<table>
<thead>
<tr>
<th><strong>PRISON</strong></th>
<th><strong>WORK</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>PRISON - Cook County Correctional Center</td>
<td>WORK - Pentagon, Washington, DC</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>@ PRISON</strong></td>
<td><strong>@ Work</strong></td>
</tr>
<tr>
<td>You spend most of your time in a 10X10 cell</td>
<td>You spend most of your time in a 6X6 cubicle</td>
</tr>
<tr>
<td>You get three fully paid for meals a day</td>
<td>You get a break for one meal, and you have to pay for it</td>
</tr>
<tr>
<td>For good behavior, you get time off</td>
<td>For good behavior, you get more work</td>
</tr>
<tr>
<td>The guard locks and unlocks all the doors for you</td>
<td>You carry a security card and open all the doors yourself</td>
</tr>
<tr>
<td>You can watch TV and play games</td>
<td>You could get fired for watching TV and playing games</td>
</tr>
<tr>
<td>You get your own toilet</td>
<td>You share the toilet with people who pee on the seat</td>
</tr>
<tr>
<td>They allow your family and friends to visit</td>
<td>You aren't even supposed to speak to your family</td>
</tr>
<tr>
<td>All expenses are paid by the taxpayers with no work required on your part</td>
<td>You must pay all your expenses to go to work, and they deduct taxes from your salary to pay for prisoners</td>
</tr>
<tr>
<td>You spend most of your life inside bars wanting to get out</td>
<td>You spend most of your time wanting to get out and go inside bars</td>
</tr>
<tr>
<td>You must deal with sadistic wardens</td>
<td>They are called &quot;Generals and Admirals&quot;</td>
</tr>
</tbody>
</table>

**THERE IS SOMETHING SERIOUSLY WRONG WITH THIS PICTURE.**
USMC Organizations involved in Research and Acquisition

- Assistant Secretary Of the Navy Research, Development & Acquisition
  - Chief of Naval Research
    - Marine Corps Warfighting Lab
  - Office of Naval Research
  - Program Executive Officer Land Systems
    - Commanding Officer Marine Corps Systems Command
      - Commandant of the Marine Corps
        - Deputy Commandant Plans / Policy / Ops
        - Deputy Commandant Programs / Resources
        - Deputy Commandant Installations / Logistics
        - Deputy Commandant Aviation
        - Deputy Commandant Combat Development
      - Assistant Commandant of the Marine Corps
        - Deputy Commandant Combat Development
  - Assistant Secretary Of the Navy Research, Development & Acquisition
  - Deputy Commandant Plans / Policy / Ops
  - Deputy Commandant Programs / Resources
  - Deputy Commandant Installations / Logistics
  - Deputy Commandant Aviation
  - Deputy Commandant Combat Development
• 75% of people live w/in 200mi of a coast
• 70% of world is water
• 95% of international communications travels via underwater cables
• 23,000 ships are underway daily carrying 90% of the world’s international commerce
• 49% of the world’s oil travels through 6 major chokepoints
• 25% of the world’s oil and gas is drilled at sea

We are a Maritime Nation
Strategic Challenges

- Multipolar world
  - Economic volatility
  - Energy dependency
  - Global Commons accessibility

- Weakened states
  - Key region instability
  - Terrorist / Pirate sanctuary
  - WMD proliferation

- Transnational threats
  - Migration & Illegal immigration
  - Climate change
  - Increased competition for resources
Pirates – Argghhhh!

I tried to hijack a US ship
And all I got was this HAT!
Sources of Instability, Stress & Conflict

- Energy Demand
- Terrorism/Crime
- Water Stress
- Urban Stress
- Ungoverned
- Poorly Governed Spaces
  - Guatemala-Chiapas Border
  - Colombia-Venezuela Border
  - West Africa
  - East Africa
  - Arabian Peninsula
  - North Caucasus Region
  - Afghan-Pakistan Border
  - Sulawesi-Mindanao
- Energy Demand
- Nuclear
- Choke points
Hybrid threats, the blurring character of conflict, and complex environments lead to...

**Hybrid Threat Capabilities**
- Terrorism/Crime
- Significant Drug Regions
- Ungoverned Spaces
- Nuclear Armed States
- Anti-access Weapons

**Access challenges...**
- Terrorism/Crime
- Significant Drug Regions
- Ungoverned Spaces
- Nuclear Armed States
- Anti-access Weapons

**ARC OF INSTABILITY**
- Emerging Global Powers
- Increasing Global Interdependence
- “Haves” vs “Have Nots”
- Anti-West attitudes

**Access challenges...**
- Urbanization
- High Earthquake Risk Areas
- Famine and Disease
- Top Ten Oil Reserves

**Largely in the Littorals**

**Wars Amongst the People**

**Complex Terrain**

**Information Environment**
Conflict is not “irregular” or “conventional”
Requires “Smart Power” - combines soft and hard power

...thiving in an uncertain world
We are the Nation’s Expeditionary Force
Philosophical Challenges

- Plan for Worst Case
  - “The Marine Corps will be ready when the rest of the Country is not”

- Evolving scale of Warfare

- Success on the side of Bigger Battalions

- Cost – Effectiveness vs ROI
Current Deployment Concept

FLIGHT FERRY

Fly in Forces

Afloat Prepositioning

AFLD

MEF (FWD)

PORT/BEACH

OBJ

Current Deployment Concept
Future Seabasing and Expeditionary Maneuver Warfare
A Faster More Lethal Force
New Capabilities ... New Way to Fight

Distributed Operations
Security Cooperation MAGTF

Task organized to meet specific requirements

Additional capabilities / attachments as required:
- Interagency Representatives
- Navy Expeditionary Combat Command
- U.S. Coast Guard
- Allies
- Info Operations / Civil Affairs
- Veterinary capabilities
- Band
- Others as needed

KEY to increasing forward presence and engagement

Reinforced Infantry Battalion

Task Organized Aviation Detachment

Task Organized Combat Logistics Element

Other Detachments
Balanced Expeditionary Capability

Balanced Force Capability
- Infantry
- Aviation
- Artillery
- Combat Logistics
- Intelligence
- Engineers
- Military Police
- Civil Affairs
- EOD
- Radio/SIGINT

Enabling Capability
- Trainers
- Recruiters
- Training Pipeline

Baseline Force

Selective Unit Increases
202,000

1:2 Force Deployment Tempo

180,000

1:≤2

175,000
Meeting Theatre Demands, Responding to Lessons Learned & Replacing Destroyed Equipment with 2006 Technology
Infantry Squad Communication in the Old Days

AN/PRC-88 x 1

BB588/U x 1
Modern Infantry Squad Requirements

- AN/GSC-68 M-DACT x1
- AN/GSC-68 M-DACT x1
- AN/PRC-117F x2
- AN/PRC-150 x2
- AN/PVS-14 x2
- AN/PSC-13 D-DACT x8
- AN/PRC-153 + AA adaptor x12
- AN/GSC-68 M-DACT x1
- BA-5590
- IZLID x4
- AN/PVS-17 x1
- AN/PVS-27 SSMRNS x2
- AN/PAS-13D x6
- AN/PSN-13A Dager x2
- Handheld GPS x2
- AN/PRC-148 + 3v adaptor
- DL-123 3V x1
- DL-123 3V x1
- AA x12
- VLI x3
- AN/PEQ-2 x2
- AN/PVS-17 x1
Squad Systems Requiring Non-Compatible Rechargeable Lithium Batteries

AN/PSC-13 D-DACT
MSIDS
AN/VSQ-2C EPLRS
AN/PRC-153 IISR
Squad Digital Camera
Tactical Computer
Health and Comfort Issues

No Problem in the Assault
But Austerity Goes Only So Far
Capability vs Affordability
<table>
<thead>
<tr>
<th></th>
<th>Stock HMMVV</th>
<th>Hybrid HMMVV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top speed (mph)</td>
<td>70</td>
<td>85</td>
</tr>
<tr>
<td>Acceleration (0-50) (sec)</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Fuel economy (mpg)</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Range (miles)</td>
<td>275</td>
<td>380</td>
</tr>
<tr>
<td>Power Gen Source</td>
<td>None</td>
<td>55KW</td>
</tr>
<tr>
<td>Cost</td>
<td>$50K</td>
<td>$200K</td>
</tr>
</tbody>
</table>

Hybrid HMMWWV 200% more fuel efficient
USAF Transformation
Navy Transformation
Providing Energy not easy
Marine View of Change
2002 Fuel Efficiency Policy Memorandum

- Set forth following actions:
  - Acquisition:
    - Achieve a 10% reduction of fuel requirements in replacement platforms
    - Consider Fuel Efficiency as a key requirement in each acquisition milestone decision
  - RDTE: Continue Warfighting Laboratory efforts in emerging technologies to reduce fossil fuel use
  - Bases and Stations: Prosecute an alternate fuels program in non-tactical fleet
Maj. Gen. Richard Zilmer submitted an urgent request for renewable energy systems due to the vulnerability of American supply lines to insurgent attack by ambush or roadside bombs. The request said “reducing the military's dependence on fuel for power generation could reduce the number of road-bound convoys.” …’Without this solution, personnel loss rates are likely to continue at their current rate. Continued casualty accumulation exhibits potential to jeopardize mission success…”

Defense News, August 2006
- Improve aggressive research, development, acquisition, fielding and sustainment of equipment that;
- Has inherent force protection capability,
- Is lighter, easier to maintain, and promotes energy efficiency, and
- Ensure interoperability with and between naval platforms and joint systems.
# Changes in Equipment Fuel Efficiency

<table>
<thead>
<tr>
<th>Platform 0ld/ New</th>
<th>Old (Yr)</th>
<th>Cargo max (tons)</th>
<th>baseline Mi-Tons/Gal</th>
<th>Fuel Eff Incr %</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMMWV</td>
<td>1984</td>
<td>13</td>
<td>2.5</td>
<td>33</td>
</tr>
<tr>
<td>JLTV</td>
<td>2015</td>
<td>17</td>
<td>2.5</td>
<td>43</td>
</tr>
<tr>
<td>M813</td>
<td>1982</td>
<td>4.3</td>
<td>5</td>
<td>21.5</td>
</tr>
<tr>
<td>MTVR</td>
<td>2002</td>
<td>4.5</td>
<td>7.1</td>
<td>32</td>
</tr>
<tr>
<td>LVS</td>
<td>1990</td>
<td>2</td>
<td>12.5</td>
<td>25</td>
</tr>
<tr>
<td>LVSR</td>
<td>2010</td>
<td>2.6</td>
<td>16</td>
<td>42.9</td>
</tr>
<tr>
<td>CH46</td>
<td>1963</td>
<td>0.605</td>
<td>2</td>
<td>1.211</td>
</tr>
<tr>
<td>MV22</td>
<td>2006</td>
<td>0.605</td>
<td>5</td>
<td>3.029</td>
</tr>
<tr>
<td>F18/AV8B</td>
<td>1988</td>
<td>996 Gal/Hr</td>
<td>2</td>
<td>NA</td>
</tr>
<tr>
<td>JSF</td>
<td>2012</td>
<td>794 Gal/Hr</td>
<td>2</td>
<td>NA</td>
</tr>
</tbody>
</table>
Equipment Scalability Concept

D9

Multi-Terrain Loader

D8

D7

Skid Steer Loader
Fuel Distribution

**DESCRIPTION**

- Ground Expedient Refueling Systems (GERS) - fuel distribution equipment procured in two sizes (small – 168 gallons; medium – 620 gallons).
- Uses an electric air compressor vice liquid pumps to dispense fuel.
- Transportable by any vehicle (HMMWV or larger), incidental operators, easily set-up and operated.
- Capability to be “tailored” to use various logistics platforms as a fuel distribution vehicle, or as a range-extension capability for units possessing GERS.
**Description**

- E-WPS places potable water into bags ranging from 1 to 3 liters.
- Serve as source of resupply for the existing Marine-on-the-move hydration system or stand alone packaged water for relief missions. Note: The E-WPS bag is not intended for replacement of the hydration system bladder, but to serve as a source of water to refill the bladder.
- Rugged, automated, and skid mounted so that it can be integrated on a standard M1102H HMMWV trailer without exceeding the towing capacity of the HMMWV.
Foam for tents and Relocatable Buildings

End View

Texture

Profile view

60-75% power requirement reduction to cool or heat
Increased Simulator Use
Inserted three Initiatives into POM08 ($15M)

FY09 Plus-up Funding ($10M)

Nominated five initiatives for Economic Stimulus Funding ($10M)
Participation in Joint Efforts

- Joint Staff Functional Capabilities Integration Board
  - Develop Joint Standards on Feeding/ Water/ Billeting/Hygiene
- Joint Expeditionary Base Working Group
  - Develop Joint Standards for Tent Camps between Army and Air Force
    - Energy Efficiency
    - Joint Interoperability/commonality of parts and maintenance and savings in costs
How much will be enough?

- Initiated studies on
  - Future of Bulk Fuel Consumption
  - Power
  - Equipment to maintainer Ratio
Navy Energy Strategy Efforts
Expeditionary Working Group 2020 Goals

Reduce operational energy consumption by 15%

Increase operational energy efficiency up by 15%

Increase use of non-petroleum fuel to 25-40% of operational energy generation
Fuels Working Group Efforts

**Objective:** Produce a JP-8 surrogate to reduce DoD dependence on petroleum-based fuels

### Approach:
- Develop and demonstrate an affordable, highly efficient process for converting crop oils to JP-8
- Submit a final bio-derived JP-8 sample for government testing and evaluation
- Diversify portfolio of agricultural / aquacultural source feedstock to avoid competition with current crop oil / food markets

### Highly-efficient conversion process to JP-8 from long chain oils

**“Build-down” process:**
cracking/isomerization of C12-C16 to JP-8

### Highly-efficient conversion process to JP-8 from short chain biomass waste

**“Build-up” process:**
oligomerization of C2-C6 to JP-8

### Highly-efficient system for cellulosic feedstocks and low-cost algal oil production and conversion to JP-8

Maximize algal oil production and process algal oil to JP-8
Finding the Marine Corps Way Ahead

- Include fuel effectiveness/efficiency in all requirements and acquisition processes.

- Aggressively explore/pursue alternative and renewable fuels and power technologies.
  - Commercial application efficiency improvements will benefit tactical applications

- Continue to leverage other Services and Commercial Sector Capabilities and efforts
...A Thought....A Goal??

....By 20XX, the Pentagon will be a NET ZERO PLUS installation.
"Hell is paved with good intentions, roofed in with lost opportunities."

— Portuguese Proverb