

# Engineering Research Development Center Contingency Base Virtual Forward Operating Base R&D Program

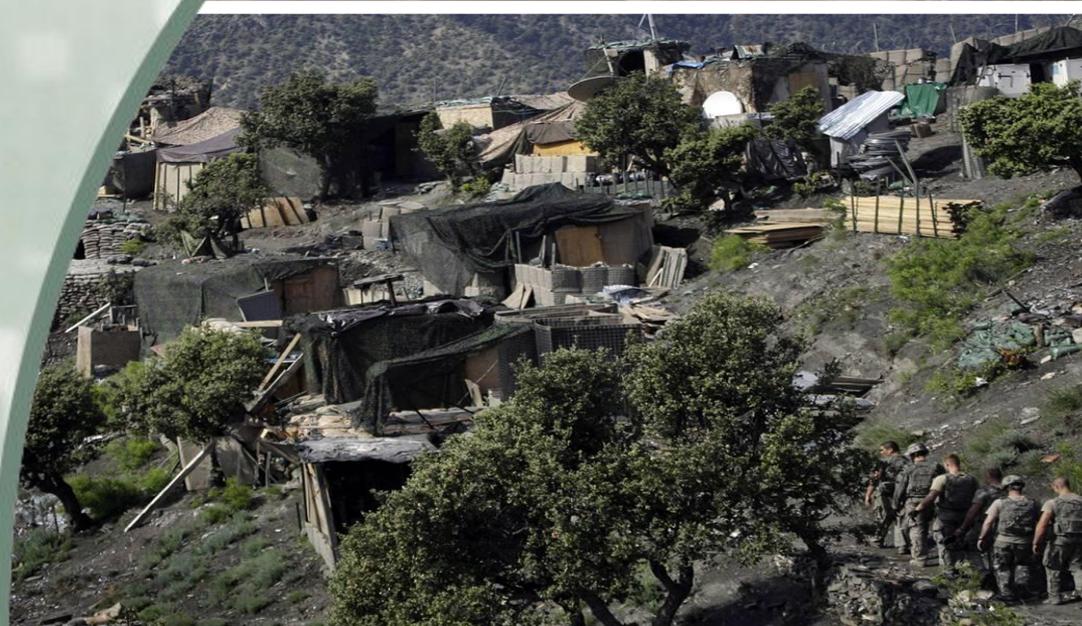
**Presented by:**  
Kurt J. Kinnevan, P.E.

Construction Engineering Research Laboratory  
Champaign, IL

18 October 2012



**US Army Corps  
of Engineers®**



# Report Documentation Page

*Form Approved*  
*OMB No. 0704-0188*

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE <b>18 OCT 2012</b>	2. REPORT TYPE	3. DATES COVERED <b>00-00-2012 to 00-00-2012</b>			
4. TITLE AND SUBTITLE <b>Engineering Research Development Center Contingency Base Virtual Forward Operating Base R&amp;D Program</b>		5a. CONTRACT NUMBER			
		5b. GRANT NUMBER			
		5c. PROGRAM ELEMENT NUMBER			
6. AUTHOR(S)		5d. PROJECT NUMBER			
		5e. TASK NUMBER			
		5f. WORK UNIT NUMBER			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, PO Box 9005, Champaign, IL, 61826</b>		8. PERFORMING ORGANIZATION REPORT NUMBER			
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)			
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)			
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES <b>Presented at the 2012 Science, Technology &amp; Requirements Forum held 17-18 October in Fort Leonard Wood, MO.</b>					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>9</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

# ***Agenda***

- *Contingency Base Planning and Design Goals*
- *Virtual Forward Operating Base (VFOB™) Effort*
- *Summary*
- *Questions*



# ***ERDC/CERL Contingency Basing Planning & Design Goals***

- ***Reduce Resource Requirements***
- ***Understand Functional Systems and System Dynamics***
- ***Optimize Systems Designs***
- ***Improve Sustainability***
- ***Increase Modularity, Scalability, Adaptability, Reusability, Durability, and Reliability***
- ***Enhance Survivability***
- ***Improve Deployability***



***Force Multiplier + Reduce Casualties + Combat Multiplier***



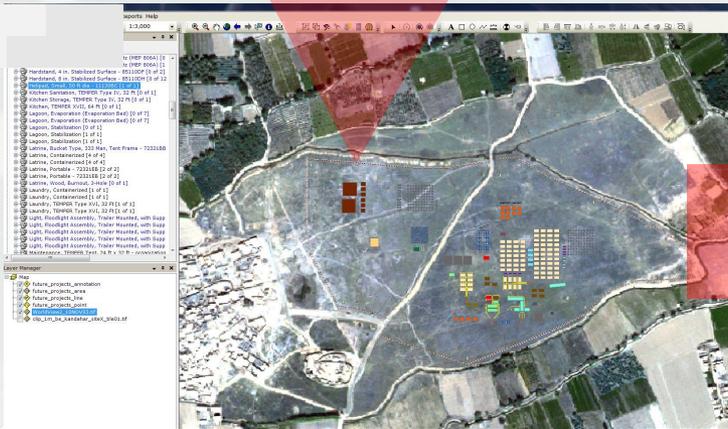
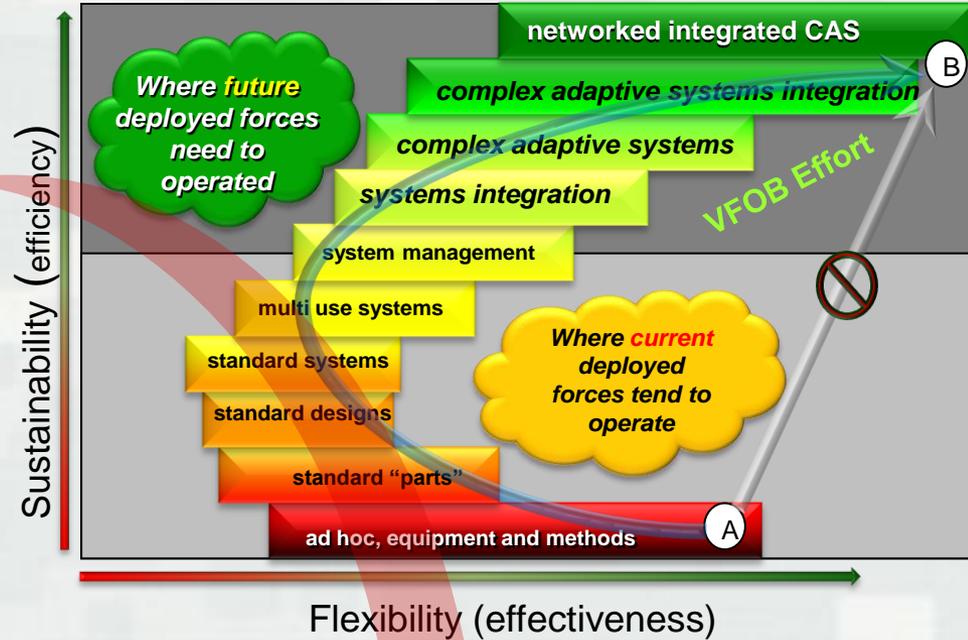
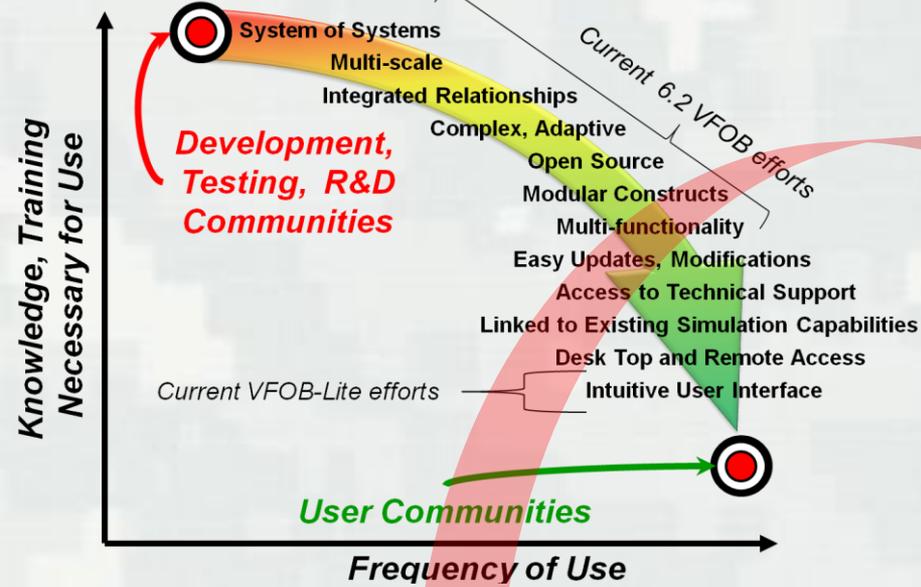
BUILDING STRONG®

**ERDC**

*Innovative solutions for a safer, better world*

# Virtual Forward Operating Bases (VFOB™)

VFOB Objective



**VFOB™ models Power, Water, Waste use for Contingency Bases**

# VFOB™ is a Multi-level Suite of Tools

Steady State

## **Resource Calculator**

Linked Systems-level tool based on mission, PAX, Location

## **Planning Tool (VFOBLITE)**

Geo-rectified, Interface between systems and components

Dynamic

Individual System Level

Level

## **Power Model (PD2AT)**

Power generation and distribution model

## **Waste Analysis Models**

Still in development

## **Water Resource Model**

Still in development

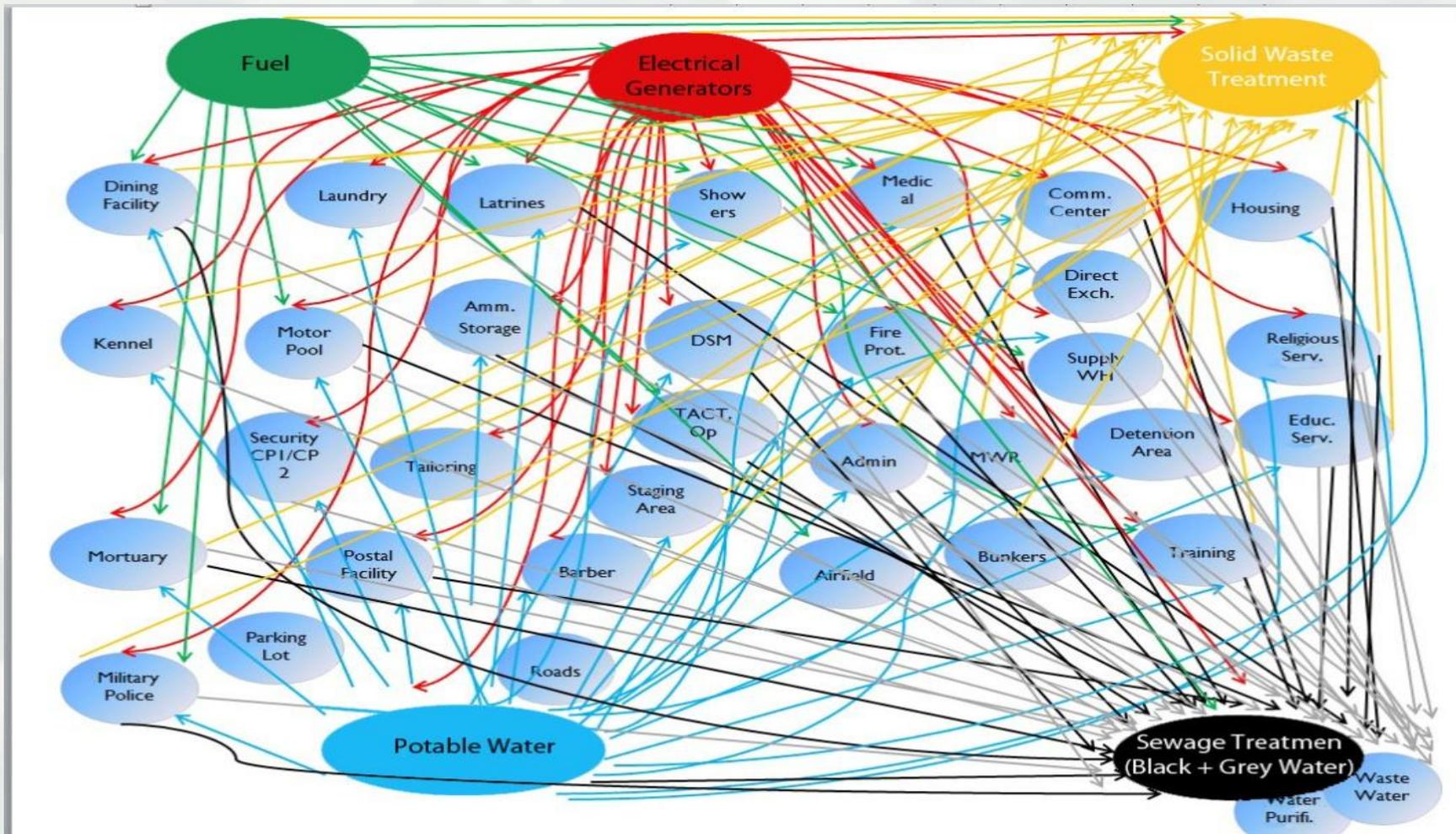
Component Level

## **Detailed Component Analysis Models (DCAM)**

“Bottom-up”, detailed, defines use levels



# VFOB™ Resource Calculator Flow Paths



**Numerous Complex Interrelationships**



BUILDING STRONG®

**ERDC**

*Innovative solutions for a safer, better world*

# VFOB™ Layout and Information Tool Editor (VFOBLITE)

The screenshot displays the VFOBLITE software interface. The main window shows a 3D site layout overlaid on an aerial photograph. A red rectangular box highlights a specific area of the site. In the top right corner, there is a 2D site plan view. The left sidebar contains a 'Planned Assets' list with the following items:

- Generator, TQG, DED, 60kW, 50/60 Hz (MEP 806A) [0]
- Generator, TQG, DED, 60kW, 50/60 Hz (MEP 806A) [1]
- Hardstand, 4 in. Stabilized Surface - 85110DF [0 of 2]
- Hardstand, 8 in. Stabilized Surface - 85110DH [0 of 12]
- Helipad, Small, 50 ft dia - 11130BC [1 of 1]
- Kitchen Sanitation, TEMPER Type IV, 32 Ft [0 of 1]
- Kitchen Storage, TEMPER Type IV, 32 Ft [0 of 1]
- Kitchen, TEMPER XVII, 64 Ft [0 of 1]
- Lagoon, Evaporation (Evaporation Bed) [0 of 7]
- Lagoon, Evaporation (Evaporation Bed) [0 of 7]
- Lagoon, Stabilization [0 of 1]
- Lagoon, Stabilization [1 of 1]
- Lagoon, Stabilization [1 of 1]
- Latrine, Bucket Type, 333 Man, Tent Frame - 72321EB
- Latrine, Containerized [4 of 4]
- Latrine, Containerized [4 of 4]
- Latrine, Portable - 72321EB [2 of 2]
- Latrine, Portable - 72321EB [2 of 2]
- Latrine, Wood, Burnout, 3-Hole [0 of 1]
- Laundry, Containerized [1 of 1]
- Laundry, Containerized [1 of 1]
- Laundry, TEMPER Type XVI, 32 Ft [1 of 1]
- Laundry, TEMPER Type XVI, 32 Ft [1 of 1]
- Light, Floodlight Assembly, Trailer Mounted, with Supp
- Maintenance, TEMPER Tent, 24 ft x 32 ft - organization

The bottom left sidebar shows the 'Layer Manager' with the following layers:

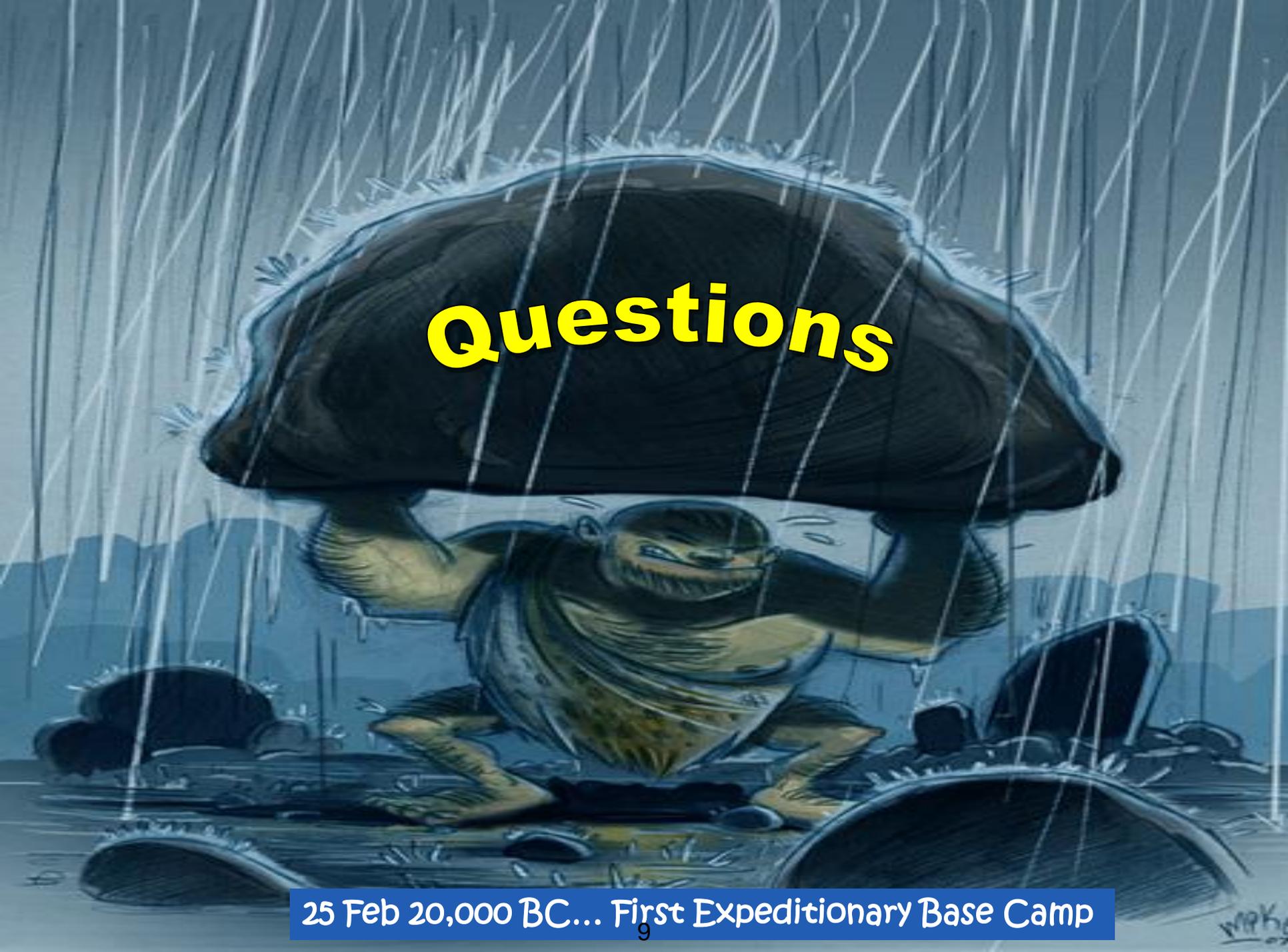
- Map
- future\_projects\_annotation
- future\_projects\_area
- future\_projects\_line
- future\_projects\_point
- WorldView2\_10NOV03.tif
- clip\_1m\_be\_kandahar\_siteX\_tile01.tif

**Drag and Drop Templates, Systems, Components**

# Summary

- **ERDC /CERL is leading the way in developing methods and tools for planning and design for contingency bases**
  - ✓ Manage and operate **CBITEC** one of critical demonstration locations for TECD 4a for new capabilities
  - ✓ Co-Lead for TECD 4a Base Sustainment
  - ✓ NATO Net Zero Basing Lead for contingency base modeling.
- **ERDC/CERL VFOB™ effort has begun spiraling out planning and tools**
  - ✓ Resource Calculator Tool
    - Undergoing first round **user test and evaluation**
    - **USMA evaluating as training tool**
  - ✓ PD2AT
    - Completed **proof of concept**
    - Creating user community defined use case scenarios
  - ✓ VFOBLITE
    - Established **geo-rectification of maps** and templates, systems sets, and components.
    - Linked with **Resource Calculator and PD2AT**
    - Developing systems library for object model that is capable of **linking with AFCS/JCMS**
  - ✓ Developing dynamic systems time dependent use relationships
  - ✓ DCAM Library
    - Expanding and improving models for non-Force Provider base camps and new technologies
    - Will be used to **validate existing relationships**
    - Will be used to **evaluate effects of new technologies** on resource-use behavior
  - ✓ Developing Water and Waste models
  - ✓ Starting Dashboard Model Start FY14





# Questions

25 Feb 20,000 BC... First Expeditionary Base Camp