



Joint Committee on Tactical Shelters Update 19 November 2015

Sustainability/ Logistics-Basing, Science & Technology Objective- Demonstration (SLB-STO-D)

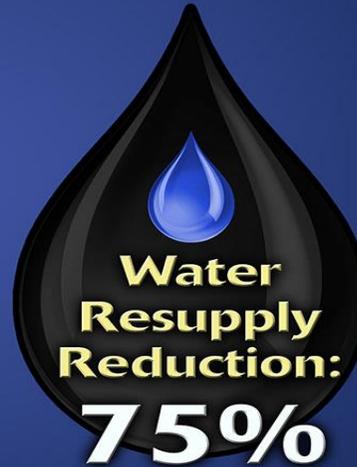
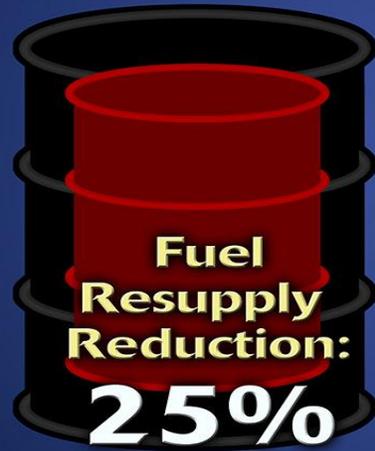
Mr. Douglas Tamilio – RDECOM Champion- NSRDEC
Mr. Gregg Gildea - Lead (RDECOM-NSRDEC)
Mr. Kurt Kinnevan - Co-Lead (ERDC-CERL)
Mr. Paul Carpenter – Deputy (RDECOM-NSRDEC)



Sustainability Logistics Basing - Science & Technology Objectives - Demonstration



Objectives:



Integrated Model Based **SYSTEMS**
ENGINEERING APPROACH to Demonstrate
a Significant Reduction in Sustainment Resupply...

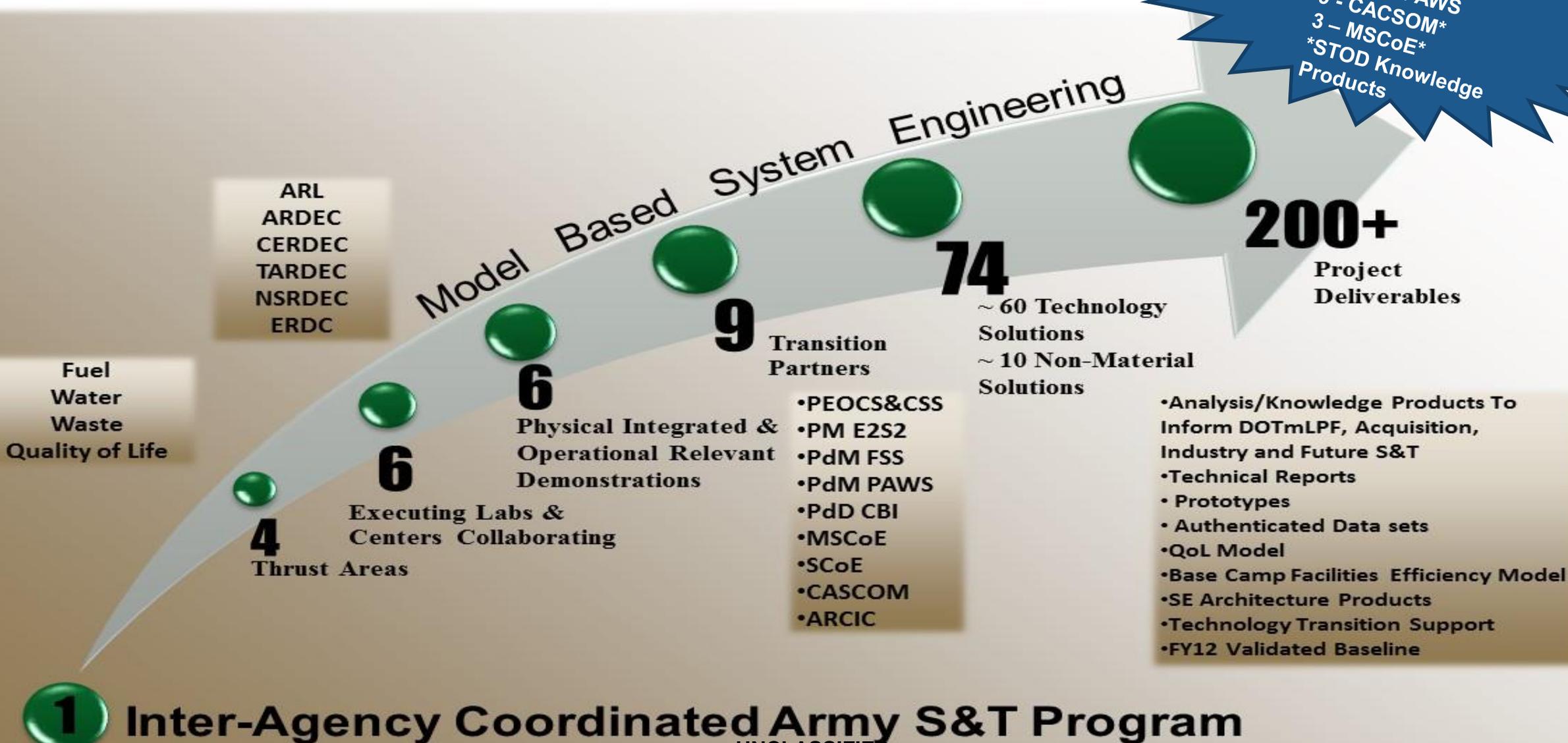
...While Maintaining **QUALITY OF LIFE**
and Increasing Self Sufficiency at
Extra-Small/Small Base Camps.





SLB-STO-D "By the Numbers"

TTAs:
 1 - PM E2S2
 6 - PdM FSS*
 7 - PdM PAWS
 9 - CACSOM*
 3 - MSCoE*
 *STOD Knowledge Products



ARL
 ARDEC
 CERDEC
 TARDEC
 NSRDEC
 ERDC

Fuel
 Water
 Waste
 Quality of Life

- Transition Partners
- PEOCS&CSS
 - PM E2S2
 - PdM FSS
 - PdM PAWS
 - PdD CBI
 - MSCoE
 - SCoE
 - CASCOM
 - ARCIC

- Analysis/Knowledge Products To Inform DOTmLPF, Acquisition, Industry and Future S&T
- Technical Reports
 - Prototypes
 - Authenticated Data sets
 - QoL Model
 - Base Camp Facilities Efficiency Model
 - SE Architecture Products
 - Technology Transition Support
 - FY12 Validated Baseline



Bottom Line Up Front (BLUF)

25% Fuel and 75% Water reduction realized

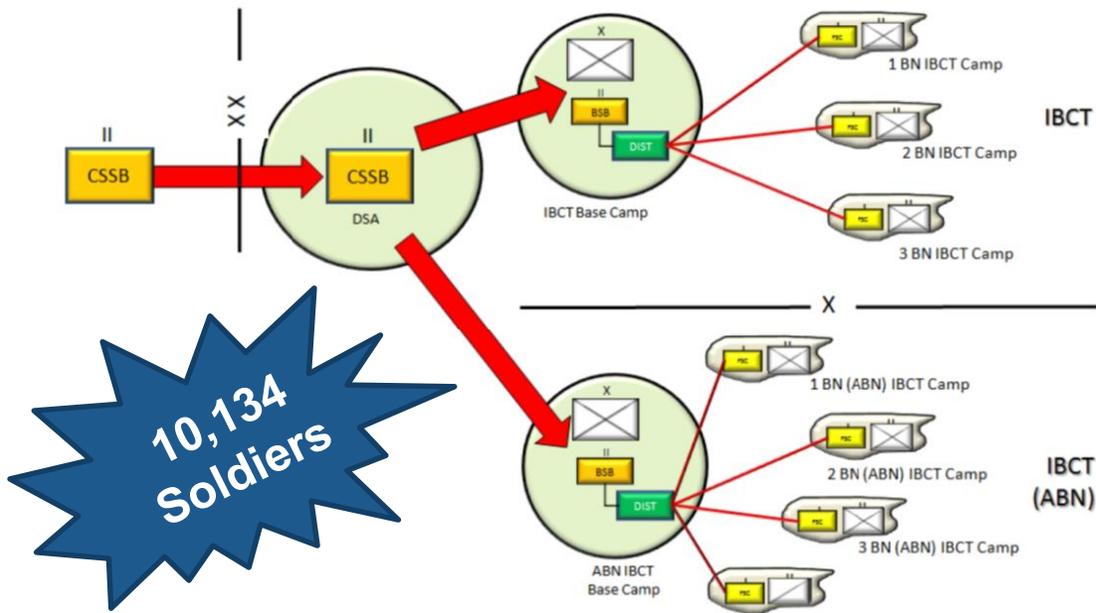


Figure 2: Commodity flow from DSA to BN Base Camps

Key Inputs:

- 180 Day Scenario
- 3-Day resupply frequency
- JP-8: \$3.17 (DLA –Energy)
- Bulk Water: \$0.16/gal (LIA FBC tool)
- **NOTE: 50% reduction of Waste back hauled not included in existing Models**

Operational effectiveness analysis articulates impacts to Army based on SLB-STO- D success – GAMEX Example.

- The Maneuver Support Battle Lab – Provided Unified Challenge experiment as overarching use case and analysis framework.
- SCoE/CASCOM provided OPLOG Planner to develop convoy structure to resupply all classes of supply to all base camps in this cluster.
- G-4, LIA provided the Fully Burdened Cost tool for preliminary results of Analysis. Augments OPLOG results with fuel consumption of convoy and protection consideration and other refinements



Bottom Line Up Front (BLUF) Cont'd

25% Fuel and 75% Water reduction realized

Unified Challenge GAMEX experiment 180 Day Scenario - Entire Task force				
	Base Case	Improved Case	Difference	% Difference
# of Resupply Convoys	2,160	1,320	840	39%
# of Total Truckloads - Fuel, Water, Other, Ground and Air Protection	60,240	34,860	25,380	42%
Threat (Hours) - Total Resupply, Ground and Air Protection	905,901	417,894	488,007	54%
CO2 (pounds) emissions - Unit and Convoy	412,757,980	345,390,576	67,367,404	16%
Fuel Consumption (Gallons) - Unit and Convoy	19,202,471	16,068,381	3,134,090	16%
Bulk Water Consumption (Gallons) - Unit	47,098,778	11,774,695	35,324,083	75%
Fully Burdened Cost Estimate (\$) -Fuel	72,140,437	65,912,725	6,227,712	9%
Fully Burdened Cost Estimate (\$) - Bulk Water	74,608,113	23,606,144	51,001,969	68%
Fully Burdened Cost Estimate (\$) -Fuel and Bulk Water	\$146,748,550	\$89,518,869	\$57,229,681	39%

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JP8: \$3.17/g
H₂O: \$0.16/g

\$317,943 Saved Per Day

\$5,647 Saved Per Soldier

Sustainability & Logistics-Basing

Concept – 0V1

Integrated, Waste, Water and Fuel Management Solutions for Initial and Temporary Base Camps

Extra Small (50 – 299 PAX)

Small (300 – 1999 PAX)

50-149
Pax

- **Highly Mobile, Easy to Establish**
- **Initial Entry Operations**
- **Tailorable, Mission Specific**
- **All Organic Capabilities**
- **Basic Functions, Services and QOL – Improvement Options Available**
- **Small Unit Leaders Trained to Operate a Base (PSG, 1SG)**

150-599
Pax

- **Highly Adaptable, Mobile & Scaleable**
- **Stand Alone & Integrated Capabilities**
- **Organic with possible Contractor Support /Maintenance**
- **Expanded Functions, Services and QOL Beyond Unit Capabilities**
- **Small Unit Leaders Trained to Manage Base Efficiency Efforts & Objectives**

600-1000
Pax

- **Fixed Integrated Systems**
- **Adaptable to Existing Infrastructure & Utilities**
- **Organic and Contractor Support /Maintenance**
- **Expanded QOL is Standard**
- **Established Base Management Infrastructure**

S - 312

S- 1160

XS - 64
PAX



Vision For Success: Sustainability/Logistics-Basing

Model Based **Systems Engineering** (MBSE) Approach

- Analysis will show how we will meet our objectives

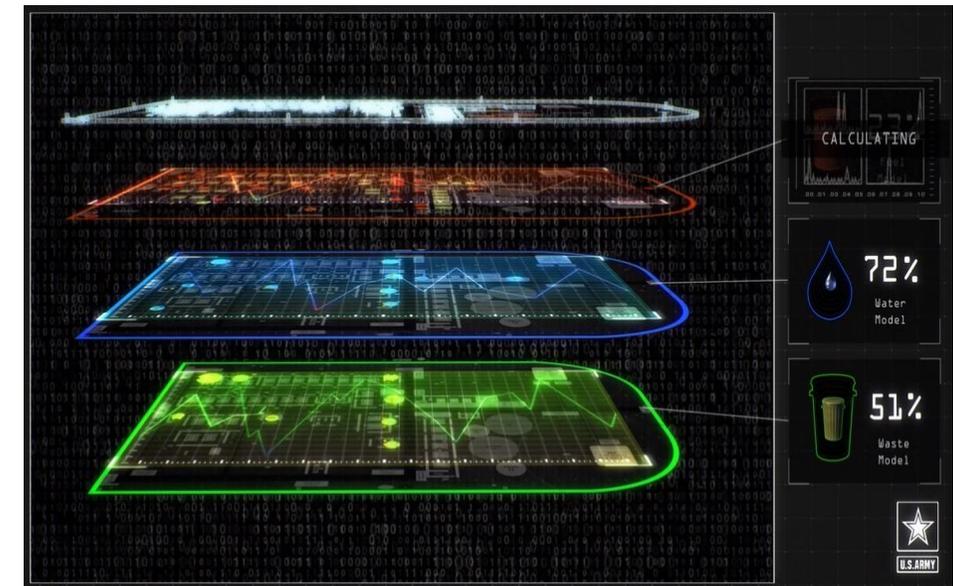
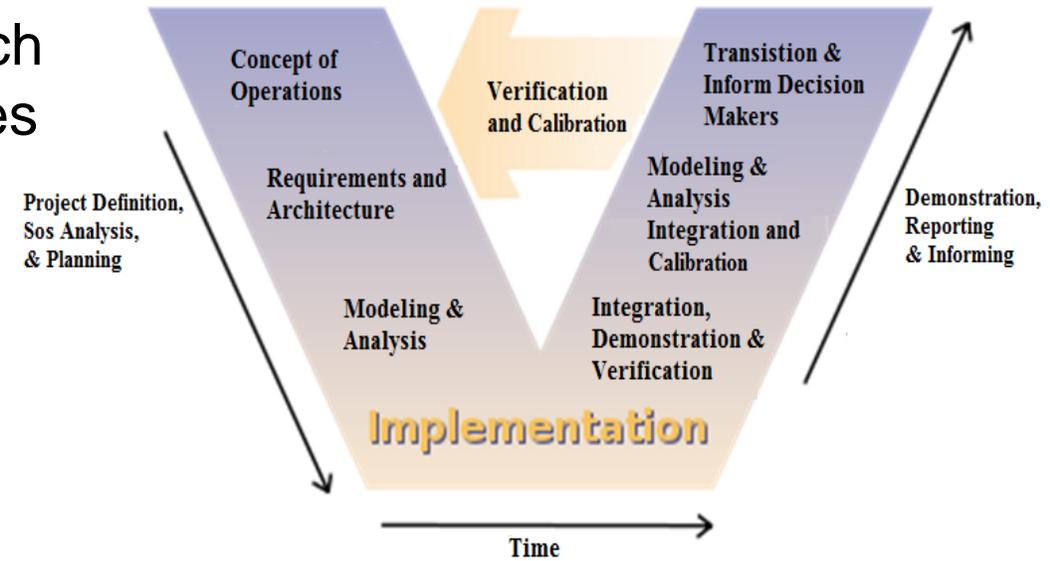
Operationally Relevant **Demonstrations**

- Both systems and components
- Materiel and non-materiel solutions

Integrated Solution **Architectures** that address ICD
Capability Gaps

Modeling and Simulation Capabilities and Analytical
Results will be critical components of our
Demonstrations

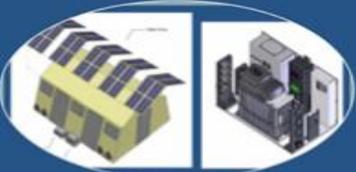
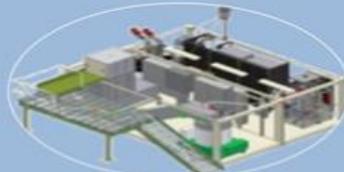
Knowledge and Technology Transition, a key
measure of success





SLB-STO-D, Focus and Technology Areas

Sustainability Logistics – Basing – STO-D Focus Areas and Enabling Technologies

Sustainability Logistics – Basing – STO-D Focus Areas			
	Fuel Demand Reduction 25%	Water Demand Reduction 75%	Waste Reduction 50%
SLB – STO-D Thrust Areas	 <ul style="list-style-type: none">• Supply Side-Power Generation• Supply Side-Alternative Thermal / Electric Energy• Supply Side Power Control, Distribution, Storage• Demand Side-HVAC• Demand Side-Habitation Systems• Demand Side-Organizational Systems	 <ul style="list-style-type: none">• Supply Side-Water Purification• Supply Side-Water Generation• Supply Side-Water Recycling & Repurposing• Demand Side-Organizational Systems	 <ul style="list-style-type: none">• Source Reduction• Waste Reduction and stabilization• Waste to Energy• Waste Re-purposing• Water Based Liquid Waste Management• Waste Management Analysis• Planning and Management Tools
Enabling Technologies (Examples)	<ul style="list-style-type: none">• Microgrids• Integrated Energy Efficient Shelters (Liners, HVAC, Lighting)• Fixed and Flexible Photovoltaics• Energy Efficient Organizational Systems (Kitchen, Laundry, etc)	<ul style="list-style-type: none">• Water Recycling & Reuse• Water Quality Monitoring• Water Efficient Organizational Systems (Kitchen, Laundry, Hygiene)• Water Generation (Air, etc)	<ul style="list-style-type: none">• Waste Source Reduction• Waste to Energy Conversion• Blackwater Dewatering

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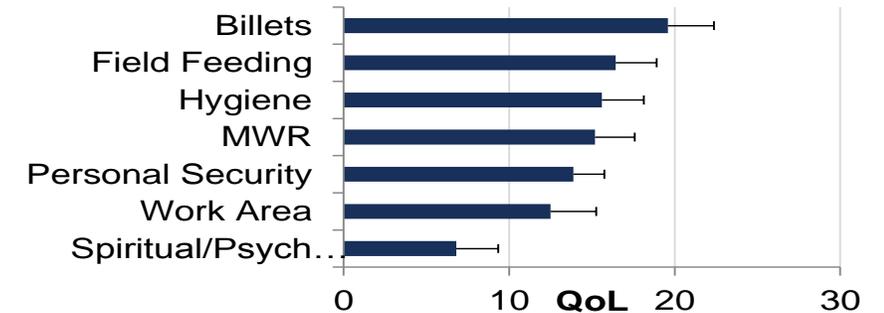


Quality of Life (Q of L) – NSRDEC Consumer Research Team

Develop a quantitative framework to measure, baseline and model basecamp quality of life (QoL) as an enabler of Soldier readiness

Captures the “voice of the Soldier” by identifying how they prioritize QoL-related base camp services

Enables SLB-STO-D to assess progress against objective of reducing the fuel, water, and waste burden of expeditionary basecamps while maintaining Soldier QoL

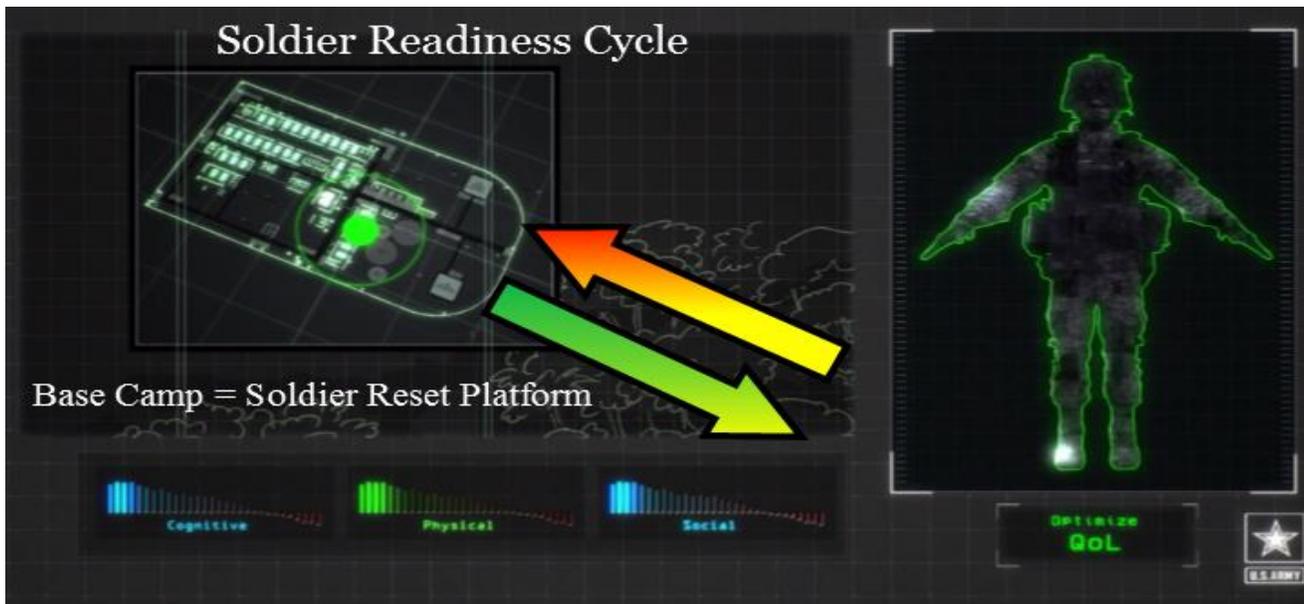
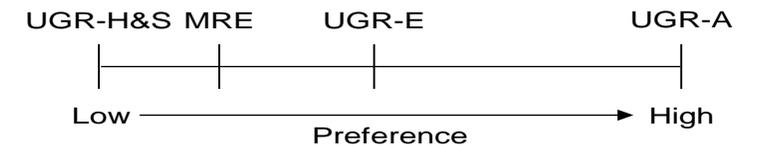


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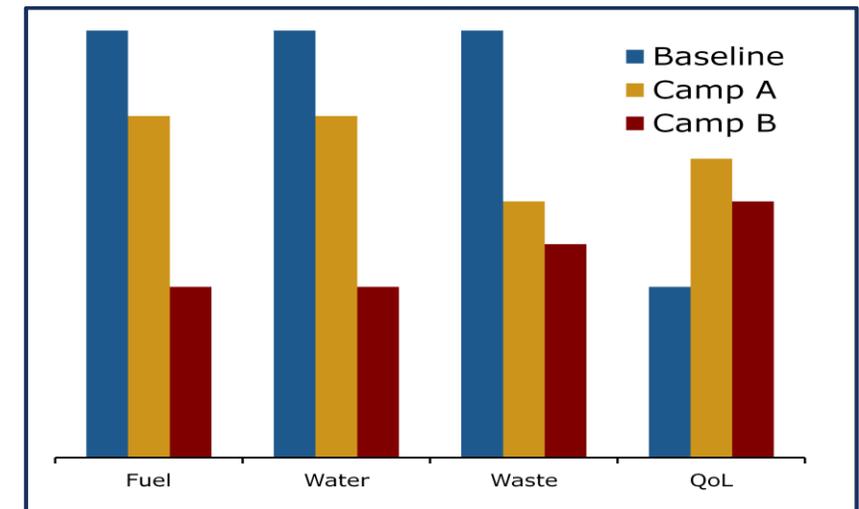
- Breakfast rations
- Lunch rations
- ...
- Humidity in billets

Levels

- MRE
- UGR-H&S
- UGR-A
- UGR-E

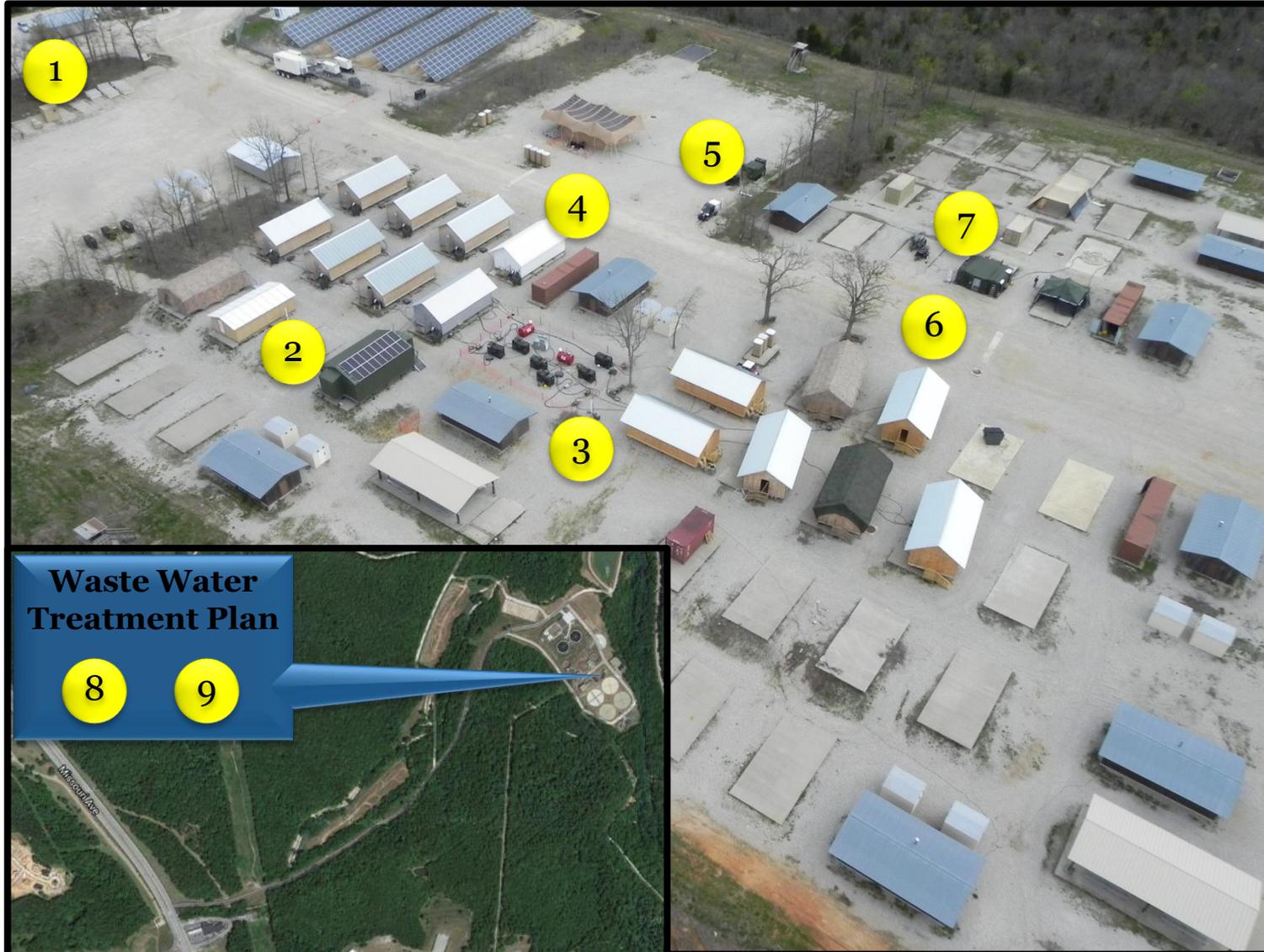


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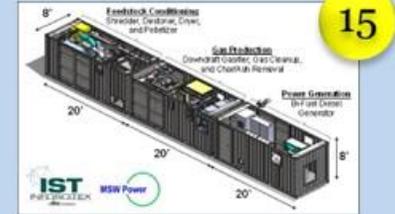
1000 PAX Demonstration, CBITEC 6 April – 2 May



1	Deployable Metering & Monitoring System – ERDC
2	Structural Insulated Panel Hut – ERDC
3	Energy Informed Operations – Central CERDEC
4	PowerShade Cost Reduction – NSRDEC
5	Hybrid Power Trailer – ERDC
6	Modular Appliances for Configurable Kitchens – NSRDEC
7	Desert Environment Sustainable Efficient Refrigeration Technology - NSRDEC
8	Real Time Inline Diagnostic Technology for Water Monitoring - TARDEC
9	Waste Water Treatment – Biological TARDEC



300 PAX Demonstration, July 2015



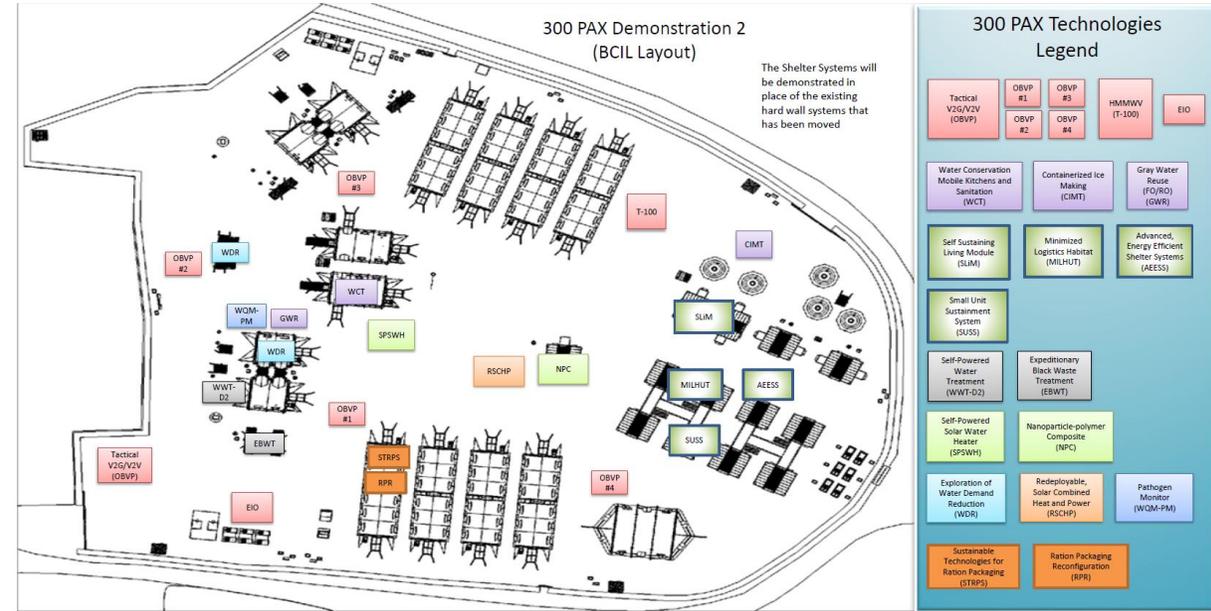
Being Demonstrated but not physically located at the BCIL

1	Energy Informed Operations – Central (EIO-C)	7	Energy Efficient Expedient Shelters with Non-Woven Composite Liners (LINER)
2	Power Management and Control (nanogrid)	8	1KWe JP-8 Man-Portable Genset (MANGEN)
3	Onsite Automatic Cooling for Individual Sustainment (OACIS)	9	Joint Inter-service Field Feeding (JIFF) Burner
4	Energy Efficiency (E2) Optimization of Combat Outpost/Platoon Base Shelters	10	Expeditionary TRICON Kitchen System (ETKS) Fuel-Fired Appliance Integration
5	Solar Power Shelter System (SPSS)	11	Grey Water Reuse (GWR)
6	Innovative Cooling Equipment (ICE)	12	Real Time Inline Diagnostic Technology for Water Monitoring (WATERMON)
		13	Waste Water Treatment – Biological (WWT-Bio)
		14	Modular Force Water Generation Storage & Analysis (Water from Air)
		15	Battalion-Scale Waste to Energy Converter (BWEC)



Next 12 months

- Conduct analysis of data from 50, 300 and 1000 person demonstrations
- Complete and publish reports on 300 and 1000 person demonstrations
- Expand on Operational benefit analysis with OPLOG planned and FBCT – Self Sufficiency
- Support development of Basecamp Capability Development Documents (Management, Utilities and Facilities)
- Plan and execute increment 2 of 1000 PAX demonstration (CBITEC, Feb – Mar 16) and 300 PAX demonstration (BCIL, May – Jun 16)
- Submit a follow on STO-R for enduring basing capabilities



<p>Fuel Recovery Reduction 25%</p> <p>Self-Powered Solar Water Heater</p> <p>Expeditionary Mobile Base Camp Demo - Inter Unit Sustainment System (SLUSS)</p> <p>Advanced, Energy Efficient Shelter (AEES)</p> <p>SMART Energy Efficient Expeditionary Shelter (SEES)</p> <p>Non-Powered Ice Making Technologies (CMT)</p>	<p>Water Recovery Reduction 75%</p> <p>Self-Powered Solar Combined Heat and Power (SPCHP)</p> <p>Quilt, Multi-Fuel MCC Engine and Generator</p> <p>Rapidly Deployable Lightweight Shelters for Austere Environments</p> <p>Self-Sustaining Living Module (SLM)</p> <p>Minimized Logistics Habitat (MLHUT)</p> <p>Nanoparticle-polymer Composite for Solar Power and Energy</p>	<p>Water Conservation Backboard Reduction 50%</p> <p>Rapidly Deployable Lightweight Shelters for Austere Environments</p> <p>Water Recycling for Mobile Kitchens and Sanitation Centers</p> <p>Efficient Water Reuse Technologies for COEs</p> <p>Self-Powered Water Treatment for Forward Operating Bases</p>	<p>Water Quality Monitoring (Pathogen Monitor)</p> <p>Gray Water Reuse (GWR)</p> <p>Expeditionary Black Waste Treatment Technologies</p> <p>Exploration of Water Demand Reduction Technologies for COE Organizational Equipment</p> <p>Ration Packaging Reconfiguration</p> <p>Sustainable Technologies for Ration Packaging by Item</p>
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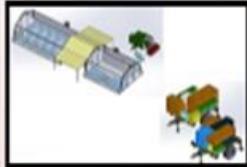
Demonstration II – FY 16 (~25 Technologies)



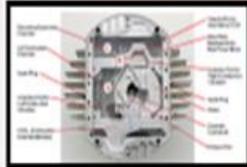
Self-Powered Solar Water Heater



Redeployable, Solar Combined Heat and Power (R3CHP)



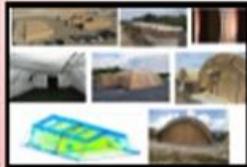
Expeditionary Mobile Base Camp Demo - Small Unit Sustainment System (EUBS)



Quiet, Multi-Fuel MCC Engine and Generator



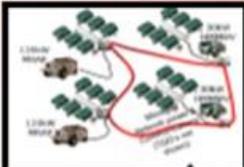
Rapidly Deployable Lightweight Shelters for Austere Environments



Advanced, Energy Efficient Shelter (AEEBS)



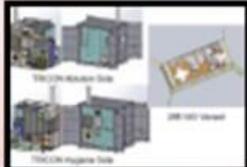
Self-Sustaining Living Module (SLM)



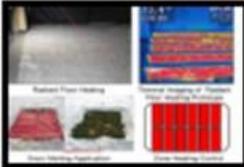
Tactical V2G and V2V Demonstration (OBVP)



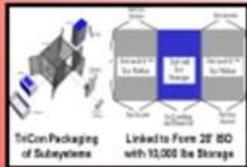
SMART Energy Efficient Deployable Shelters (SEEDS)



Minimized Logistic Habitat Unit (MILHUT)



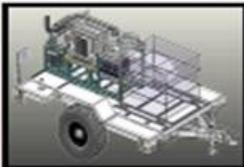
Shelter Radiant Heating Systems (SRHS)



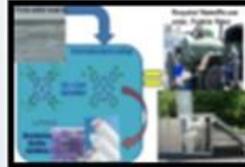
Containerized Ice Making Technologies (CIMT)



Nanoparticle-polymer Composite for Soldier Power and Energy



HMMWV Towable Load Following 100 kW Power Unit



Material Development for Water Purification (AARD)



Water Quality Monitoring (Pathogen Monitor)



Water Recycling for Mobile Kitchens and Sanitation Centers



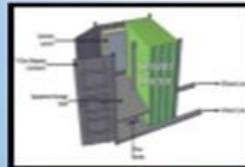
Gray Water Reuse (FORO)



Efficient Water Reuse Technologies for COBs



Exploration of Water Demand Reduction Technologies for FOB Organizational Equipment



Self-Powered Water Treatment for Forward Operating Bases



Solid Waste Destruction System (SWDS) for Small Contingency Base Camps



Expeditionary Black Water Treatment Technologies



Ration Packaging Reconfiguration



Sustainable Technologies for Ration Packaging Systems

Demonstration Venues
300 PAX Use Case



Base Camp Integration Lab (BCIL)

1000 PAX Use Case



Contingency Basing Integration Test and Evaluation Center (BCIL)



Questions