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AI-Assisted Artillery Fire Mission Planning

Using Simulation-Based Effectiveness Assessment

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What supports the commander's decision?

Doctrine and procedures

Expert judgement

Standard ammunition expenditure tables

WEIGHT OF FIRE ANALYSIS									
Target Area	Target Type	Neutralisation				Destruction			
		155mm PD	155mm Prox	105mm PD	105mm Prox	155mm PD	155mm Prox	105mm PD	105mm Prox
200m x 200m	Pers	16	18	18	12	48	32	60	48
	Soft Skin	24	16	60	60	80	72	180	216
	Light Armd Veh	40	24	288	252	144	96	P	P
400m x 400m	Pers	64	32	72	48	192	128	252	180
	Soft Skin	96	64	252	216	320	288	756	864
	Light Armd Veh	160	96	1,134	1,026	576	384	P	P
600m x 600m	Pers	144	72	162	108	432	288	540	486
	Soft Skin	216	144	540	486	720	648	1,620	P
	Light Armd Veh	360	216	P	P	P	864	P	P
Note		P - Prohibitive (cannot achieve the desired response without firing a prohibitive amounts							

(Ref.: Royal Artillery Ready Reckoner, Royal School of Artillery(

How well does a standard recommendation represent this particular situation?

The assumptions behind a standard recommendation

How reliable is the input information?

Which assumptions does the table use?

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How are the possible outcomes distributed?

Which conditions differ from the reference case?

What does the prescribed expenditure tell us about outcome uncertainty?

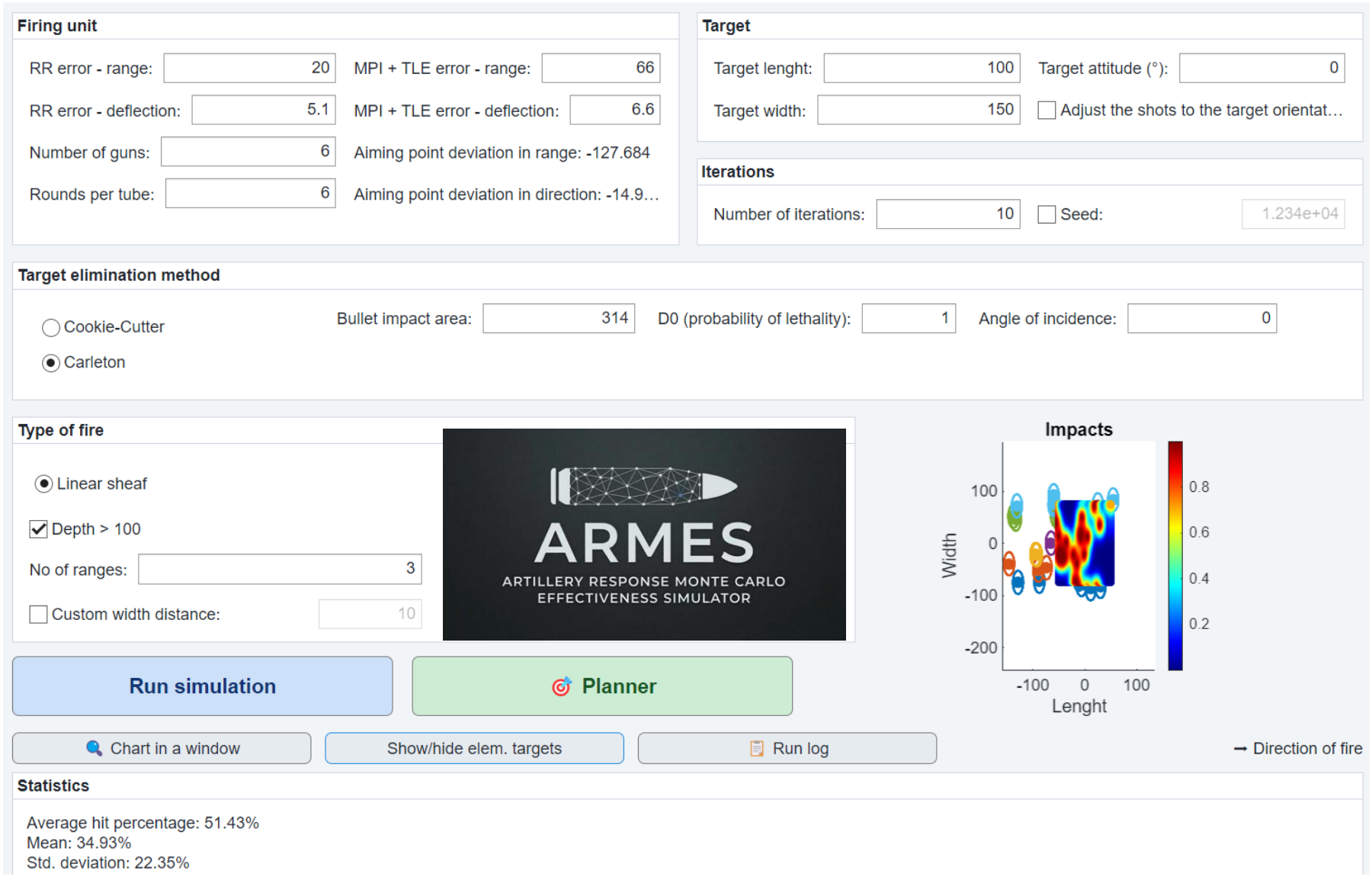
ARMES: effectiveness assessment

A planner-defined configuration

Repeated simulations under uncertainty

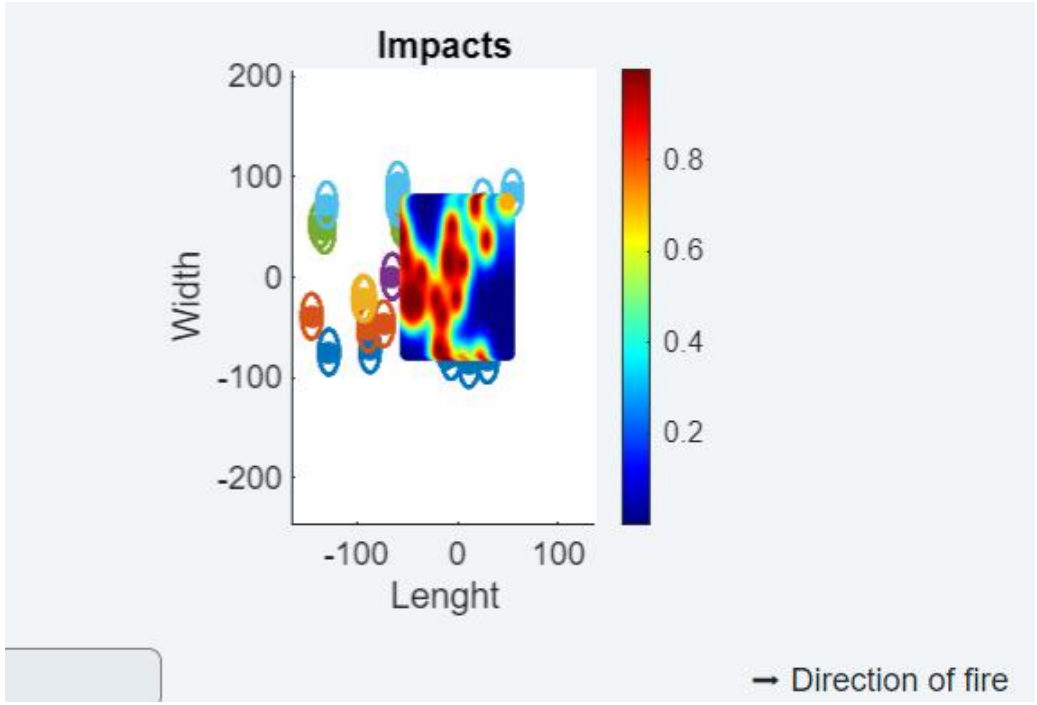
A distribution of possible outcomes

Existing simulation core

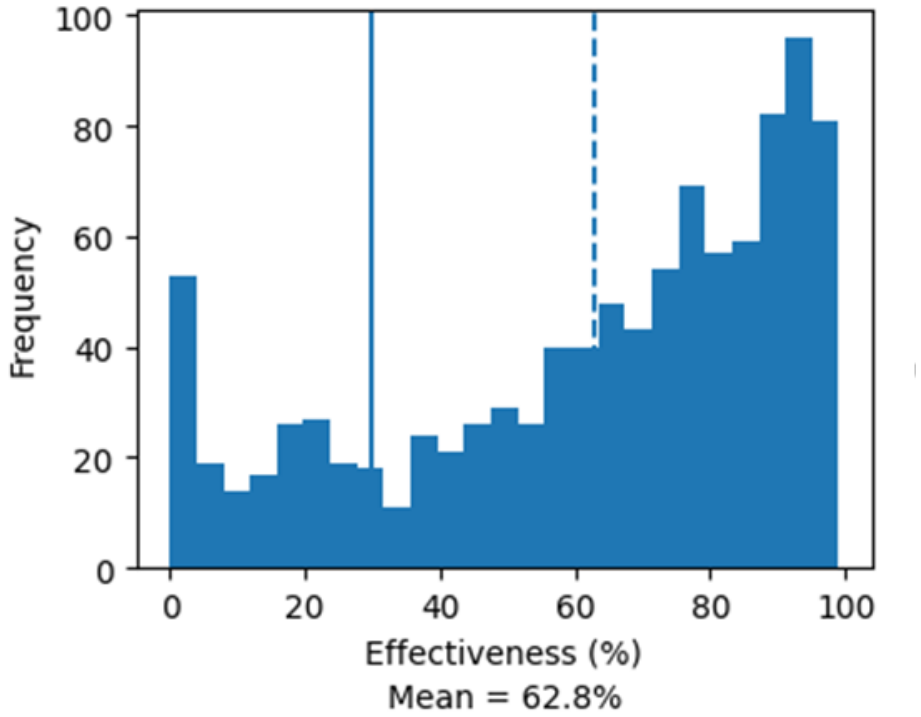


Seeing uncertainty

One simulated outcome



Across repeated simulations



The mean describes only part of the result.

The planner still chooses what to test

The planner defines alternatives.

ARMES evaluates them.

The planner interprets the results.

How can we support the generation and comparison of alternatives?



The proposed planning framework

01	02	03	04
Mission data processing	**Candidate generation**	**Simulation-based assessment**	**Decision support**

Existing ARMES core

Human review and approval

Conceptual architecture building on an existing simulation core

Requirements and preferences

Mandatory requirements

Define whether an alternative is feasible.

Planner-defined priorities

Guide the comparison of feasible alternatives.

Multi-criteria decision-making

A preferred solution depends on the stated constraints and priorities.

Where AI could contribute

Function	Approach considered in the paper
Candidate generation	Knowledge-based rules
Exploration of alternatives	Heuristic search
Comparison and recommendation	Multi-criteria decision-making
Knowledge refinement	Supervised machine learning

Offline learning

Simulation data support knowledge refinement.

Online decision support

The planner reviews recommendations.

Research status and validation

EXISTING

ARMES simulation core

Assessment of manually prepared alternatives

PROPOSED

Integrated planning architecture

AI-related roles within the framework

TO BE VALIDATED

Prototype performance

Recommendation quality

Human interaction

The present paper provides a conceptual design.

Simulation-informed decision support



Simulation makes outcome uncertainty visible.

The proposed framework connects assessment with planning.

AI contributions require experimental validation.

Human responsibility remains central.