M1123**: 5,850 lbs. / 109 SQFT

**1990s**

- **M1123 w/ MAK**: 9,800 lbs. / 123 SQFT

**2000s**

- **M1114 UAH**: 9,870 lbs. / 122 SQFT

**2009**

- **M1165A1 ECV**: 9,770 lbs. / 117 SQFT

1.003/1.05

* Box shows growth in weight/square from previous vehicle.
Co HQ (x3/Bn)
[Image of soldiers and vehicle]

RFL Plt (x3/Co x9/Bn)
[Image of soldiers and vehicle]

WPNS Plt (x3/Bn)
[Image of soldiers and vehicles]

Pre-OIF Rifle Company Radios

- T/O 6 Officer/176 Enlisted
  - VHF-V (VRC-88): 1
  - VHF-M (PRC-119): 7
  - UHF-M (PRC-113): 1

Radio Weights
- PRC-119 - 22.5 lbs
- PRC-113 - 16.7 lbs
  * w/batteries

Mounted in M998A1
Co HQ (x3/Bn)

RFL Plt (x3/Co x9/Bn)

WPNS Plt (x3/Bn)

Mounted in M1123A2s

Radio Weights
- PRC-150 - 15.7 lbs
- PRC-117 - 15.9 lbs
- PRC-152 - 2.4 lbs
- PRC-153 - 1 lbs

* w/batteries

T/O 6 Officer/176 Enlisted
- MBR-V (VRC-103): 1
- MBR-M (PRC-117): 6
- HFMR (PRC-150): 5
- DVA (VRC-110): 2
- THHR (PRC-148/152): 35
- IISR (PRC-153): 176
Individual Power Requirements

- AN / PRC-148 or 152
  - Unique Batteries
- AN / PVS-17
  - AA Battery
- AN / PVS-14
  - AA Battery
- AN / PAS-13D
  - AA Battery
- AN / PEQ-16A
  - DI-123A Battery
- Hand-held flashlight
  - AA Battery
- MIOX Water Purifier
  - AA Battery
- AN / PSC-13 D-DACT
  - Unique or AA Battery
- DAGR
  - AA Battery
- AN / PVS-14
  - AA Battery
- AN / PEQ-16A
  - DI-123A Battery
- AN / PRC-153
  - Unique Battery
- Quiet Pro Headset
  - Unique Battery
- Squad Digital Camera
  - Unique Battery
- Rugged Laptop
  - Unique Battery
- AN / PRC-117F
  - BA-5590 / BA-5390 / BB-2590 Batteries
Combat Weight of Marines

The Soldier's Load and the Mobility of a Nation

NVAC
NAVAL RESEARCH ADVISORY COMMITTEE REPORT
Lightening the Load
September 2007
2/7 April 2008 Equipment Weight by Billet

Average Weight 112 lbs

- Platoon Commander *
- Squad Leader
- Rifleman *
- 81MM Mortarman
- Rifleman
- Rifleman *
- Corpsman *
- Platoon Commander
- Squad Leader *
- Platoon Commander
- RTO
- Corpsman *
- RTO
- Automatic Rifleman *
- Machinegun Team Leader
- Team Leader
- Machinegun Section Leader *
- Automatic Rifleman
- Automatic Rifleman
- Scout Sniper Platoon
- 60MM Mortarman
- Platoon Commander/JTAC
- Team Leader *
- Medium Machine Gunner
- Automatic Rifleman
- 60MM Mortarman
- Automatic Rifleman *
- Machinegun Section Leader
- 60MM Mortarman
- Team Leader/Automatic Rifleman *
2/2 March 2010 Equipment Weight by Billet

Average Equipment

2/7 Avg Equipment Weight
112 lbs

* = MTV
Thermal Heat Strain

1st Lt. Thomas "Teo" Tompkins with Company E, 2nd Battalion, 8th Marine Regiment, scans a possible enemy position with his rifle combat optic Aug. 10, 2009.

Pfc. James B. Lutz, machine gunner, Company E, 2nd Battalion, 8th Marine Regiment, races down his squad’s position to get more ammo while receiving fire from enemy positions Sept. 2009.
NRAC 2007:

Adequate models do not exist that incorporate combat effectiveness parameters and predict human performance effects of weight.
Marine Burden

- Weight
- Stiffness
- Bulk
Tunnel & Hatch

Stair & Ladder Climb

Sprint

Agility Run

Agility Run

START
Balance Beam
Low Crawl
Low Crawl
Balance Beam
Wall Climb
Wall Climb
Sensor Pad Stations

| Questionnaire Kiosks |

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<tr>
<th>Question</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Question 1</td>
<td>The stiffness of the test condition</td>
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<tr>
<td>Question 2</td>
<td>The bulk of the test condition</td>
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<tr>
<td>Question 3</td>
<td>The weight of the test condition</td>
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<tr>
<td>Question 4</td>
<td>Your agility while wearing the test condition</td>
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<td>2</td>
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<td>7</td>
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<tr>
<td>Question 5</td>
<td>Your speed while wearing the test condition</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Question 6</td>
<td>Your overall mobility while wearing the test condition</td>
<td>1</td>
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<tr>
<td>Question 7</td>
<td>Your overall performance while wearing the test condition</td>
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Sequential to Concurrent Design Trades
• Rapid Innovation Fund (RIF)
  – FY 11 MCSC/PEO 15 projects $25M
  – FY 12 ONR BAA - July
  – Address JUONS and Naval Needs
  – Talk to Program Offices (Technology Leads)

• Small Business Innovation Research (SBIR)
  – $14M for FY 12
  – Small Business Workshop

Keep the Good Ideas Coming