Counter-Insurgency (COIN) Sandbox

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Army-Contract Mission Oriented Investigation and Experimentation

Problem

- **Current analytical tools do not represent non-kinetic effects reflected in Counter-Insurgency (COIN) Operations.**
  - **Current force-on-force combat models cannot support rapid prototyping and rapid response.**
  - **Current Commercial Off-the-Shelf (COTS) and Government Off-the-Shelf (GOTS) solutions are insufficient.**

Background

- **Counterinsurgency (COIN) operations are a fundamentally different form of combat operation.**
  - **COIN operations rely heavily on the social and cultural dynamics of the local populace.**

… killing insurgents—while necessary, especially with respect to extremists—by itself cannot defeat an insurgency.

FM 3-24 COUNTERINSURGENCY, para. 1-14.

the ability to generate and sustain popular support, or at least acquiescence and tolerance … is usually the insurgency's center of gravity.
FM 3-24 COUNTERINSURGENCY, p. 3-75.

Objective

- **Develop a Proof of Principle computational model to explore the dynamics of COIN operation described in *FM 3-24 (MCWP 3-33.5), Counterinsurgency*.**

- **Creating a simulation "Sandbox" for the COIN environment.**
  - **Initial: Create an analytical tool to represent these non-kinetic effects.**
  - **Objective: Brigade-level, decision support tool for COIN operations**

Activities

- Review of FM 3-24
- Additional Data Collection
- Model Formulation
- Formulation Review
- Model Instantiation
  - Operational Scenario
  - Relevant Scale
- Data Analysis
- Documentation
  - Study Report
  - Software

Highlight - Infrastructure for Complex Systems Engineering

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Simulation Tools
(mathematical models, discrete event, SD, network, etc.)

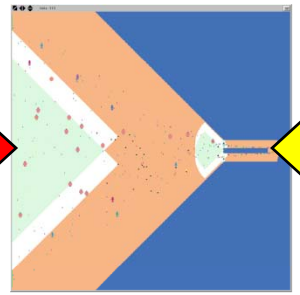
Building Blocks

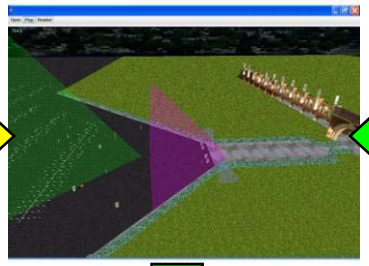
- Detailed Physics Models
- Subject Matter Experts/Decision Maker Expertise
- Representative Geometries
- Primary and Secondary Information
- Representative Behaviors

Agent-Based Models

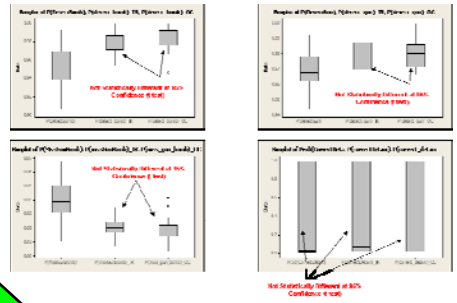
Rapid Prototypes (e.g., NetLogo)

Higher-Fidelity, Scalable Models (e.g., Repast)





Data Mining and Analysis



Variable	Mean	StDev	Minimum	Maximum	Range
P(DetectBomb)	0.95456	0.02272	0.90625	0.9927	0.08645
P(detect_bomb)_OC	0.98128	0.01383	0.94531	1	0.05469
P(detect_bomb)_IR	0.98071	0.0107	0.95425	1	0.04575
P(DetectGun)	0.98767	0.01331	0.94486	0.99365	0.04879
P(detect_gun)_OC	0.98028	0.00873	0.96644	1	0.03356
P(detect_gun)_IR	0.979	0.01251	0.94937	1	0.05063
P(MissGunBomb)	0.04013	0.01332	0.01049	0.06803	0.05754
P(miss_gun_bomb)_OC	0.01925	0.00808	0.00375	0.04151	0.03776
P(missGunBomb)_IR	0.02037	0.00775	0.00669	0.03537	0.02868
Prob(CorrectDetain)	0.3525	0.4663	0.0095	1	0.9905
P(correct_detain)_OC	0.4023	0.4503	0.0148	1	0.9852
P(correctDetain)_IR	0.4019	0.4499	0.0149	1	0.9851

High Performance Computing on C2C HIVE

Optimization / Robustness

Knowledge Elicitation
Data Gathering

Demonstration

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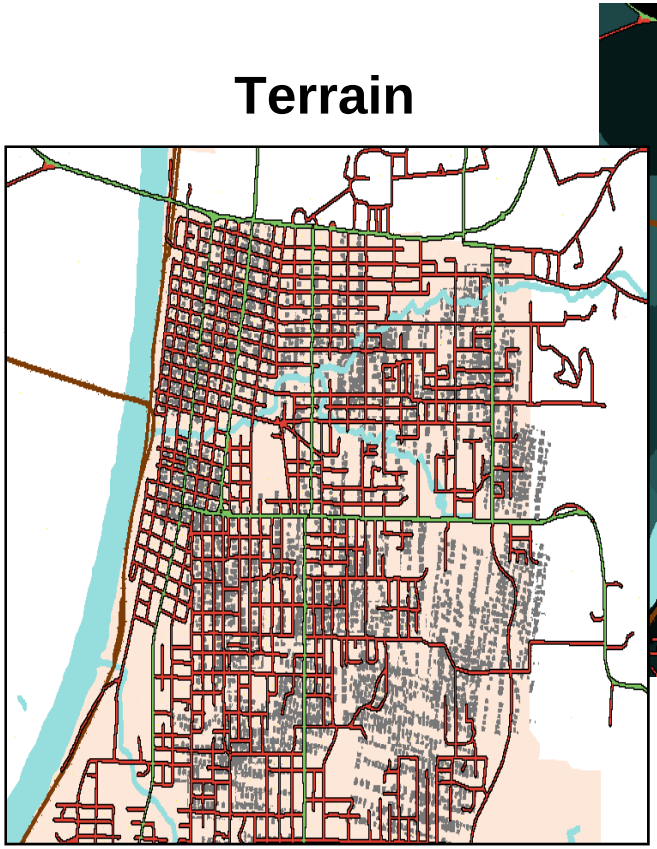
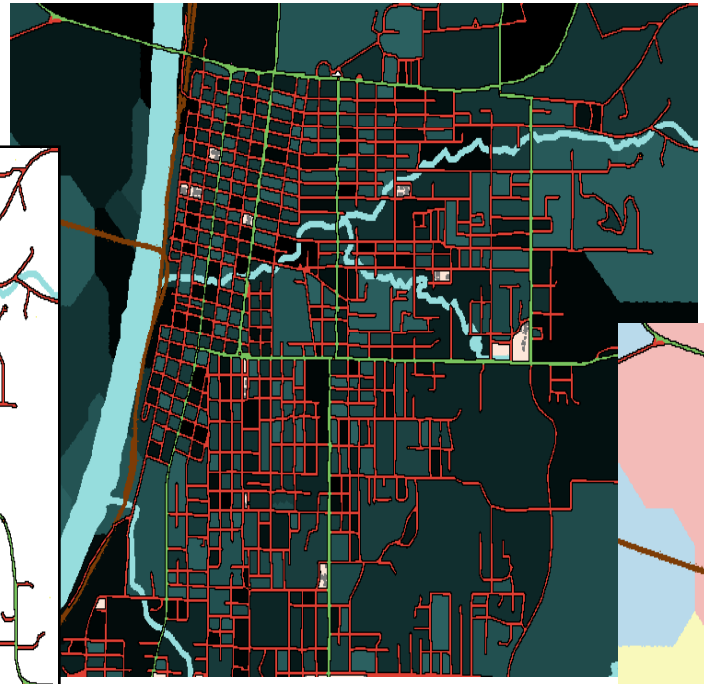
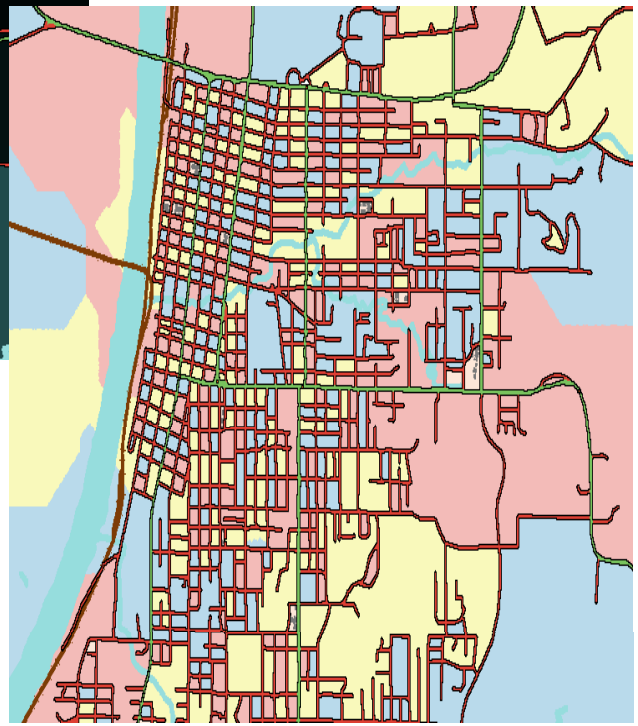
Attitude toward Violence

Terrain





Attitude toward Coalition



Impacts

- DHS, S&T Stand-Off Technology Demonstration Program.
  - Application of modeling infrastructure.
- Recent, Project Kickoffs
  - Joint IED Defeat Organization (JIEDDO)
    - COIN Sandbox to serve as integration environment for analytical products from other JIEDDO Performers.
  - G-3/5/7, LandWarNet / Battle Command.
    - Modeling infrastructure is being extended for use in LandWarNet applications.
    - COIN and other operational scenarios.
- External Collaborations
  - Santa Fe Institute
  - Argonne National Laboratory

Future Plans

- Complete the development of the prototype
- Demonstrate its application
- Enhance user interface
- Integration with current data collection systems
  - Human Terrain
  - Patrol Planning / Debriefing Tools
- Integration with hardened and low power computing capability (i.e., “suitcase cluster”)