RDECOM

2008 International Infantry & Joint Services Small Arms Systems Symposium

System Analysis: Infantry Studies and Simulations

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ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER
PICATINNY ARSENAL, NJ

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

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Overview

1. How does System Analysis Modeling and Simulation improve the world of infantry technology and doctrine?
2. Modeling and Simulation tools
3. Examples of analysis performed
4. M&S Outlook

Improving Small Arms through Modeling and Simulation

- **How does System Analysis Modeling and Simulation improve the world of infantry technology and doctrine?**
  - Allows us to QUANTIFY improvements in warfighter survivability, lethality, and mission success by modifying specific parameters (e.g. improved body armor, lighter weapon)
    - Can define optimal technology to accomplish goal
  - Comparison of existing technologies
    - Models and simulations show the effects of these capabilities and allow us to compare these situations to the baseline
      - How does this undeveloped capability improve our forces' lethality, survivability, and ability to accomplish a given mission?
      - Which capability leads to the most improvement? Optimization.
- **Points towards the technology alternative that is closest to goal.**

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Improving Small Arms through Modeling and Simulation

- M&S is essential throughout the development of a Small Arms technology!
  - Saves money
  - Allows controlled experiments to obtain statistical results
  - Results create direction for development of small arms technology

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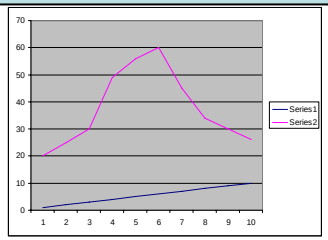
Improving Small Arms through Modeling and Simulation

Real life test data



Analysis using Software tool(s)

Results and Conclusion

Support for R&D Effort

Soldier input

Development of Small Arms System

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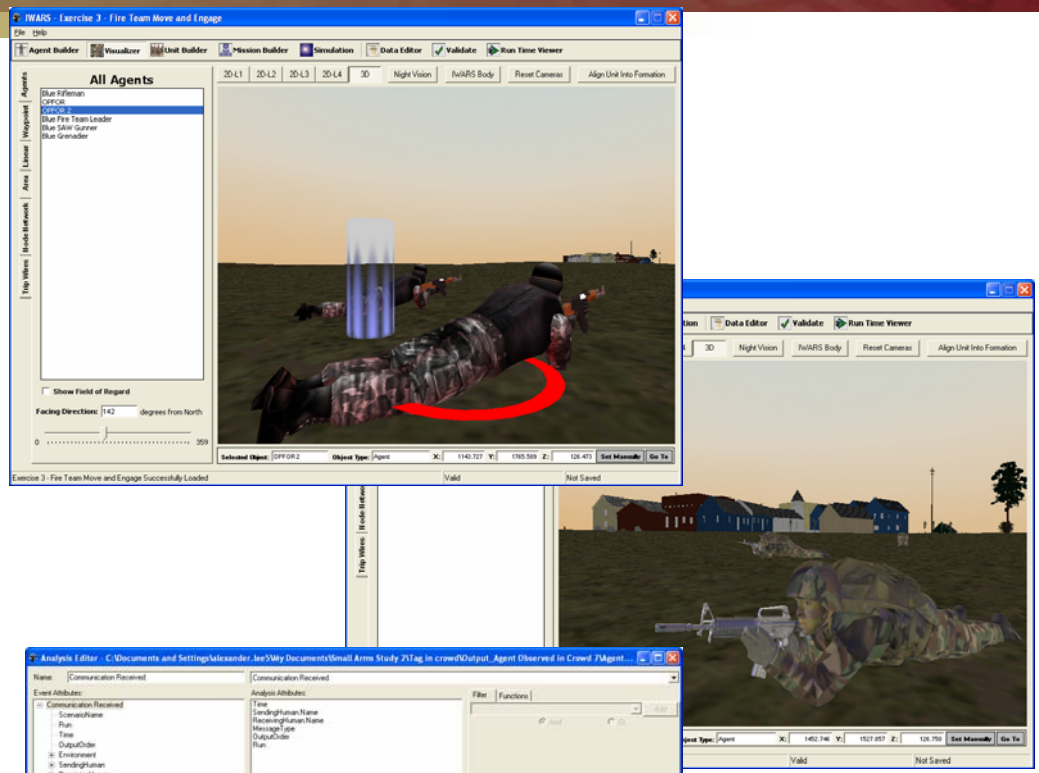
Guidance

- Guidance from Subject Matter Experts (eg: Infantry School at Ft. Benning)
  - What areas of improvement to study
  - Measures of Effectiveness (MOE's)
  - Infantry scenarios
  - Training Doctrine
- Working in coordination with other efforts to support Army Technology Objectives
- Major Demands:
  - Higher stopping power
  - Better protection
  - Lighter equipment
  - Reduce exposure to fire
- Given this information, what input provides the system with the best performance according to the MOE's?

Tools: IWARS



IWARS (Infantry Warrior Simulation) – AMSAA approved model

- Force-on-Force Analysis
- High resolution Dismounted Infantry model
- Programmable Small Infantry Engagements
- 3-D representation and run time viewer
- Output analysis tool

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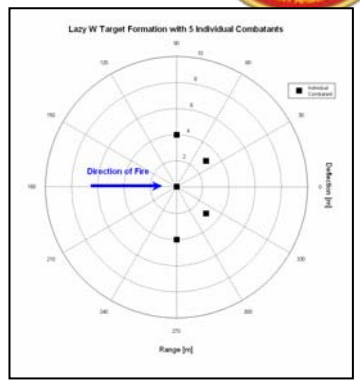
Tools: CASRED and FBAR

Weapon Characteristics
- Fragmentation Data[1]
-Terminal velocity [2]
- Angle of Fall [2]

Delivery Accuracy
- Baseline Case
- Improved Range Finder
-Improved MV
- Improved Range & MV

Target Formation
- 5 combatants
- Lazy W [3]



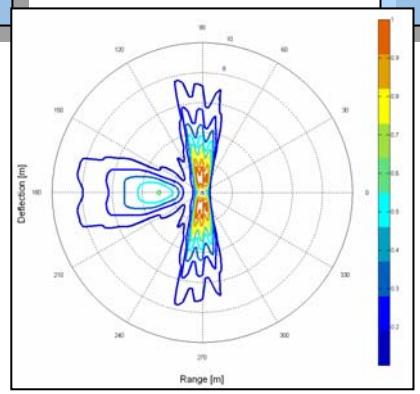
CASRED (Lethality)

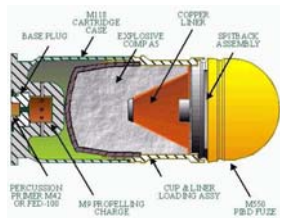
Pk Contour files

FBAR (Effectiveness)
50,000 Monte Carlo Trials

Expected Fractional Casualty Values

Individual Soldier Data
-Winter Uniform
-No Armor / No Helmet
-Standing Posture
- 5-min Assault Criteria





Allows examination of lethality of theoretical weapon systems in comparison to ones in use today.

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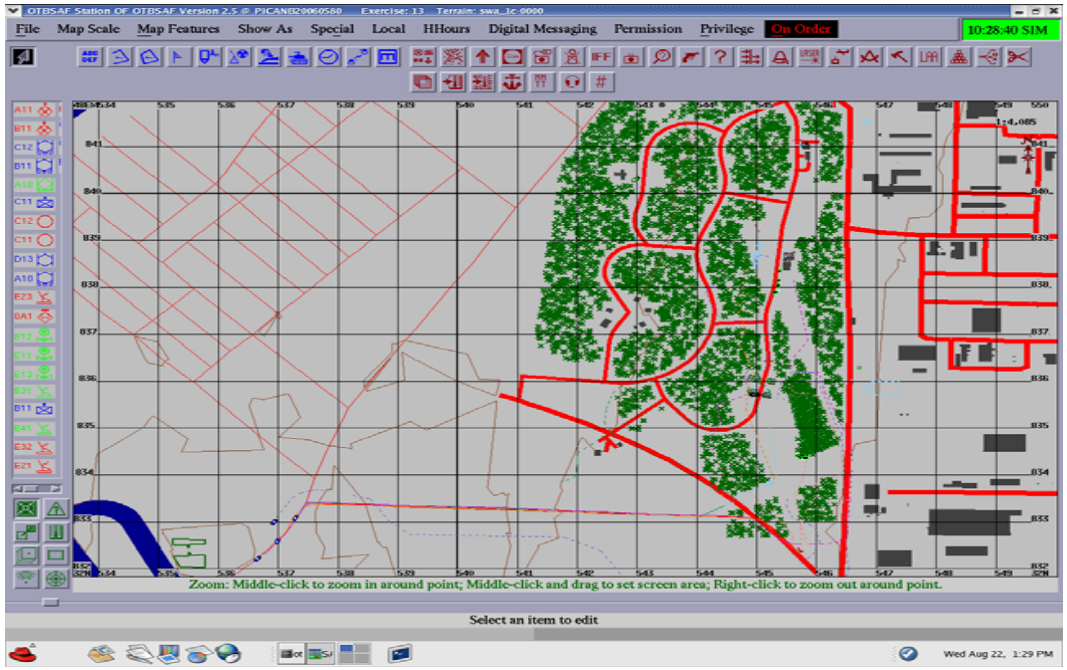
Tools: One Saf Test Bed (OTB)



- Distributed force-on-force simulation
  - A macro perspective allows large force-on-force engagements
  - Shows what technology can do under operation conditions

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Infantry School Guided Study 1

- In baseline scenario, breaching squad is exposed in street waiting for door to be breached
- Breach takes approximately 5 seconds

- With improved capability, the breaching round is fired from cover while the breaching squad waits under cover
- Answers the question: How much improvement in terms of friendly force survivability and breaching time can be achieved using a breaching round?

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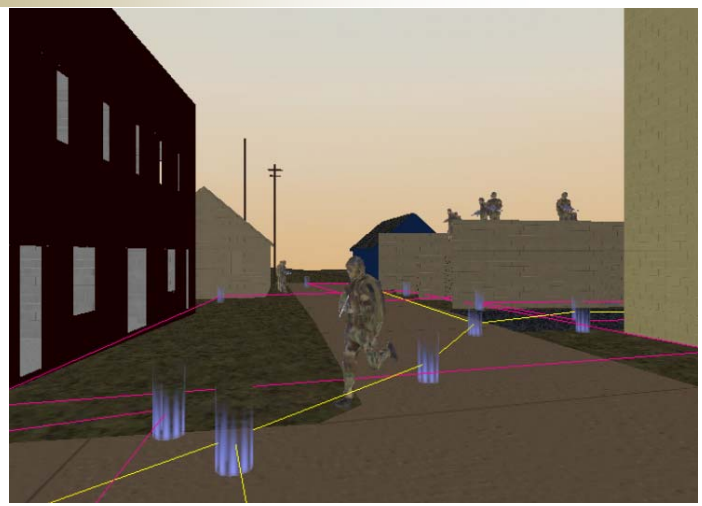
Infantry School Guided Study 2



- If potential insurgent can be tagged, he can be pursued more effectively.
- Allows the warfighter to discriminate the target from other civilians.
- Higher percentage of correctly locating the target = better tagging technology.
- Marginal improvements in capture times and success rate were recorded
- Results show most return with 100% accuracy for tagging.

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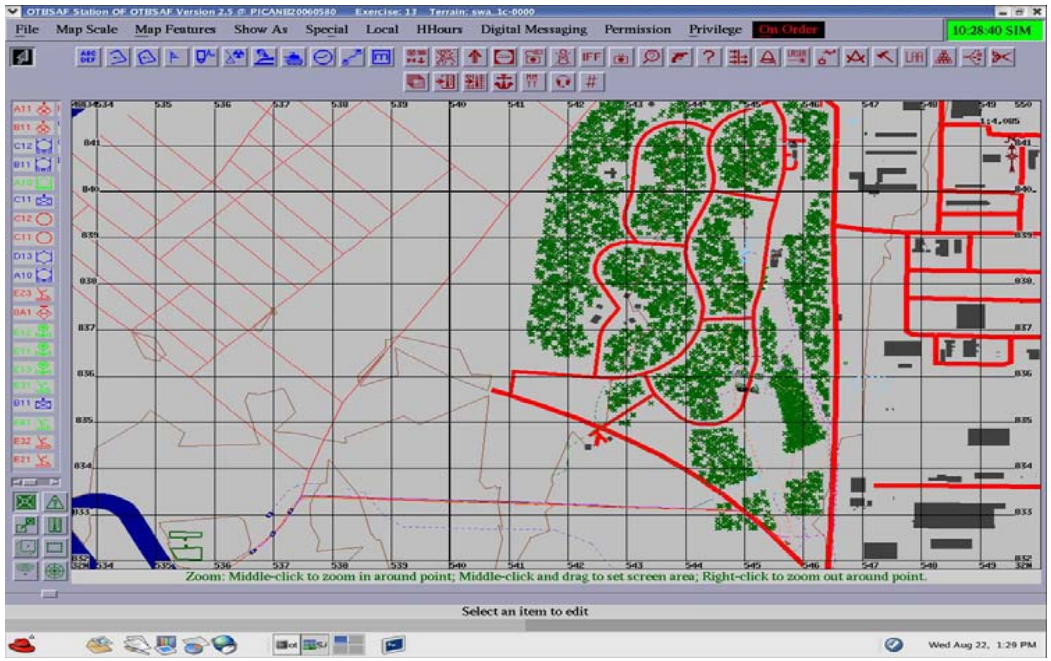
OTB work



- Scenario: Blue forces are engaged by red (insurgents) at a roadblock
- Parameter focus is on the Vertical and Horizontal Per-Shot Error of M16.
- Statistics were obtained from 150 runs of the scenario with 30 runs of each parameter modification
- Identified a specific reduction in Vertical and Horizontal Per-Shot error in mils that led to the most the most improvement

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Infantry Study Outlook

- Continue to support the development of improvements (materiel or otherwise) to support the warfighter.
- Help to optimize R&D efforts to bring the most benefit to the warfighter.
- Continue to implement new tools to expand our effort.

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