

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

Story Teller



Vendor

Expert

Facilitator

Integrator

Super-User



A Good Facilitator + Users/Vendors/Experts + Multiple Prototypes = Solutions

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-foot Containerized Support Systems
- 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