

# 73rd MORSS CD Cover Page

UNCLASSIFIED DISCLOSURE FORM CD Presentation

712CD

Revised 41205

21-23 June 2005, at US Military Academy, West Point, NY

**Please complete this form 712CD as your cover page to your electronic briefing submission to the MORSS CD. Do not fax to the MORS office.**

**Author Request (To be completed by applicant) - The following author(s) request authority to disclose the following presentation in the MORSS Final Report, for inclusion on the MORSS CD and/or posting on the MORS web site.**

Name of Principal Author and all other author(s):

*MAJ Grant Martin*

*LTC Jeffrey Schamburg*

*LTC Michael J. Kwinn, Jr.*

Principal Author's Organization and address:

Phone:\_(845) 938-5663

Fax:\_\_\_\_(845) 938-5665

Email: \_phillip.martin@us.army.mil

Original title on 712 A/B:\_\_\_\_Finding the Right Terrain Database\_\_\_\_\_

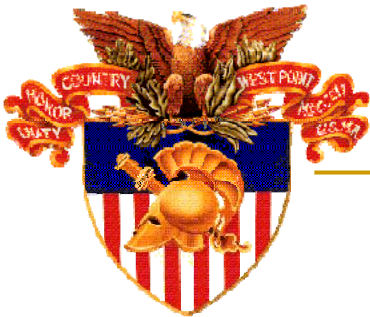
Revised title:\_\_\_\_\_Finding the Right Terrain Database\_\_\_\_\_

Presented in (input and Bold one): **WG10**

This presentation is believed to be:  
**UNCLASSIFIED AND APPROVED FOR PUBLIC RELEASE**

| Report Documentation Page                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                    |                                     |                                            | Form Approved<br>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<br><b>23 JUN 2005</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                    | 2. REPORT TYPE<br><b>N/A</b>        |                                            | 3. DATES COVERED<br><b>-</b>                |                                    |
| 4. TITLE AND SUBTITLE<br><b>Finding the Right Terrain Database</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)<br><b>Department of Systems Engineering USMA</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                    |                                     |                                            | 8. PERFORMING ORGANIZATION<br>REPORT NUMBER |                                    |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                    |                                     |                                            | 10. SPONSOR/MONITOR'S ACRONYM(S)            |                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                    |                                     |                                            | 11. SPONSOR/MONITOR'S REPORT<br>NUMBER(S)   |                                    |
| 12. DISTRIBUTION/AVAILABILITY STATEMENT<br><b>Approved for public release, distribution unlimited</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                    |                                     |                                            |                                             |                                    |
| 13. SUPPLEMENTARY NOTES<br><b>See also ADM201946, Military Operations Research Society Symposium (73rd) Held in West Point, NY on 21-23 June 2005., The original document contains color images.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                    |                                     |                                            |                                             |                                    |
| 14. ABSTRACT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                    |                                     |                                            |                                             |                                    |
| 15. SUBJECT TERMS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                    |                                     |                                            |                                             |                                    |
| 16. SECURITY CLASSIFICATION OF:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                    |                                     | 17. LIMITATION OF<br>ABSTRACT<br><b>UU</b> | 18. NUMBER<br>OF PAGES<br><b>36</b>         | 19a. NAME OF<br>RESPONSIBLE PERSON |
| a. REPORT<br><b>unclassified</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | b. ABSTRACT<br><b>unclassified</b> | c. THIS PAGE<br><b>unclassified</b> |                                            |                                             |                                    |

# Finding the Right Terrain Database



*MAJ Grant Martin*  
*LTC Jeffrey Schamburg*  
*LTC Michael J. Kwinn, Jr.*  
*Presentation to the MORSS*  
*23 June 2005*



**Operations Research Center of Excellence**  
**Researching the Army's Future**  
**Developing Tomorrow's Leaders**

# Outline



- Purpose
- Background
- Methodology
- Problem definition
- Design and Analysis
- Recommendation
- Questions and discussion

# Purpose



To describe the methodology used to define the metadata for use in the Army Digital Terrain Library (ADTL)

# Background

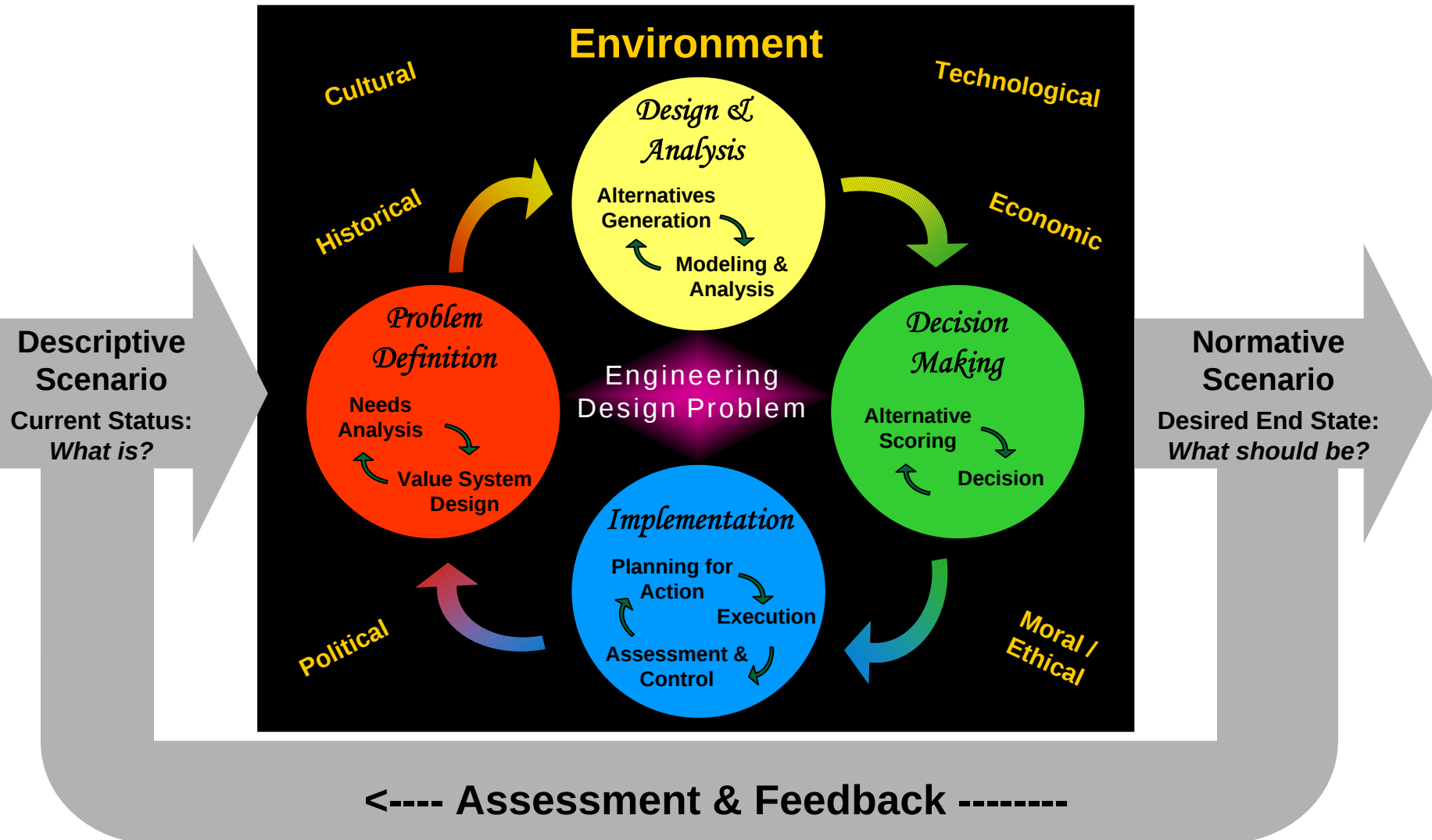


Initiated by the Battle Command, Simulation and Experimentation Directorate (BCSE)

- ❑ Goal: a list of all modeling and simulation terrain databases (M&S TDBs)
- ❑ These databases would become the basis for the ADTL

**ADTL will provide wide access to TDBs for users across the Army**

# General Approach: Systems Engineering and Management Process (SEMP)

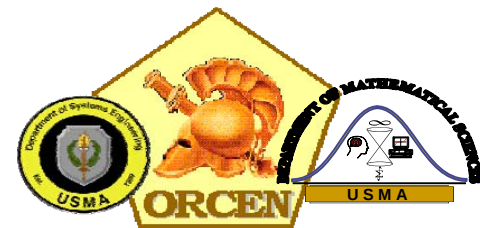
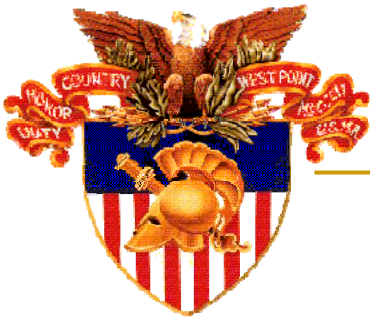


# Major Activities



- Problem definition
  - Background research
  - Stakeholder input via telecons and questionnaire
  - Refine needed functions
- Data collection and analysis
  - Workshop
  - Questionnaire
  - Telecons

# Problem Definition



**Operations Research Center of Excellence**  
**Researching the Army's Future**  
**Developing Tomorrow's Leaders**

# Initial Problem Statement



Compile a list of all modeling and simulation terrain databases

# Stakeholder Analysis

(1 of 2)



- UAMBL
- PEO STRI
- NSC
- ERDC TEC
- ERDC GSL
- MANSCEN
- MBBL
- TSM FCS
- TRAC-WSMR
- TRAC-MTRY
- TRADOC Futures Center
- Boeing
- TPIO-Terrain
- TPIO-Virtual
- TPIO-Battle Command
- Ft. Hood CTSF
- SBBL
- RDECOM
- FCS LSI / Tng. IPT
- HQ TRADOC
- Natick Soldier Center
- USMA G&EnE
- NGA
- UO FACT
- Northrup Grumman

Representatives from each of these received the questionnaires

**Operations Research Center of Excellence**

**Researching the Army's Future  
Developing Tomorrow's Leaders**

# Stakeholder Analysis

## (2 of 2)



Based on interviews, questionnaire

- Identified the needed functionality for a solution
- Identified the competing interests
  - More fields → better search capability but harder to post
  - Fewer fields → easier to post but less productive searches
- Allowed us to refine the needs of the community

Defining the metadata correctly seems to be the key to increasing the potential for success of the ADTL

# Related Systems and Activities

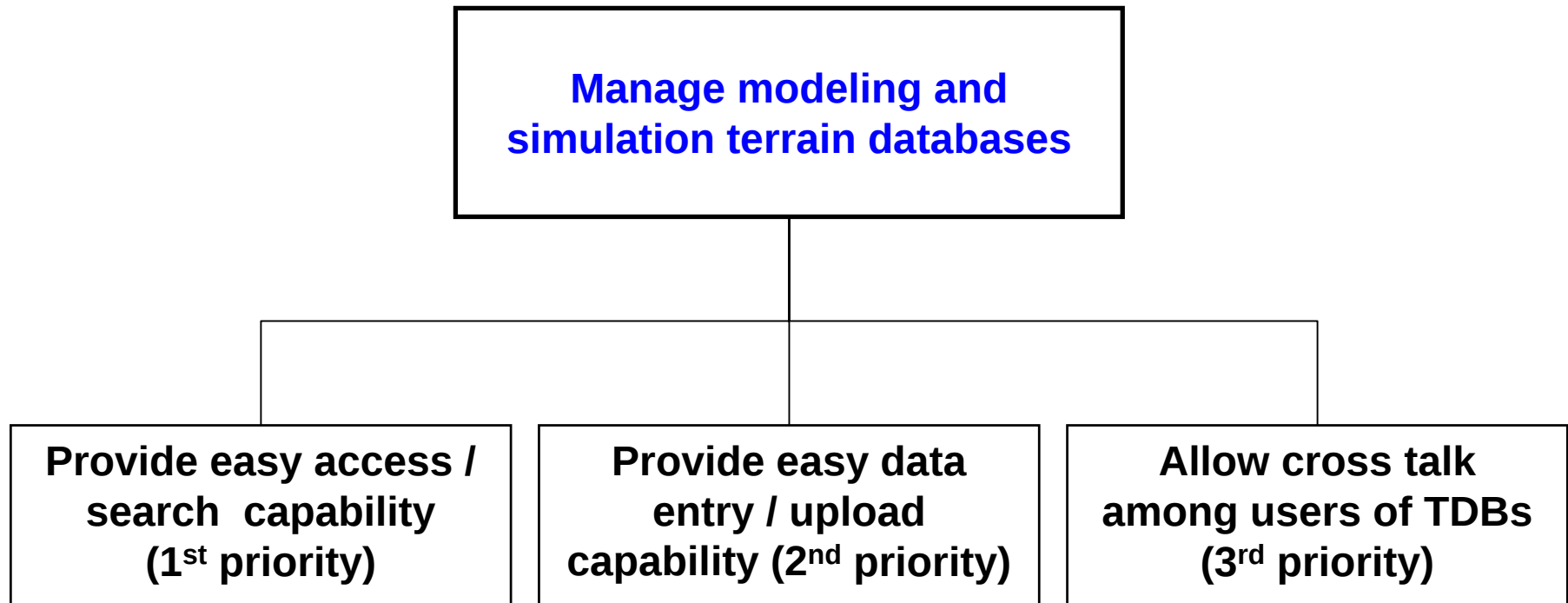


- Army Geospatial Data Integrated Master Plan (AGDIMP)
- Joint Geographic Enterprise System (J-GES) development
- Federal Geographic Data Committee Standards (FGDC)
- Synthetic Environment Data Representation and Interchange Specification (SEDRIS)
- Environmental Data Coding Specification (EDCS) (now ISO approved)
- Master Environmental Library (MEL)
- Features and Attribute Coding Catalog (FACC) development
- PEO-STRI Synthetic-Virtual Data Repository (SVDR)
- UO Focused Area Collaboration Team (FACT)
- GDI (Geospatial Data / Information) FACT

**Operations Research Center of Excellence**

**Researching the Army's Future  
Developing Tomorrow's Leaders**

# Functional Decomposition



# Value System



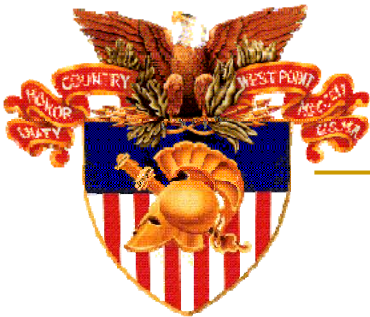
- TDB User-focused
- Competing interests for number of metadata fields
- Recommendation: metadata that is
  - Relatively short (few fields)
  - Widely-considered as useful (meaningful fields)
- Functionality should support users sharing information about TDBs

# Revised Problem Statement



Determine the essential metadata and significant functions that allow for efficient retrieval and organization of modeling and simulation terrain databases

# Modeling and Analysis



**Operations Research Center of Excellence**  
**Researching the Army's Future**  
**Developing Tomorrow's Leaders**

# Modeling



- What to model
  - ❑ Not a set of specific, stand-alone alternatives
  - ❑ No unique alternatives
- Our approach
  - ❑ Individual items or fields of metadata
  - ❑ Allow individuals from the field to rate those items

# Workshop Results



- Recommended some specific metadata
  - Discussed best way to format the metadata
    - Are roads included, Yes or No
    - Are buildings included, No / 2D / 3D
  - Those items were included in the 2<sup>nd</sup> questionnaire
- Recommended specific capabilities:
  - Allow a user to post opinions about a TDB
  - Email reflector

# Questionnaire 2

## (1 of 2)



- Online questionnaire was distributed to ~55 individuals in the community
- Purpose:
  - Gather specific feedback about many alternative metadata fields
  - Gather feedback about additional capabilities
- Respondents were asked to classify themselves as TDB users, builders or managers
- Received 28 responses

# Questionnaire 2

## (2 of 2)



- Respondents were asked to rate 24 alternative fields
  - Required
  - Desired but not required
  - Not required
- No limit to how many could be rated as required
- Potential metadata fields were taken from a variety of sources
  - Recommendations from questionnaire 1 and workshop
  - Federal Geographic Data Committee standards (MEL)
  - Environmental Data Conversion Standards (EDCS)

# Summary of Questionnaire 2 Results



- Of 28 responses received
  - 6 builders
  - 4 managers
  - 7 users
  - 11 “other”
- On average, a respondent identified 17 (of 24) fields as required
- A person searching could search on any or all of the available fields
- Additional recommended capabilities
  - Email reflector
  - Update information about the TDB

# Possible Fields



- Are structures represented
- Publication date
- Are cultural features represented
- Is hydrology represented
- Cultural source data
- Are soil types represented
- Are littoral features represented
- Lineage
- Title
- Are atmospheric effects represented
- SEDRIS-compliant
- Coordinate system
- Format
- Location
- Are roads represented
- Is vegetation represented
- Elevation source data
- Point of Contact
- Topography representation
- Application
- Are utilities represented
- Is dynamic terrain represented
- Originating agency
- System requirements

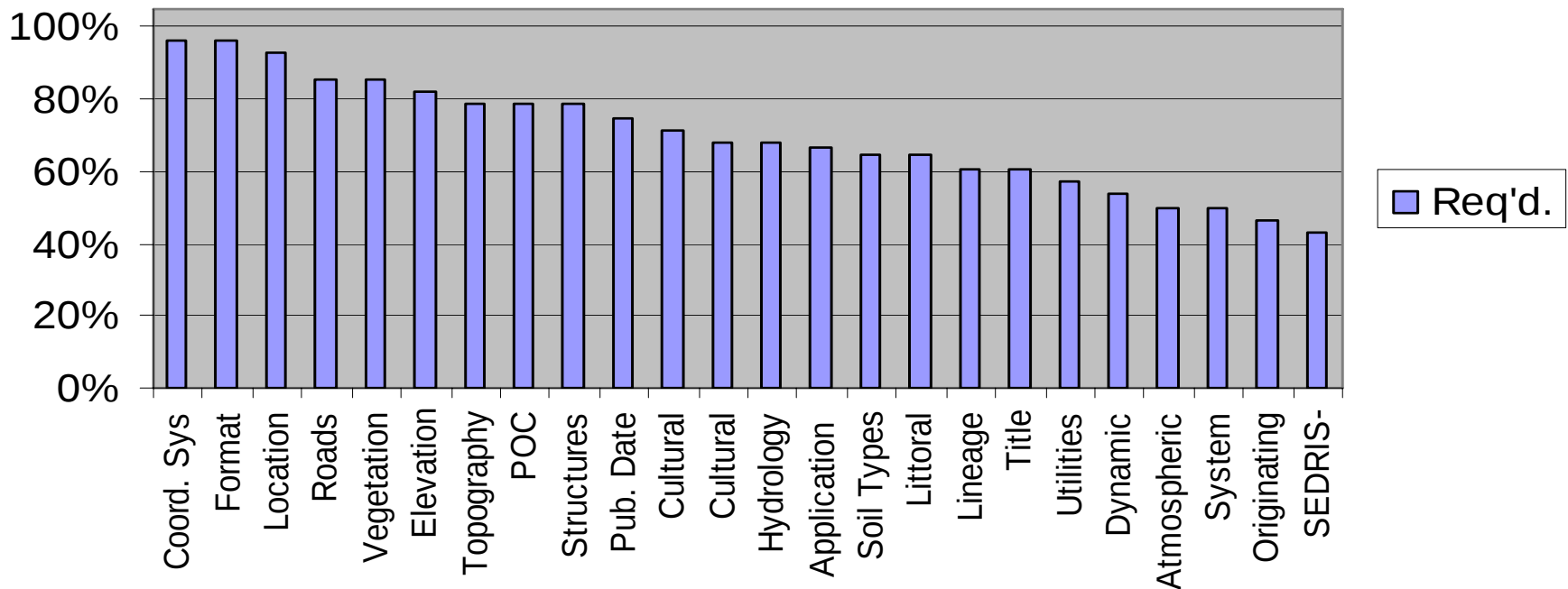
**Operations Research Center of Excellence**

**Researching the Army's Future  
Developing Tomorrow's Leaders**

# Required Responses (%) (All respondents)



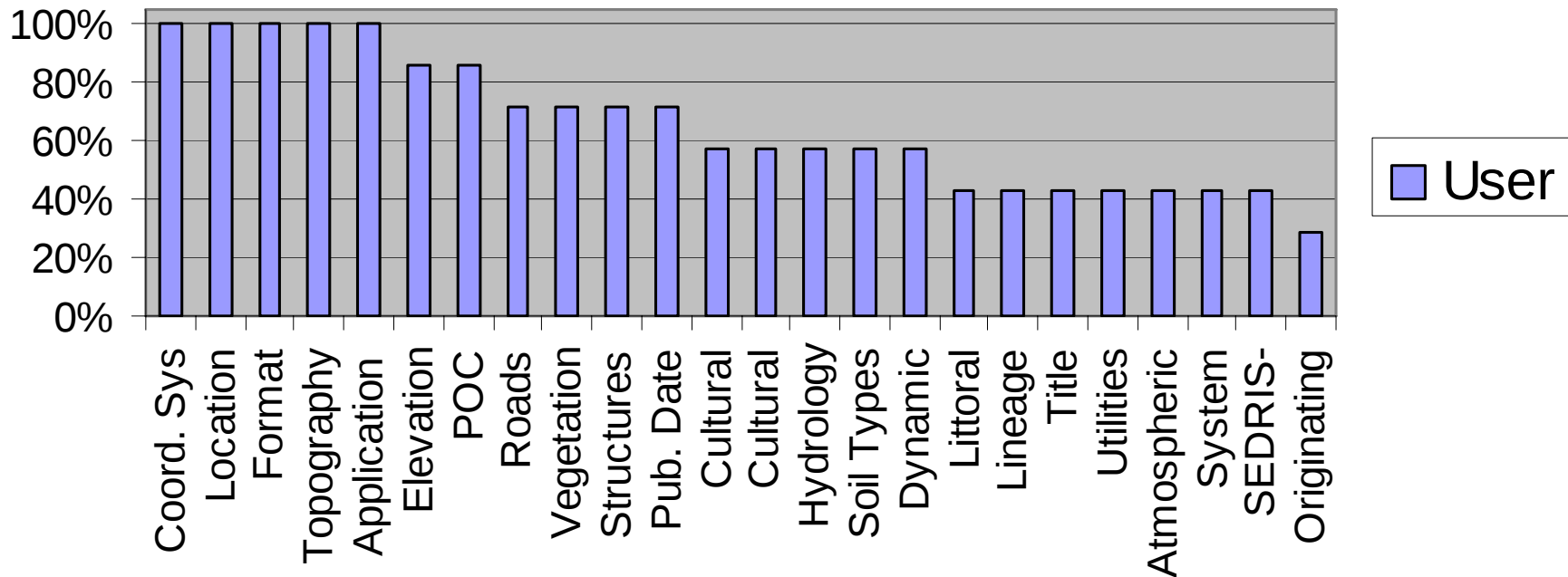
**Required Entries**



# Required Responses (%) (User)



User % Required



**Operations Research Center of Excellence**

**Researching the Army's Future  
Developing Tomorrow's Leaders**

# Scoring Method



- TDB User-focused
- Competing interests for number of fields
  - For searching, more is better (16 or more)
  - For posting, less is better (6 or less)
- Recommendation: 9 fields, based on
  - Input from users
  - Ability to reduce the number of TDBs returned

# Recommendation

## (1 of 3)



- Organize TDBs using two sections of metadata
  - Required entry when posted
  - Optional entry when posted
- Provide a mechanism for users/subscribers to post comments or information about a TDB
- Provide an email reflector to allow users/subscribers to post a question to the community

# Recommendation

## (2 of 3)



### 9 Required entries (% of respondents rated required)

1. Coordinate system (96% & *all users*)
2. Format (96% & *all users*)
3. Location (93% & *all users*)
4. Are roads represented (86%)
5. Is vegetation represented (86%)
6. Elevation source data (82%)
7. Point of Contact (79% & *required for access*)
8. Topography representation (79% & *all users*)
9. Application (67% & *all users*)

# Recommendation

## (3 of 3)



### ■ 9 Optional entries (% of respondents rated required)

1. Are structures represented (79%)
2. Publication date (75%)
3. Are cultural features represented (71%)
4. Is hydrology represented (68%)
5. Cultural source data (68%)
6. Are soil types represented (64%)
7. Are littoral features represented (64%)
8. Lineage (61%)
9. Title (61%)

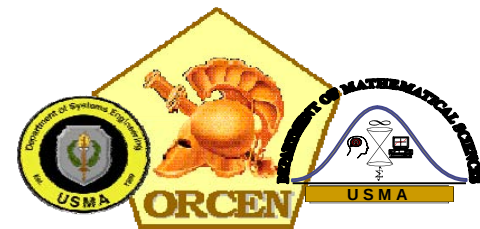
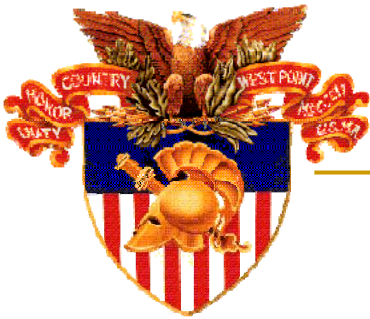
> 60% of respondents  
rated as required

# Conclusions



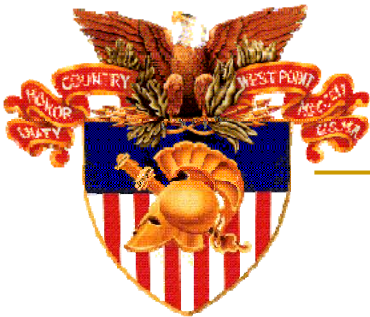
- Army Digital Terrain Library can perform a useful function for the M&S community
- The key to its use and acceptance is a meaningful yet concise set of metadata
- Next steps
  - Place ADTL in accessible location
  - Populate and manage

# Questions and Discussion



**Operations Research Center of Excellence**  
**Researching the Army's Future**  
**Developing Tomorrow's Leaders**

# Finding the Right Terrain Database



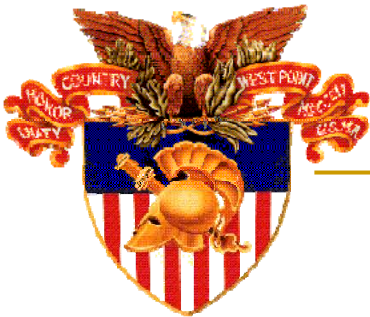
*MAJ Grant Martin*  
*LTC Jeffrey Schamburg*  
*LTC Michael J. Kwinn, Jr.*  
*Presentation to the MORSS*  
*23 June 2005*



**Operations Research Center of Excellence**  
**Researching the Army's Future**  
**Developing Tomorrow's Leaders**

End of presentation

# Backup Slides

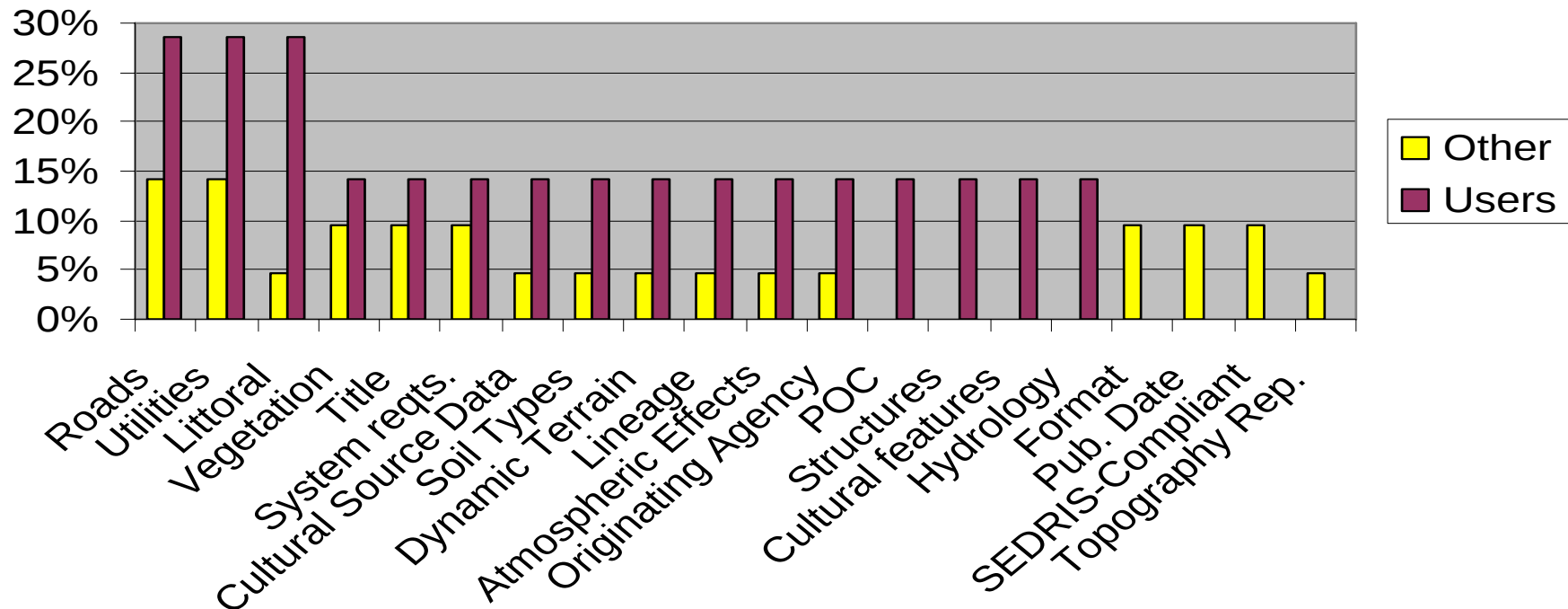


**Operations Research Center of Excellence**  
**Researching the Army's Future**  
**Developing Tomorrow's Leaders**

# Not Required Entries



## Not Required Choices



# Workshop



- 10 attendees, held in conjunction with IITSEC
- Purpose:
  - Present initial findings to the community
  - In small groups, discuss the characteristics of TDBs that should be considered
  - Capture other possible feedback for the project

# Potential Additional Steps



- Use this framework in the ADTL
- Integrate these efforts with the J-GES development
- Collaborate with PEO STRI to use SVDR as an example
- Expand the requirement to include battle command databases