



M&S Caucus Leadership Summit

***Modeling & Simulation: Key to Wise
Investing Through Superior Decision-Making***

John Nestler

Engineer Research &
Development Center
U.S. Army Corps of
Engineers

Report Documentation Page

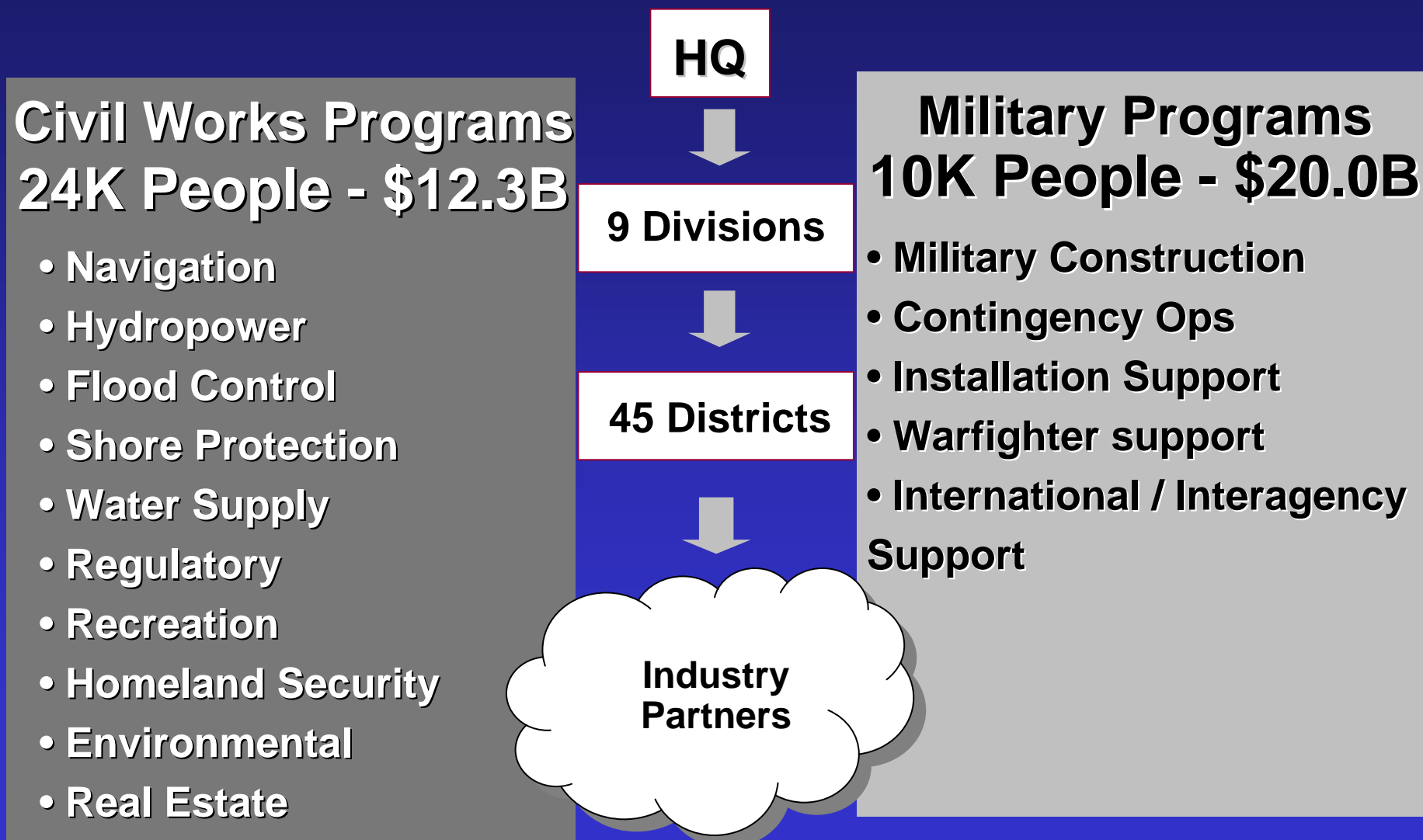
Form Approved
OMB No. 0704-0188

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 11 FEB 2008		2. REPORT TYPE		3. DATES COVERED 00-00-2008 to 00-00-2008	
4. TITLE AND SUBTITLE Modeling & Simulation: Key to Wise Investing Through Superior Decision-Making				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) U.S. Army Corps of Engineers, Engineer Research & Development Center, 3909 Hall Ferry Rd, Vicksburg, MS, 39180				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 Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES M&S Leadership Summit, February 11, 2008, Virginia Beach, VA					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	unclassified	unclassified	Same as Report (SAR)	10	

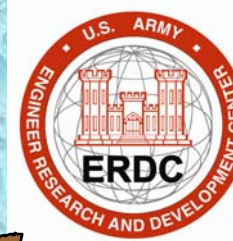


U.S. Army Corps of Engineers





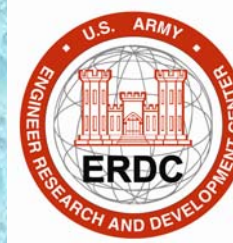
Engineer Research and Development Center



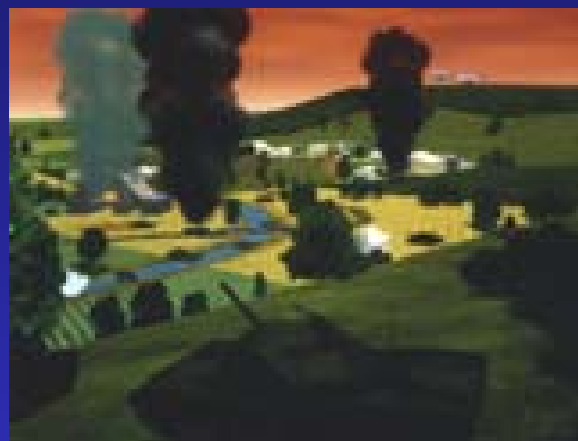
- 1859 Employees (+ ~1K Contractors)
- 1036 Scientists & Engineers
 - 420 Master's Degree (41%)
 - 276 PhD's (27%)
- FY08 Budget ~\$1B (~75%M/~25%CW)



ERDC Missions In:

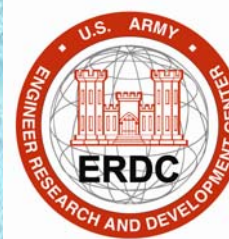


- **Warfighter Support**
- **Installations**
- **Environment**
- **Water Resources**
- **Information Technology**

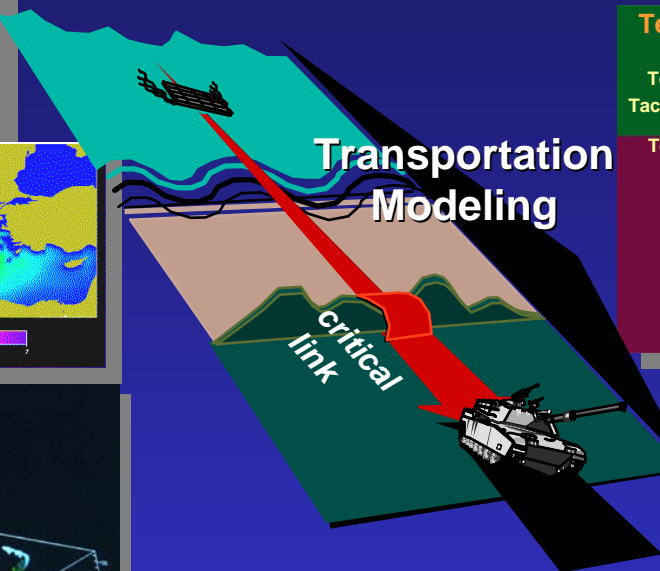
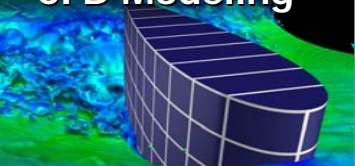




ERDC Modeling & Simulation is Important and Pervasive



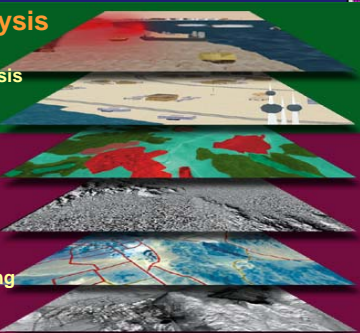
CFD Modeling



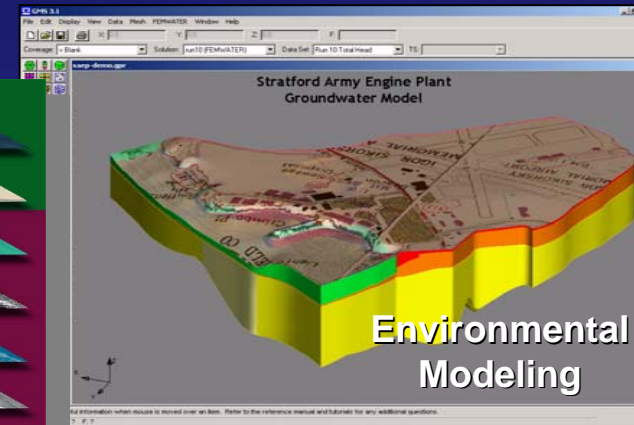
Transportation Modeling

Terrain Analysis

- Temporal Analysis
- Tactics & Effects
- Terrain Models
- Feature
- Hypsometric
- GeoPositioning
- Imagery



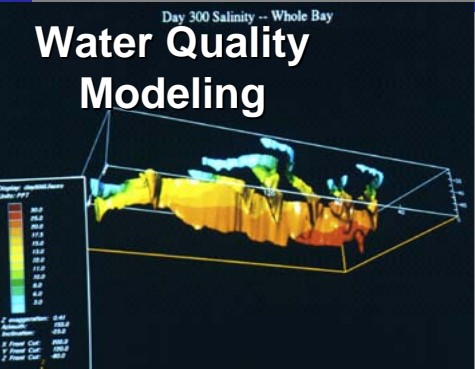
Terrain Modeling & Visualization



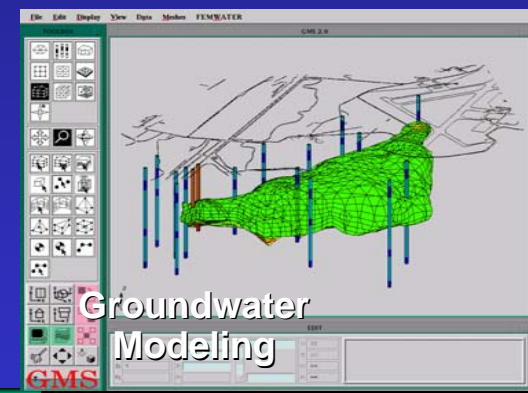
Stratford Army Engine Plant Groundwater Model

Environmental Modeling

Water Quality Modeling

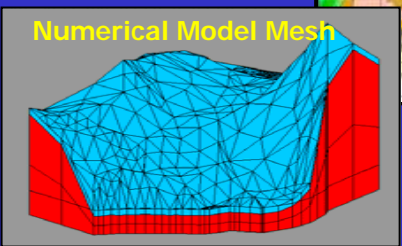


Day 300 Salinity -- Whole Bay

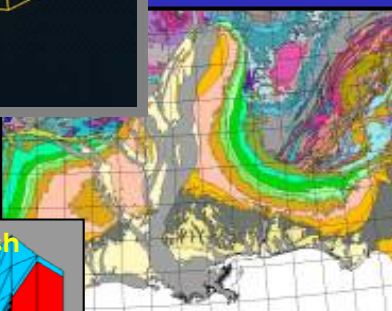


Groundwater Modeling

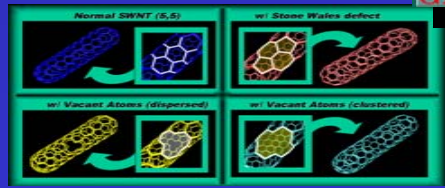
Numerical Model Mesh



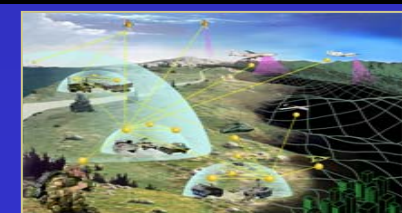
Engineering Geophysics



High Performance Computing Center



Infrastructure Materials



Theater Assessment



Enterprise Investment Decisions Reduce to "Data to Knowledge" Engine

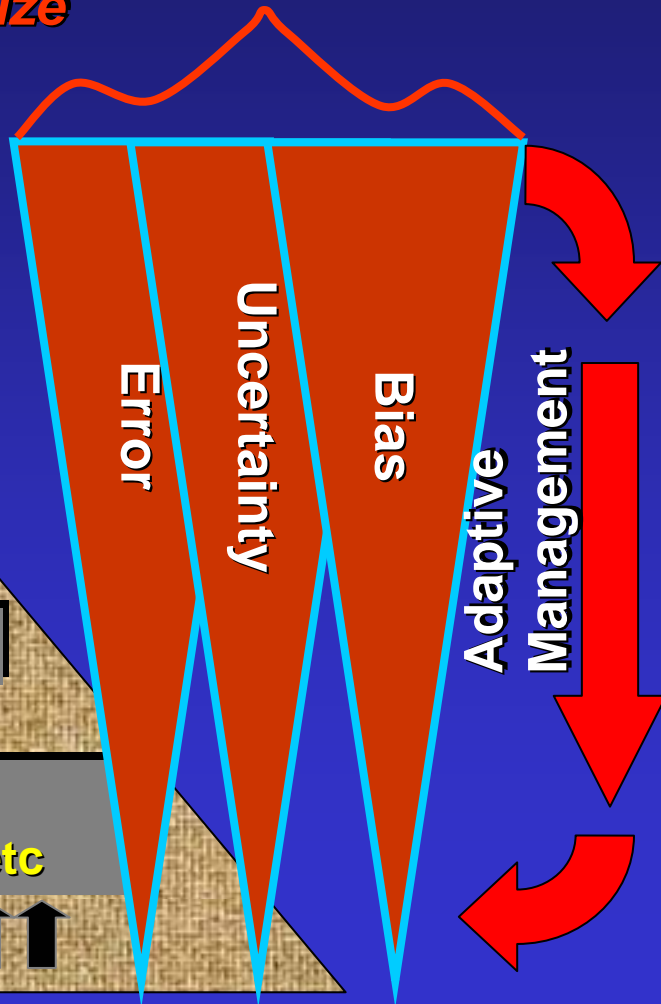
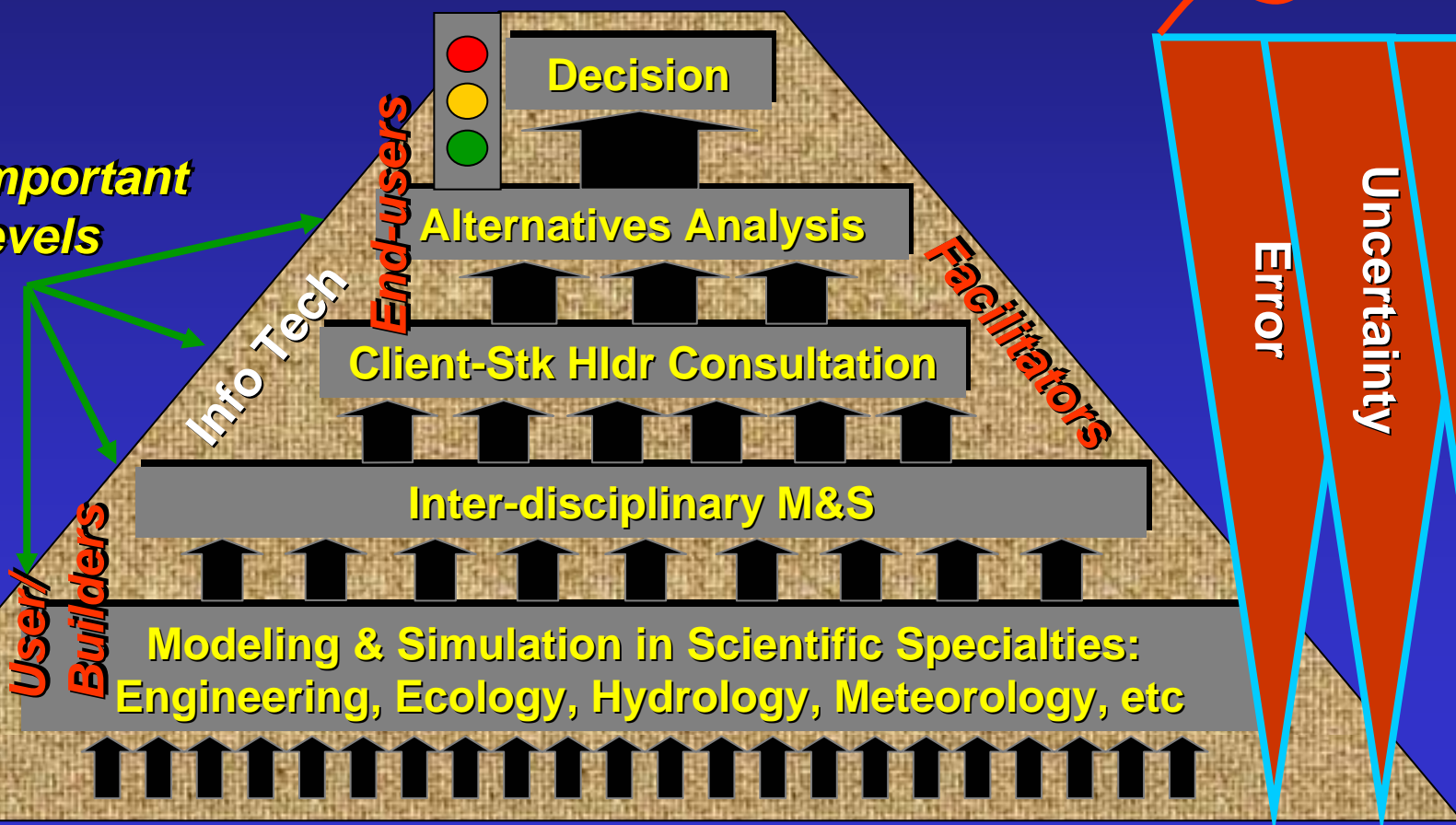
2-Wise Investing:
Decision Analysis \$

1-Wise Investing:
Maximize Minimize

*Increase Risk of
Poor Decision*



**M&S important
at all levels**





M&S Challenge for Enterprise Investment Apps @ S&E Level



Each discipline has:

- Different “currencies” and processes of different patterns & scales.
- Different “First Principles” using reference frameworks, concepts, & tools optimized for itself.
- Hundreds of years of convention & tradition.
- Builds tools without regard to the limits & capability of others.
- **Challenge: Fully integrate disparate disciplines without compromising the first principles of any.**



Improve M&S Technology to Enable Wise Investment by Training:



End-users

Policy- & Decision-Makers to:

- Pose answerable questions and expect uncertain results
- Understand and use decision-analysis
- Be the **"architect"** not the **"tradesman"**
- Meta-language for M&S?

Facilitators

IT Professionals to understand:

- Not all disciplines know their governing equations (approximation, correlation, vs determinism)
- Models cannot be "hooked together" without understanding underlying science
- Impressive graphics ≠ good science
- Perspective of both end-user and builder

User/ Builders

Discipline-Specific Modelers to :

- Convey information, but emphasize uncertainty
- Understand concepts underpinning models from other disciplines
- Understand that all models are related not disparate
- Understand the perspective of the end-users



Improve Enterprise-level M&S Technology to Enable Wise Investment



End-user

Policy- & Decision-Makers

- ***Synthesis not fragmentation***

Facilitator

IT Professionals

- ***Facilitate don't dominate***

***User/
Builder***

Discipline-Specific Modeling:

- ***Collaborate don't isolate***



The Vision:



Accurate, large domain, longtime time period, multi-disciplinary, multi-media, high-res, timely enterprise M&S that enables wise investing through superior decision-making



**Questions?
Comments?**

