



M&S Caucus Leadership Summit

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

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Development Center
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Engineers

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U.S. Army Corps of Engineers



Civil Works Programs 24K People - \$12.3B

- Navigation
- Hydropower
- Flood Control
- Shore Protection
- Water Supply
- Regulatory
- Recreation
- Homeland Security
- Environmental
- Real Estate

HQ



9 Divisions



45 Districts



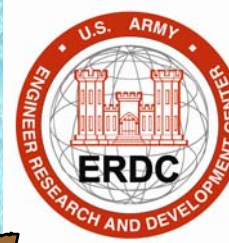
**Industry
Partners**

Military Programs 10K People - \$20.0B

- Military Construction
- Contingency Ops
- Installation Support
- Warfighter support
- International / Interagency Support



Engineer Research and Development Center



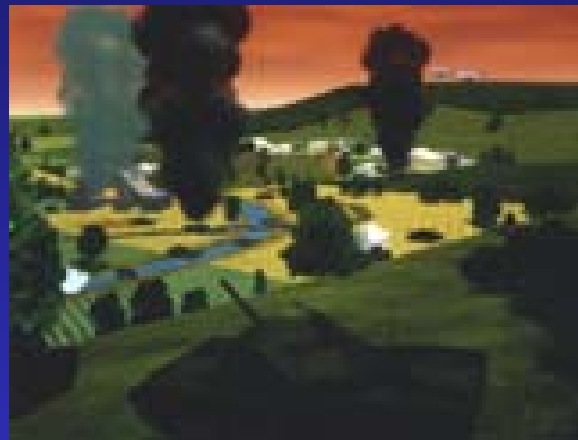
- 1859 Employees (+ ~1K Contractors)
- 1036 Scientists & Engineers
 - 420 Master's Degree (41%)
 - 276 PhD's (27%)
- FY08 Budget ~\$1B (~75%M/~25%CW)



ERDC Missions In:



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

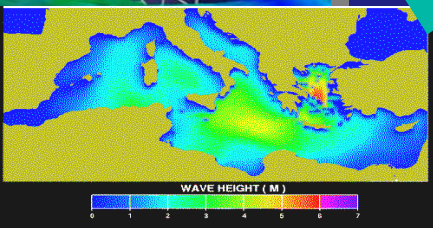
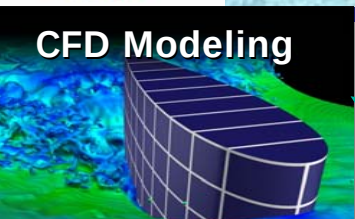




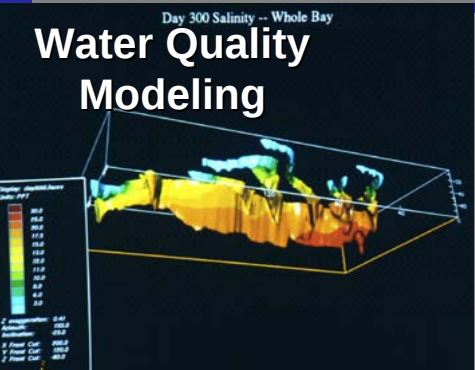
ERDC Modeling & Simulation is Important and Pervasive



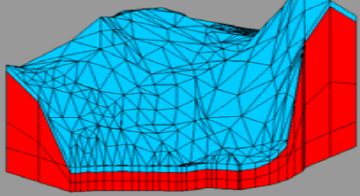
CFD Modeling



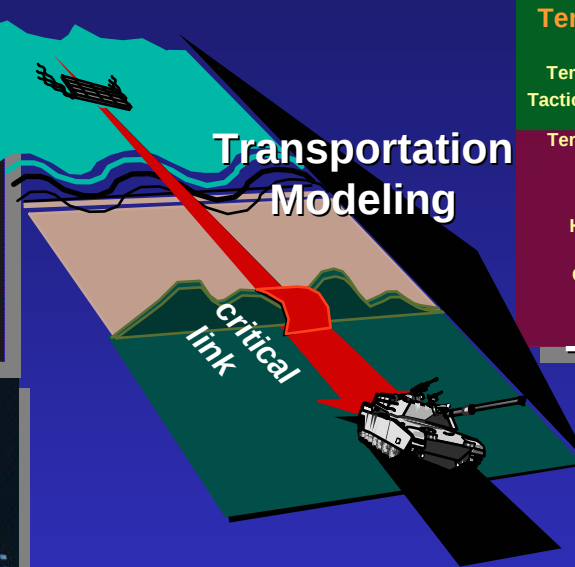
Water Quality Modeling



Numerical Model Mesh



Transportation Modeling



Terrain Analysis

Temporal Analysis
Tactics & Effects

Terrain Models

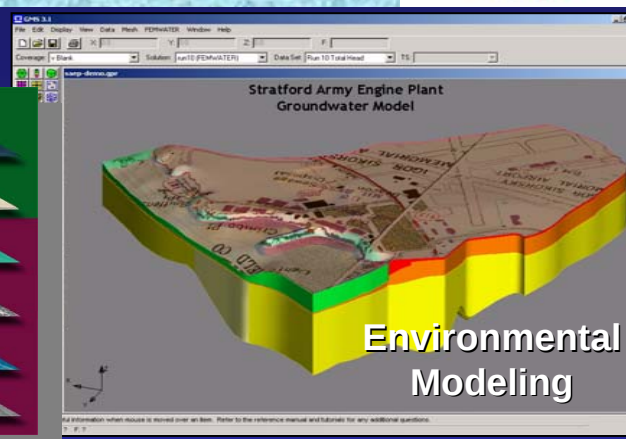
Feature

Hypsometric

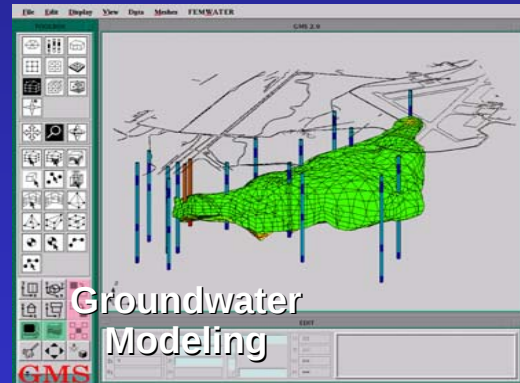
GeoPositioning

Imagery

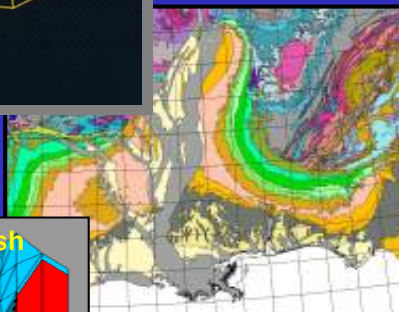
Terrain Modeling & Visualization



Environmental Modeling



Engineering Geophysics



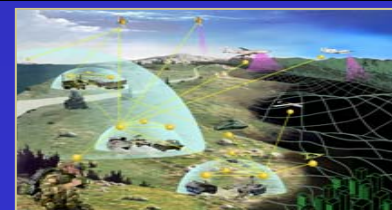
High Performance Computing Center



Infrastructure Materials



Theater Assessment





Enterprise Investment Decisions Reduce to “Data to Knowledge” Engine



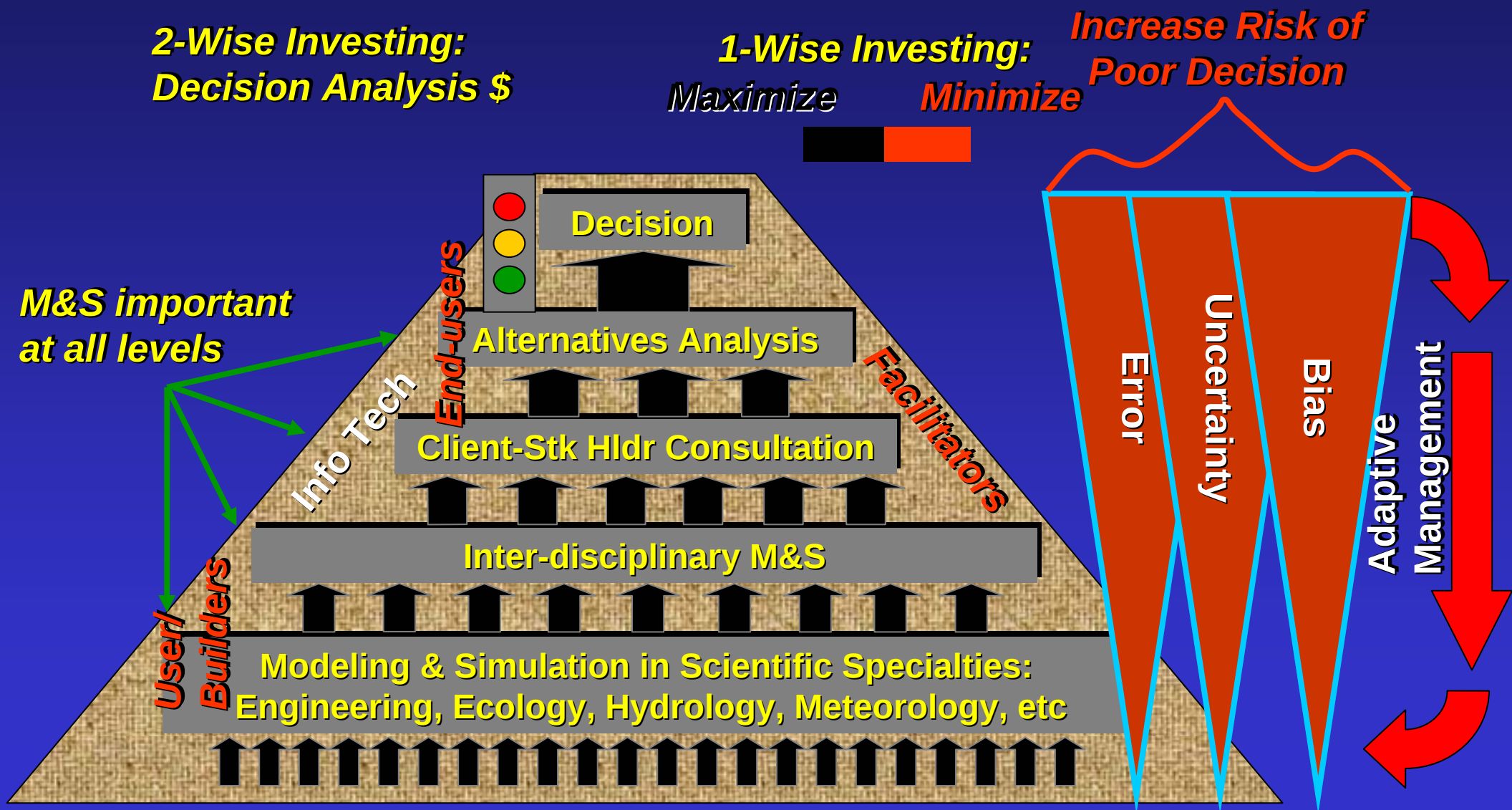
2-Wise Investing:
Decision Analysis \$

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?**

