



Malcolm Baldrige  
National  
Quality  
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Recipient

# System Analysis: Infantry Studies and Simulations



***TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.***

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1. Background
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4. Other work



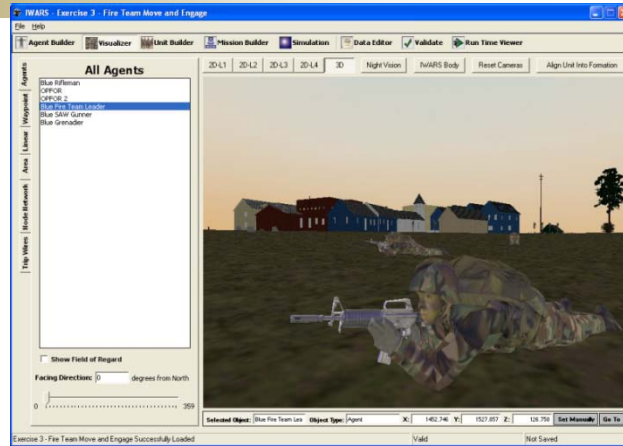
# 1. Background

## How does System Analysis Modeling and Simulation improve the world of infantry technology and doctrine?

- **M&S answers the following questions:**
  - HOW MUCH improvement can the technology/doctrine provide?
    - Survivability
    - Lethality
    - Mission Success
  - How do we optimize a certain technology to accomplish the goal?
  - How do we compare existing technologies to new technologies to achieve a certain goal?
- **M&S saves money.**
- **Results help point the direction for development of small arms technology**
  - Controlled experiments obtain statistical results

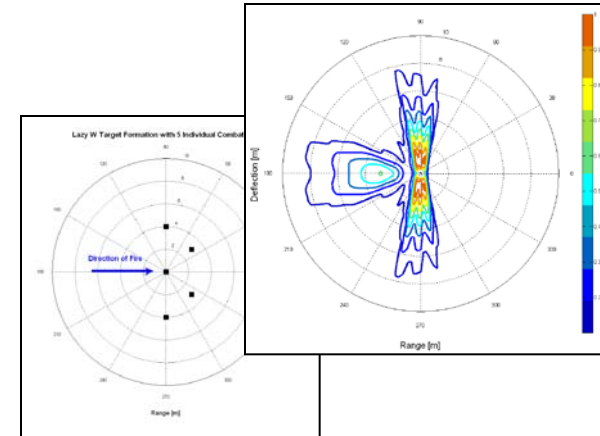


## 2. M&S Tools

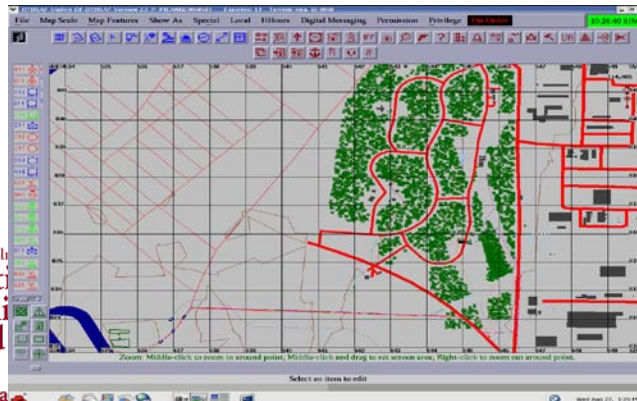


### 1. IWARS – Infantry Warrior Simulation

### 2. CASRED & FBAR – fragmentation and delivery accuracy of a bursting warhead



### 3. OTB – Distributed force on force simulation



### 3. M&S work w/ new technology

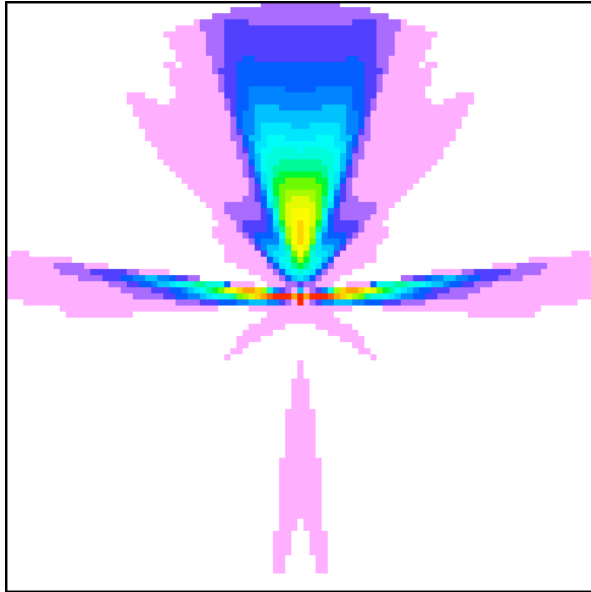
- M&S can be applied to analyze a multitude of technologies.
- The following are examples of work that have been recently completed or are in progress.



# 3. M&S work w/ new technology: Comparisons of 40mm Concepts



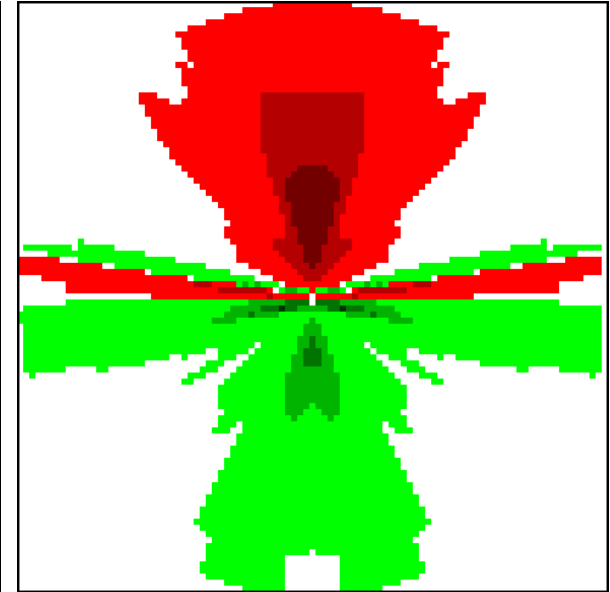
40 mm concepts



New Concept



Baseline



Difference

- This tool allows us to directly compare polar plot lethality data between two different rounds, giving us a direct picture of where a notional warhead gains and loses lethality in comparison with the baseline warhead, or with other notional concepts.
- Red indicates improvement over baseline.
- Green indicates degradation over baseline.

$.75 < x < 1$	Dark Red
$.5 < x < .75$	Red
$.25 < x < .5$	Light Red
$0 < x < .25$	Red
$x = 0$	White
$-0.25 < x < 0$	Light Green
$-.5 < x < -.25$	Green
$-.75 < x < -.5$	Dark Green
$-1 < x < -.75$	Dark Green



### 3. M&S work w/ new technology: IWARS in RAZAR study



*Technology:*

#### Rapid Addaptable Zoom for Automatic Rifle

- Allows rapid target acquisition compared to manual scopes
- Recognition and identification will allow faster target engagements



# 3. M&S work w/ new technology: IWARS in RAZAR study



## Simulation:

Blue agent attempts to acquire the target using his eyes and then uses the RAZAR scope.

- Observer to target range: 200m to 800m

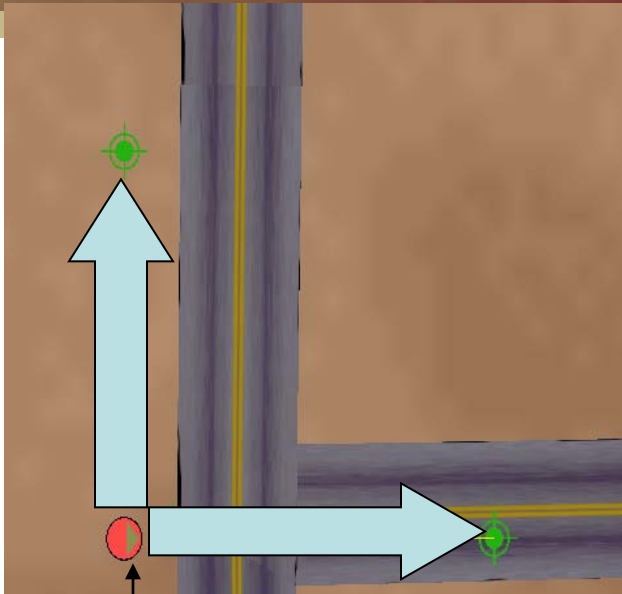
Experiments conducted in 50m increments

- Magnifications and Field of View:

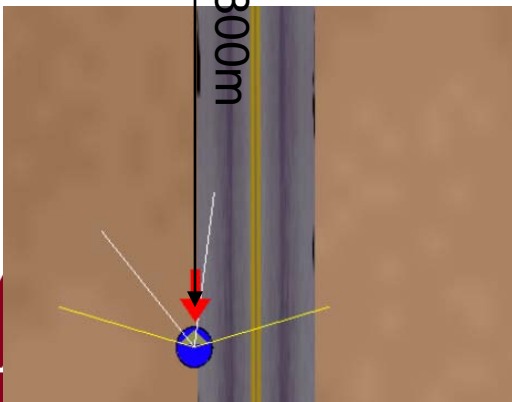
- 2X @ 12 degrees
- 4X @ 6 degrees
- 6X @ 4 degrees

- Vignettes - Red target either:

- travels short distance horizontal
- walks the same distance farther downrange



200m - 800m





### 3. M&S work w/ new technology: IWARS in RAZAR study



#### *Findings:*

Overall, RAZAR allowed further acquisitions needed for engagement of target over unaided eye

- 2X – up to 3 times (@ 700m)
- 4X – up to 2.27 times (@ 700m)
- 6X – up to 2 times (@ 800m)

Further experiments will be performed

- RAZAR aiming
- RAZAR time for acquisition



### 3. M&S work w/ new technology: IWARS in LSAT study



#### Technology:



- Lightweight Small Arms Technology implements caseless (right) and cased telescopic ammunition (left), providing a foundation for lighter rifles, carbines, and machine guns.
- Current study involves comparison of M249 LMG to the LSAT LMG



# 3. M&S work w/ new technology: IWARS in LSAT study



## *Simulation:*

- Reduced ammunition weight will have effects on warfighter mobility and ammunition capacity
- Experiments will test the energy burned and additional kills given increased ammunition capacity
- Scenarios will start with single agent and expand to squad level battles

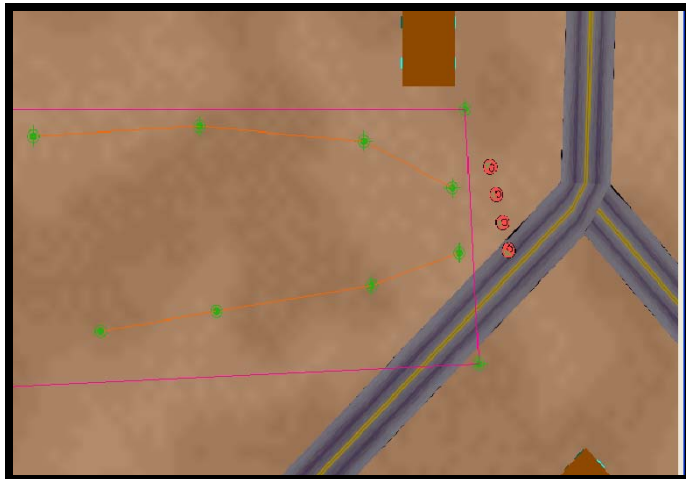
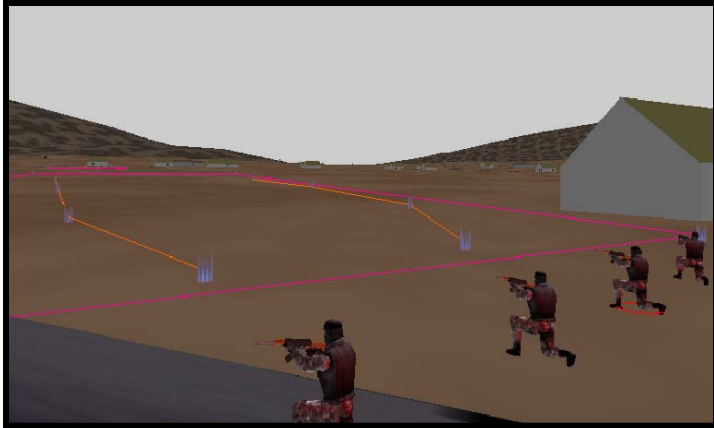


## 4. Other Work

### Laying the Groundwork

Anticipating future work and needs of the warfighter, we have taken the initiative to establish new scenarios and tools to perform experiments and other work for emerging technologies.





## Fire and Maneuver Scenario

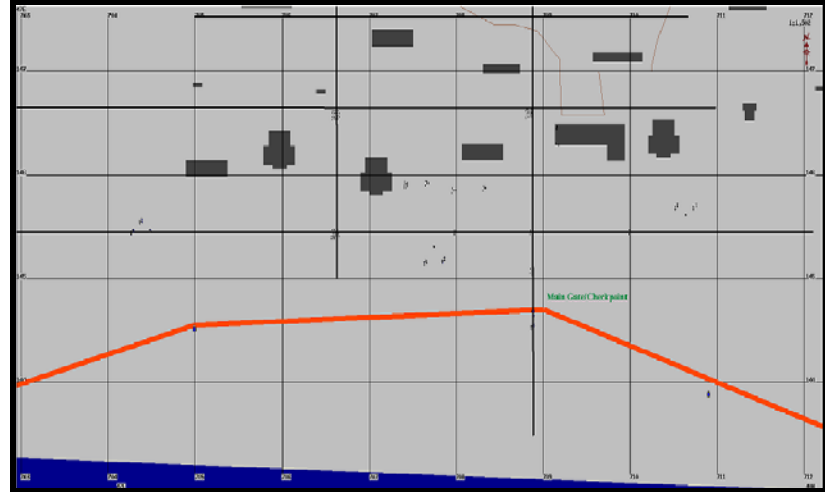
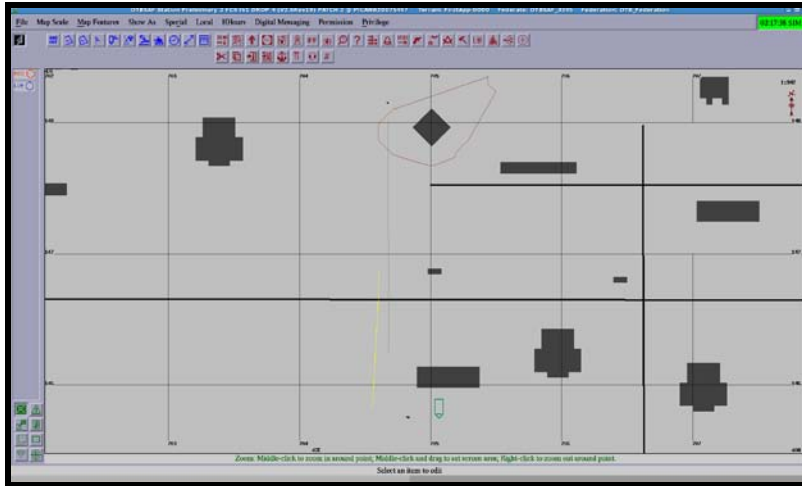
- One Red Opforce FT will attempt to fire and maneuver while another Red FT will provide firing cover, overwhelming a Blue FT under normal circumstances.
- The Blue FT will implement an improved capability such as improved acquisition or aiming.
- Stochastic shields will provide the Red force cover and concealment.
- Blue force will be in prone position.



# 4. Other Work: OTB

## Truck Bomb scenario

- Will be used as a foundation to test new capabilities



- Blue with M4 vs. Red with M4
  - ~240 meters apart
  - Red does not shoot
  - Red runs for cover behind building
  - Exposed for about 3-5 seconds

- Group of civilians head to checkpoint to cause distraction
- Blue forces converge onto checkpoint in support
- Red, to west, drive into unguarded section of gate with truck bomb
- Red soldiers on foot enter hole in gate
- Blue force retaliates





- Continue analysis of 40mm and 25mm concepts to optimize fragmentation on target
- Implementation of RAZAR in realistic team battles
- Implementation of LSAT in realistic team battles

# Questions????







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# Contact information



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