Maximize the Chance of Winning or Expected Damage? You Decide

1. Static data only provides Expected or Average Remaining Combat Effectiveness of a target. Here Weapon 1 is selected against Target 1. With an ERC of 69%.

EXPECTED REMAINING COMBAT EFFECTIVENESS

A constructed metric representing the target's expected (average) post-strike capability relative to baseline. 100% indicates full operational capability; lower values reflect greater degradation. From the attacker's perspective, lower remaining effectiveness means greater mission success.

Visit https://www.probabilitymanagement.org/readiness to learn more or contact Sam@ProbabilityManagement.org.

2. Select Stochastic data. It contains 10,000 possible interrelated trials providing estimates of the chances of achieving specified goals. Here a Success Threshold is specified of 30% or less of Remaining Combat Effectiveness, for which the chance of Weapon 1 against Target 1is 38.4%.

SUCCESS THRESHOLD

Each element of the SIP represents the remaining combat effectiveness of the target in a single simulated trial. Mission success is defined relative to an attacker-specified effectiveness threshold. The chance of mission success is calculated as the proportion of simulated trials in which remaining combat effectiveness is less than or equal to that threshold.

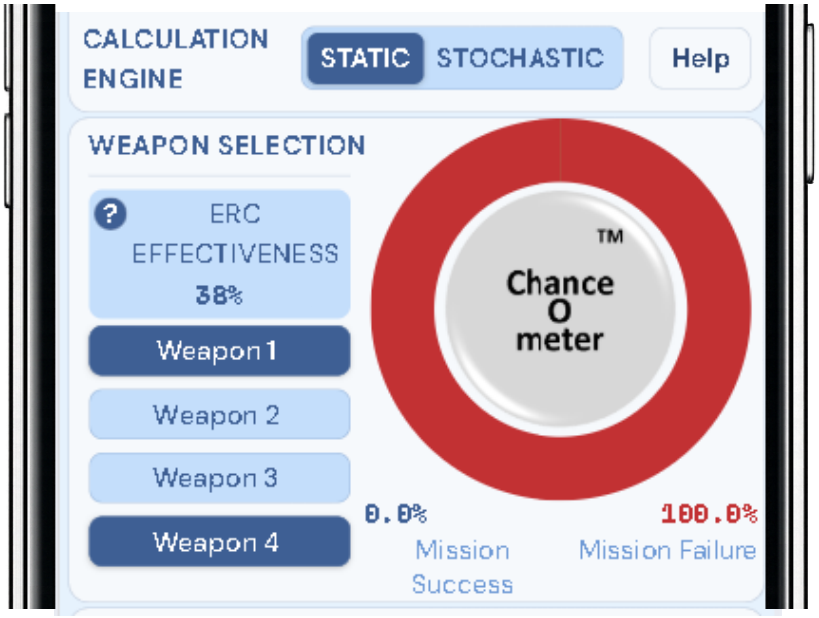
For example, if mission success requires reducing the target to 30 percent combat effectiveness or lower, the chance of success is the fraction of trials in which the simulated remaining effectiveness is 30 percent or below.

The Histogram now displays several possible outcomes in terms of Target Degradation.

3. Select Combat Effectiveness . The table Displays the Expected Remaining Combat Effectiveness of each Target with respect to each Weapon. Note that Weapons 2 and 3 are the most effective against both targets.

Now Consider a Salvo of Two Weapons Suppose you faced Target 1 and could fire only two weapons. The obvious choice would be Weapons 1 and 2. This is the **right answer** if you want to **Minimize the Expected Remaining Combat Effectiveness**. But it is the **wrong answer** if you want to **Minimize the Chance of Missing your 30% Success Threshold.**

4. Return to Static Mode and Select Weapons 2 and 3. ERC Effectiveness is 25%, which is below the Success Threshold of 30% so success is apparently guaranteed.



5. Next Select Only Weapons 1 and 4. ERC Effectiveness is 38%, which is above the Success Threshold of 30% so success is apparently impossible.

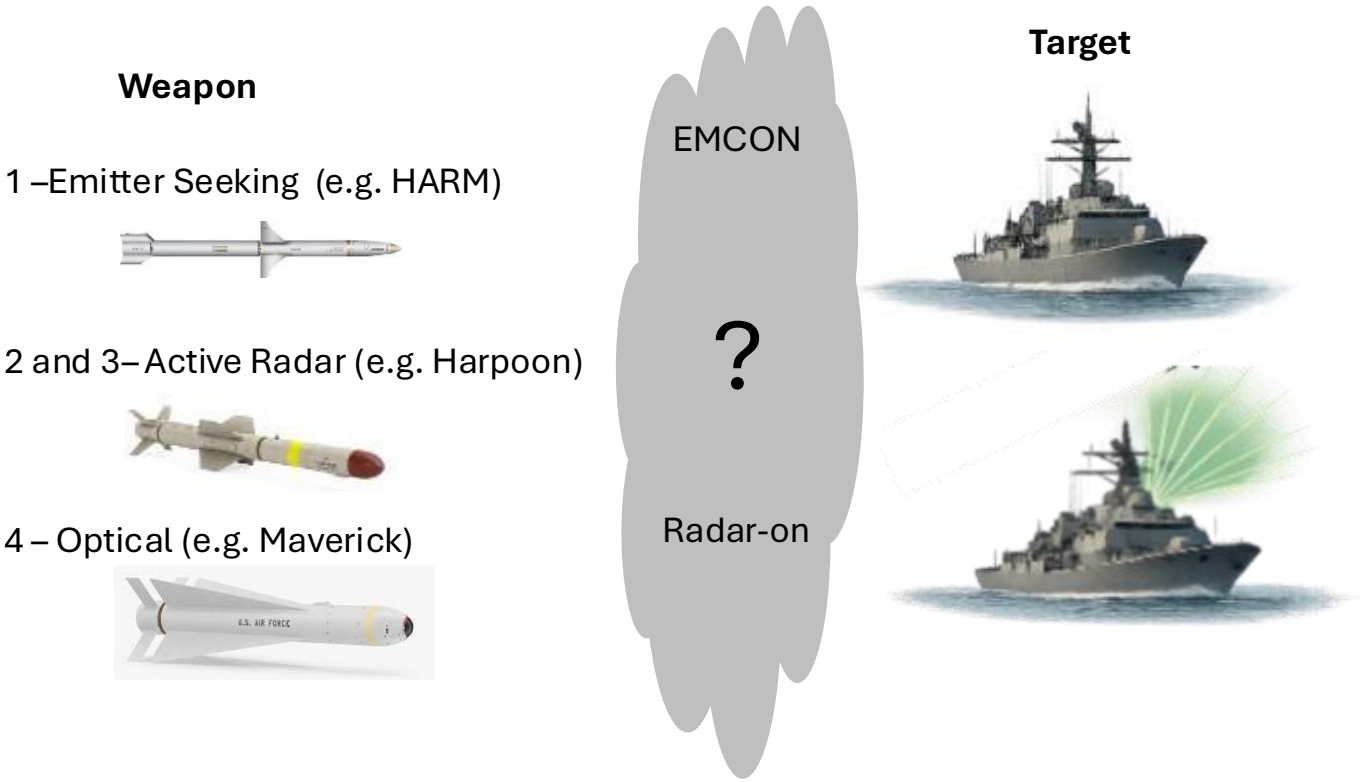
6. Select Weapons 2 and 3 and use Stochastic Mode. ERC Effectiveness is 26%,close to its previous value, but the mission is not guaranteed. There is nearly a 16% chance of mission failure. The Histogram reveals a range of possible outcomes.

7. Re-select Weapons 1 and 4. ERC Effectiveness, which was 38% in Static Mode has dropped to 27% and the chance of mission failure, 11.3% is 30% lower than it was with Weapons 2 and 3!

But why?

8. Static Data Masks Uncertainties and the Interrelationships Between Uncertainties. This leads to family of systematic errors known as the Flaw of Averages. Stochastic Data solves these problems.

In this example there are hidden relationships between weapon performance induced by the fact that the target will either be actively using radar to scan for incoming weapons, or in Emissions Control (EMCON), to avoid detection by radar seeking weapons.



Although Weapons 1 and 4 individually have lower expected performance than Weapons 2 and 3, when used together, one or the other will be advantaged by either state of the target.

Our paper on this example will be published in the Spring of 2026. Check back for a link here.