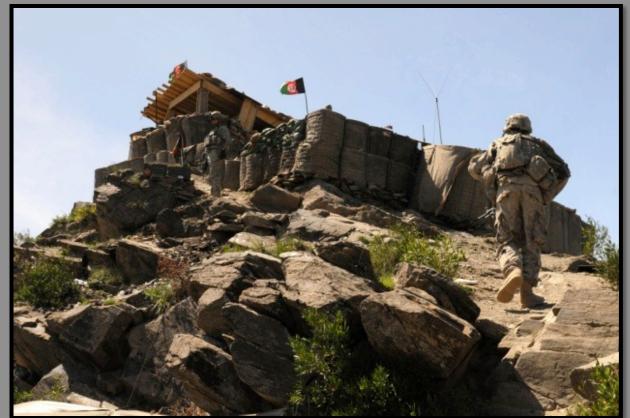
The Human Capital Cost of Brute Force Logistics

"Lessons from the Edge"



















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What is 'Resilience'?

- Engineering definition:
 - Amount of disturbance that system
 can resist; speed of return to equilibrium
 - Focus –efficiency and optimization of system



- Ecological definition:
 - Amount of disturbance that system can absorb without changing structure, feedbacks, function, overall identity
 - Focus continued existence of system...
 continuity of mission

Attributes of Resilience

Stability	Adaptive Capacity	Readiness
Single Points of Failure	Response Diversity	Situational Awareness
Controllable Degradation	Collaborative Capacity	Simplicity/ Understandability
Resistance	Connectivity	Preparedness
Balance	Reserves	False Subsidies
Dispersion	Learning Capacity	Autonomy

Resilience Study Findings

- Found factors that undermine mission success
 - COP resilience Poor
 - Lacking Response Diversity, False Subsidies create Single Points of Failure and low Resistance
 - Cascading problems can compromise mission
 - Fuel-power-water-mission nexus
- ID'ed problems in advance
 - Highlighted vulnerabilities within system and between FOB and COP

Gaining Resiliency.....A Team Sport





A Good Facilitator

Hard Lessons Learned Put to Good Use

Past: 2003-2011

Fuel – 2,250 GPD Fresh Water – 22,000 GPD Waste Water – 20,000 GPD Solid Waste – 4,000 Lbs/Day



- 600-Soldier Building Blocks
- Frame-Supported Tents
- Large Labor Force Required for Set-Up
- Spot Power Generation
- Large 20-footContainerized SupportSystems
- All Liquid & Solid Waste
 Generated Required Hauling
 Out of Camp

Present: 2012-2014

Fuel – 1,000 GPD Fresh Water – 5,500 GPD Waste Water – 4,500 GPD Solid Waste – 4,000 Lbs/Day



- ■150-Soldier Building Blocks
- Air-Beam-Supported Tents
- Efficient Insulating Liners
- Solar Shade Systems
- Micro-grids Power Distribution
- Shower Water Reuse
- LED Lighting
- TRICON Based
- Small Waste Incinerators

Future: 2015-2025

Fuel – 750 GPD Fresh Water – 1,300 GPD Waste Water – 500 GPD Solid Waste – 800 Lbs/Day



- Rigid-Walled Shelters
- Smart Micro-grids
- Renewable Energy

Storage

- Water-free Latrine Systems
- Waste-to-Energy
- Waste Reduction Source
- Zero-Footprint Tech
- "Smart" Camp Monitoring
- Precision Resupply