



המעבדה התפיסתית
המרכז לביצוע תפיסות והכוננת בניין הכוח

Military Operation Simulation Summit

November 2019

Challenges of using Modeling and Simulation for force deployment and force build-up



Agenda

- ❑ Opening Remarks- LTC Yafit Dinur
- ❑ The Concepts Laboratory- COL (Res.) Dr. Gaby Siboni
- ❑ The Operational Simulation Summit - COL (Res.) Dr. Gaby Siboni
- ❑ Proposal for Cooperation- COL (Res.) Tal Raz



The Concepts Laboratory

Purpose of the Concepts Laboratory



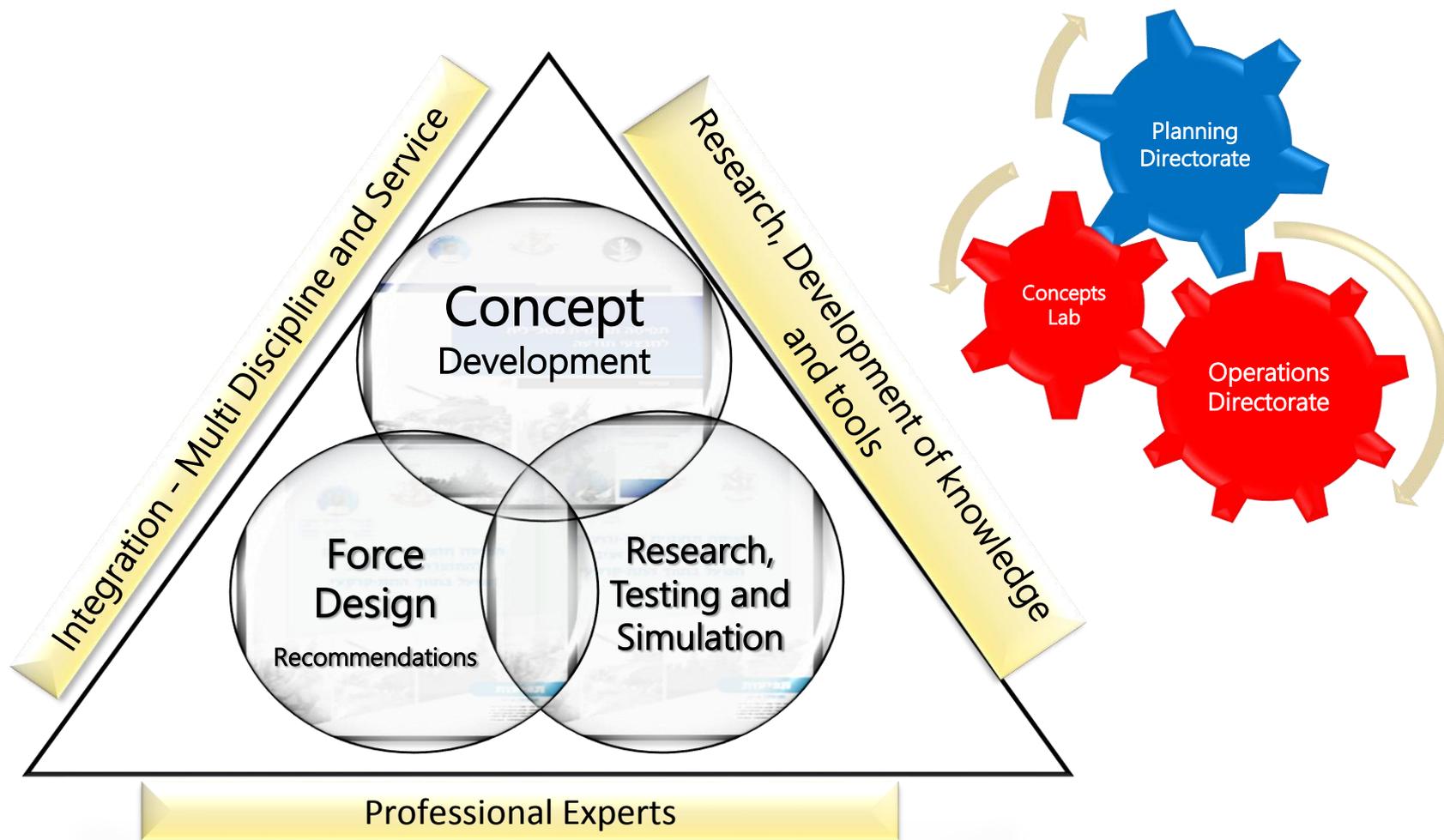
To Operate as the Professional Authority in the IDF for Concept Development, Script & Initiatives in order to help direct force build-up and best prepare the IDF for future challenges.

Main Roles



- ❑ Initiate, Formulate and Script IDF Concepts (Multi-Force).
- ❑ Define abilities, and direct force build-up, as a derivative of IDF Concepts.
- ❑ Identify Operational Gaps, Initiate operational requirements & recommend COA's in force build-up.
- ❑ J3 Authority, providing the Head of the Operations Directorate with recommendations, to help formulate the Directorate's policy in the field of force build-up in the IDF.
- ❑ Constitute the Analytical – Operational Authority of J3, to assess and validate IDF Concepts and Plans, through Simulation.
- ❑ Ongoing Development of Methodologies and Knowledge in the fields of Concept and force build-up.

Concepts Laboratory - Methodological Concept



Operational Simulation Methodology



The Goal

- ❑ Evaluate the rate of the operational change while comparing various variable changes on the overall operational combat result.
- ❑ This provides decision support layer to decision makers.

The Method

- ❑ Comparison Simulation – an Operational comparison between a Base scenario and a modified scenario.
- ❑ The Main Platform is the King's Game Platform.

Operational Simulation Methodology

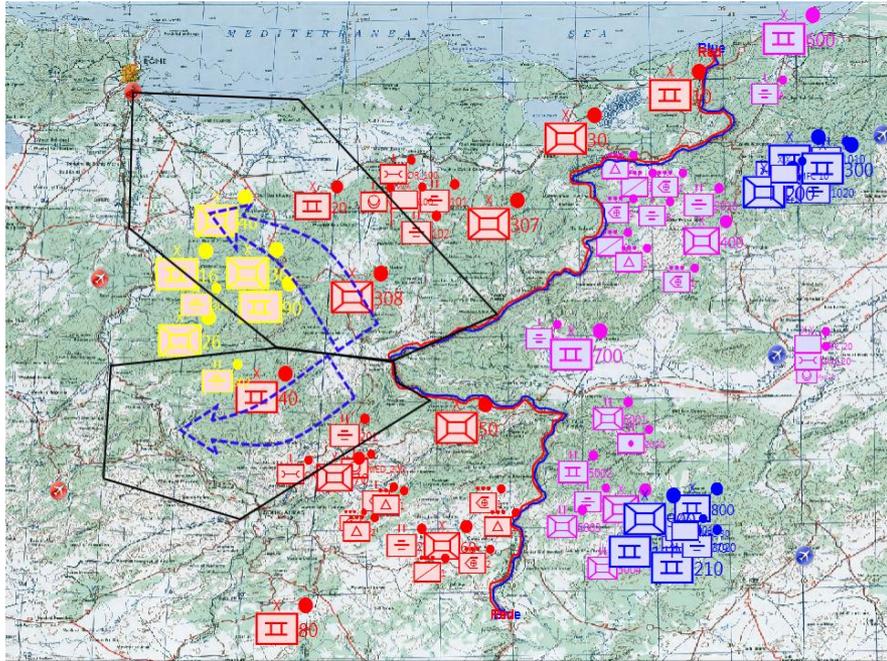


- ❑ Basic Scenario Simulation – no human interference in the system
 - ❑ Freeze the Basic scenario simulation
 - ❑ Define decision variables (different procedure, weapon system etc.)
 - ❑ Simulate discrete decision variables (one at a time) to compare with base scenario
-
- ❑ Each scenario is examined in relation to the following parameters:
 - ❑ The overall geographical operation situation
 - ❑ Casualties, Equipment damage and infrastructure destruction of Our force
 - ❑ Casualties, Equipment damage and infrastructure destruction of the Enemy

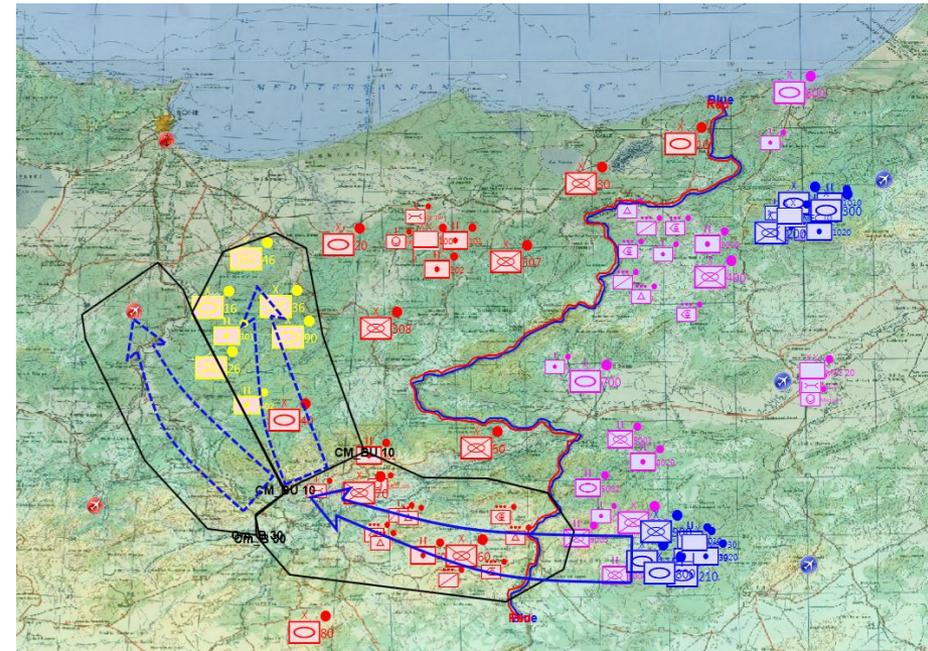
Operational Simulation – Comparison Between Two Scenarios



Base Scenario



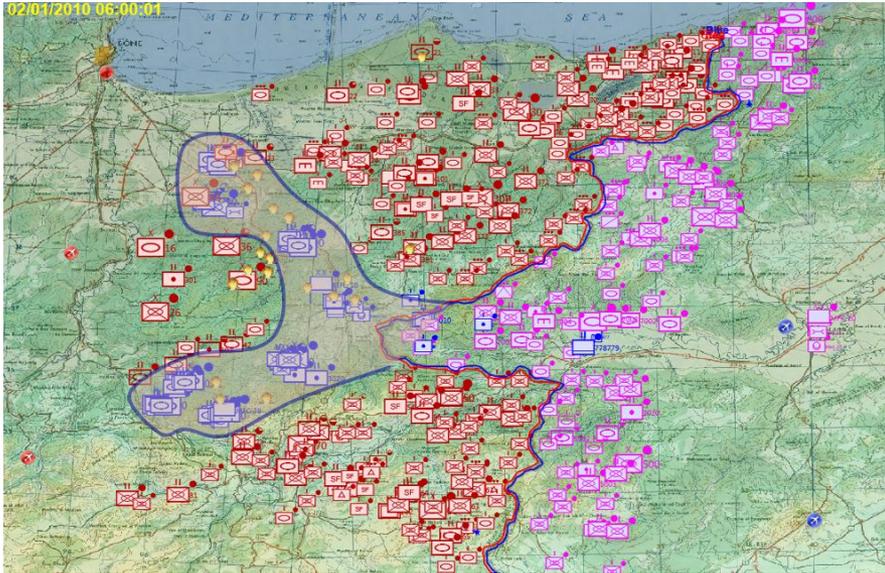
Evaluated Scenario



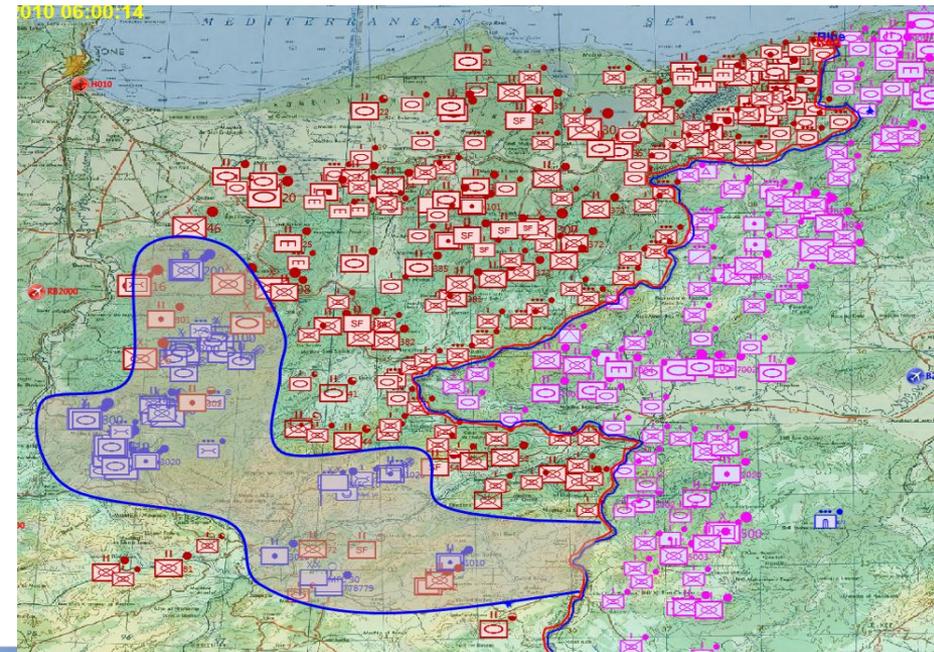
Operational Simulation Ground Position H+24



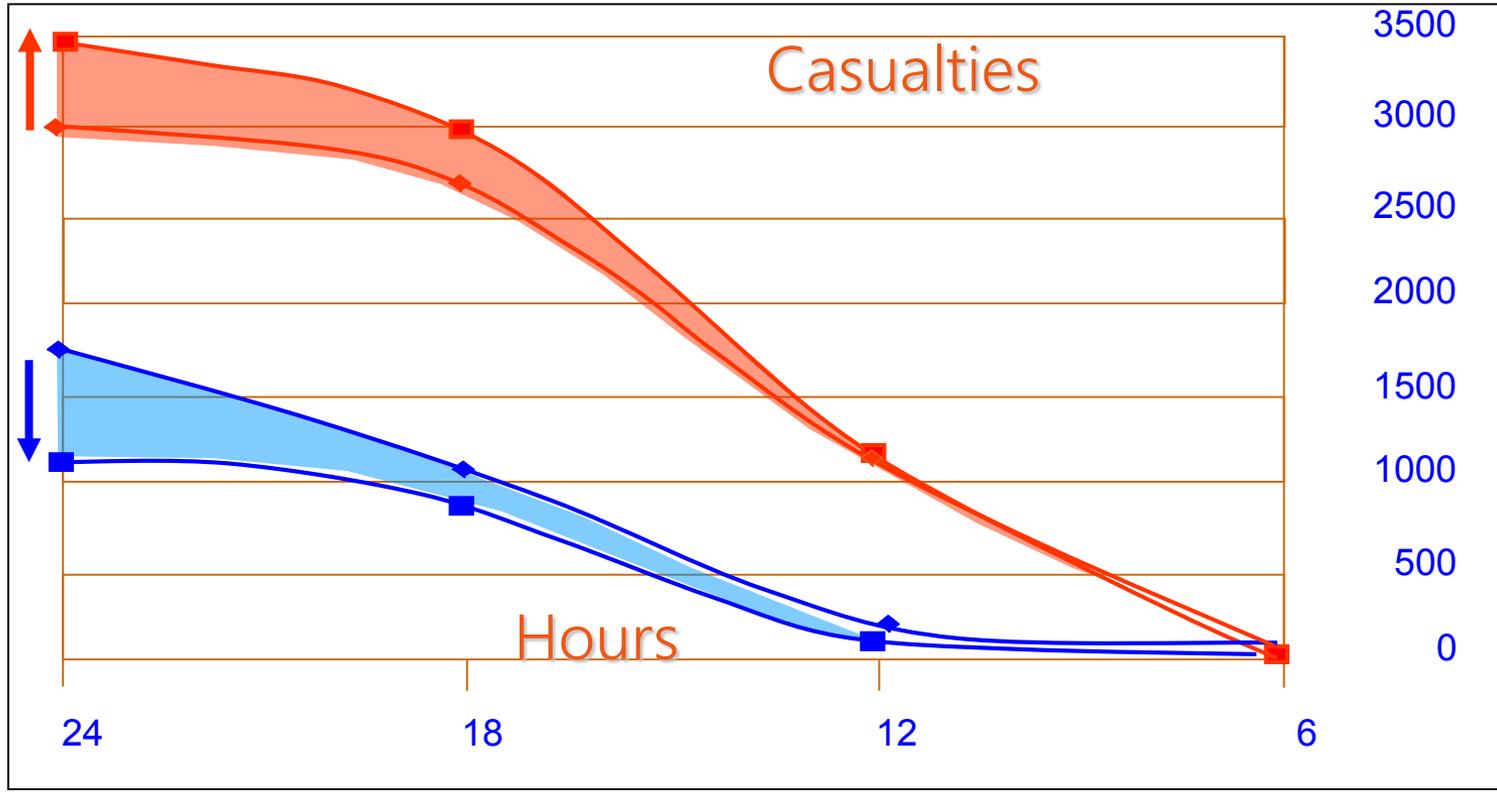
Base Scenario



Evaluated Scenario



Casualties Comparison H+24



Decrease of Blue Force casualties of 35% (~600)

Increase of Red Force casualties of 15% (~500)



King's Game Arena Generator

General Description



King's Game is a simulation system based on military drills and doctrine, physical behavior models and operations research models to create a realistic combat situation picture which integrates all elements of combat land, air and sea from a single combat element to the general staff headquarters.



General Description

- ❑ Create hierarchic operational order of battle which define the chain of command
- ❑ Automatic combat model for commands and control (C2) in all military forms of war
- ❑ Interfaces for command and control communication systems (C4i)
- ❑ Simulate a complex war gaming for all the corps
- ❑ HLA / DIS communication support
- ❑ Multi user interface

What it can be used for?

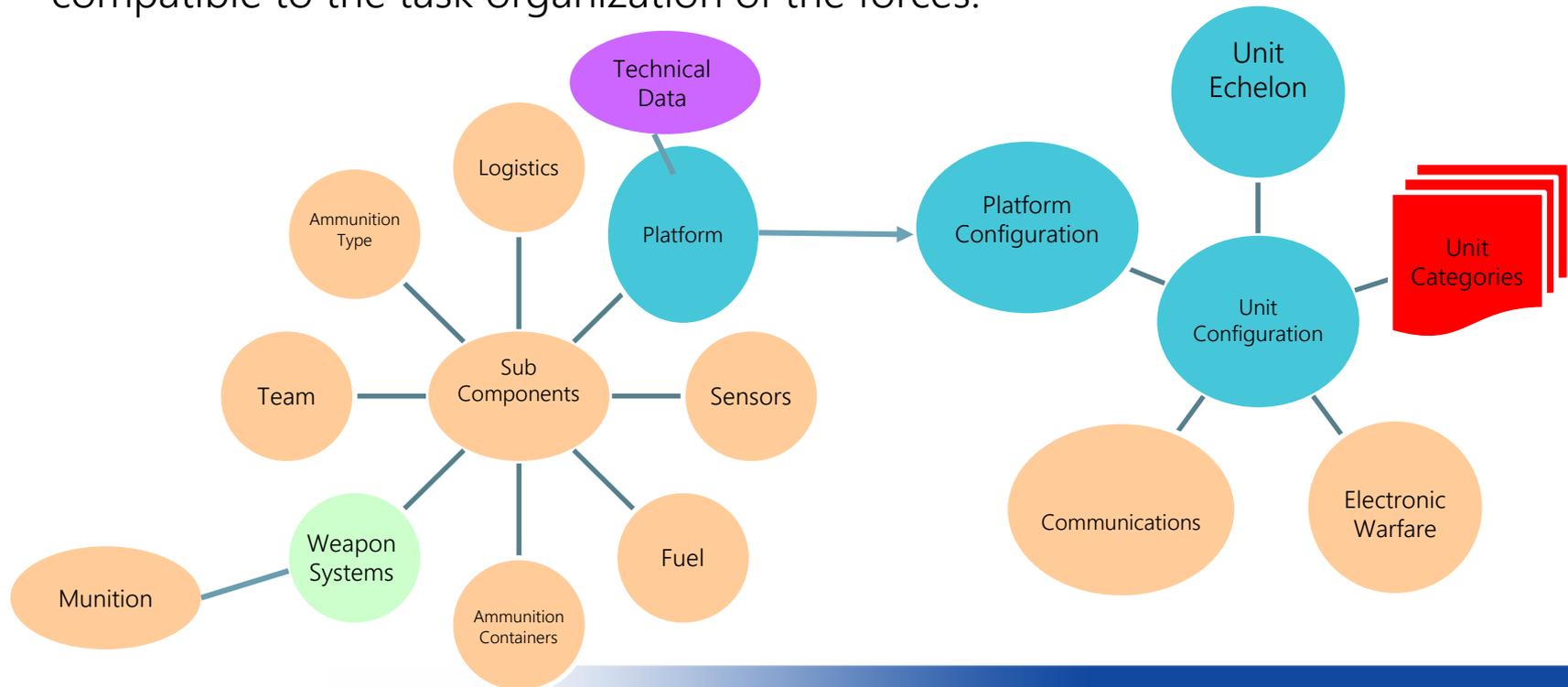


- ❑ Concept analysis Simulation
- ❑ Commanders and their staff officers for analysis of operational plans for decision making (DSS)
- ❑ Senior operational planning team for assessments and research
- ❑ Senior commander trainee qualifications
- ❑ Arena generator for tactical simulation

Entities Structure & Force Hierarchy



- ❑ The ability to simulate military forces from the individual component in the field and through to the General HQ, in a simple and quick fashion.
- ❑ The Creation of an Operational Hierarchy within the Force Hierarchy that is compatible to the task organization of the forces.

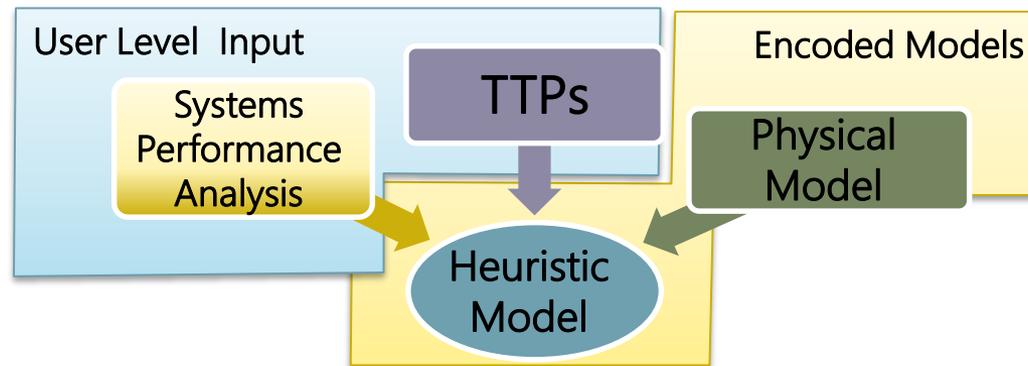


The Mathematical Model



- ❑ To allow for an automatic modeling of an arena, the “King’s Game” system makes use of multiple mathematical models Hierarchically, and with accordance to the entities’ attributes (Echelon, Soldier, Combat Technique etc.).

Fundamental Structure of Individual Model



Heuristic: A Problem Solving Technique which makes use of deep analysis and ongoing trial and error in different scenarios

Information Injected into Simulation

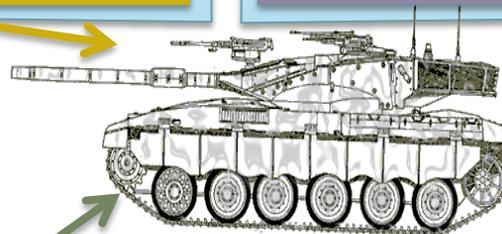


Performance Analysis (Weapon System)

- 1) Fault Percentage
- 2) Penetration and Damage Levels with Contrast to different targets

Lessons learned from previous wars and Operations TTPs

- 1) Time spent at each firing positions based upon the Combat Technique
- 2) Rate of Fire based upon the Combat Technique
- 3) Quantity and Type of ammunition available



Physical Models (Weapon System)

- 1) Minimum and Maximum range
- 2) Ballistic Trajectory
- 3) Ballistic Dispersion

Performance Analysis (Platform)

- 1) Fuel Consumption
- 2) Incline Performance
- 3) MTBF for Components

King's Game Data Structure



- ❑ The King's Game simulator data is built from the single component and through to the combat task force.
- ❑ King's Game supports several countries, each country has personalized doctrine behavior, order of battle and operational orders.

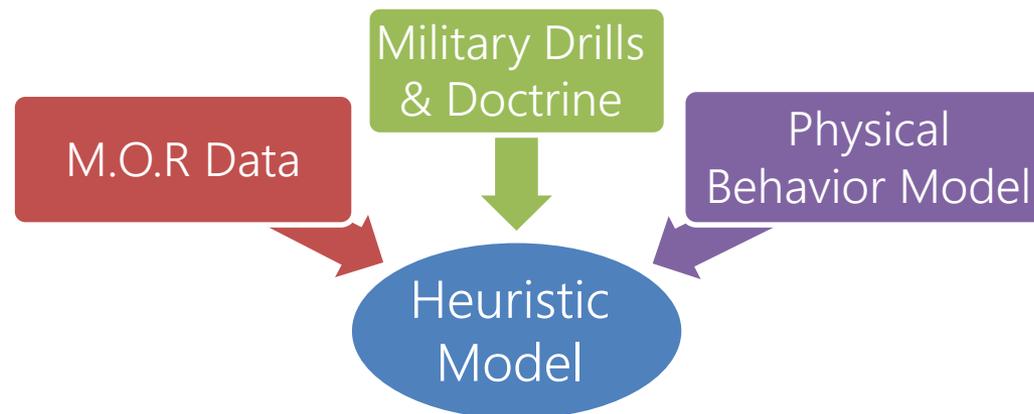


King's Game Basic Model



King's Game simulation based on military operational research (M.O.R) data, Military drills & doctrine and entity physical behavior, those parameters join together to define a specific state in heuristic model

Single Heuristic Model Structure



The Military Operation Simulation Summit



Challenges of using Modeling & Simulation for Force Deployment and Force Build-up

The Idea

- ❑ The Laboratory has developed a comprehensive approach to examining a variety of questions relating force build-up and force deployment.
- ❑ The Laboratory intends to create a community with which it can share and gain this knowledge with.
- ❑ The main component to creating this community is the International Simulation Summit that will take place during November 2019.

The Military Operation Simulation Summit



❑ Main Content:

- ❑ Challenges of force build-up
- ❑ Challenges of force deployment
- ❑ The Operational Simulation
 - Advantages & Risks
 - Application Techniques in the force build-up & force deployment processes
 - Trends and Developments

❑ Target Audience:

- ❑ Commanders and those in similar roles in parallel Labs, Military & Civilian
- ❑ Commanders and those in roles responsible for force build-up and force deployment
- ❑ Academic Professionals in the field of M&S force build-up and force deployment
- ❑ Industrial Professionals in the field of M&S, force build-up and force deployment

Initial Agenda



□ Tuesday, November 12th 2019 – Day I

- 08:00 – 09:00 Gathering
- 09:00 – 09:15 Opening Remarks
- 09:15 – 09:45 Opening Lecture (Senior Figure)
- 09:45 – 11:00 Panel I
- 11:00 – 11:30 Break
- 11:30 – 12:45 Panel II
- 12:45 – 13:45 Lunch
- 13:45 – 14:15 Professional Lecture
- 14:15 – 15:30 Panel III
- 15:30 – 15:50 Break
- 15:50 – 16:20 Closing Remarks
- Dispersal
- 20:00 Group Evening – TBD

Initial Agenda



□ Wednesday, November 13th 2019 – Day II

Similar to Day I, Finish 16:20

□ Thursday, November 14th 2019 – Day III

Tour of main area of IDF activity



Speaking Opportunities are Available



Proposal for Cooperation

Future GTG Cooperation



- ❑ The IDF Concepts Laboratory is open to international cooperation with similar Laboratories in other militaries.
- ❑ Purpose of Cooperation - Advance mutual learning with regard to tools, research techniques, lessons learned and implementation of simulations with regard to force build – up and force deployment.



Future GTG Cooperation

Joint Meetings

- Individuals from both laboratories – mutual presentation of laboratories: purpose and goals, tools (hardware & software), research and analysis methods, as well as presentation techniques

Follow up

- Professional discussions and maintenance of continuous contact via email and conference calls.

Selection of Relevant Topics

- Relevance to both militaries. Example – operation of an Infantry Brigade in an attack in open field.

Future GTG Cooperation



Joint Experiments

- Selection of Area to conduct experiment, in Israel, partner country or alternatively anywhere in the world.
- Selection and Initialization of the "Red Force" and its absorption in the "King's Game" system:
- Entities (Combatants & Weapons)
- Capabilities
- Deployment and Layout of Forces in selected area
- Operating Models in the area of Military Tactics and Practices
- Probabilities of On-Target-Strike & Injuries

Absorption of IDF's "Blue Force" in the "King's Game" System:

- Entities (Combatants & Weapons)
- Capabilities
- Deployment and Layout of Forces in selected area
- Operating Models in the area of Military Tactics and Practices
- Probabilities of On-Target-Strike & Injuries

Absorption of Partner's "Blue Force" in the "King's Game" System:

- Entities (Combatants & Weapons)
- Capabilities
- Deployment and Layout of Forces in selected area
- Operating Models in the area of Military Tactics and Practices
- Probabilities of On-Target-Strike & Injuries

Future GTG Cooperation



- ❑ Conducting a comparative experiment in the following stages:
 - Run-up of base scenario - The IDF “Blue Force” vs “Red Force” that was chosen for 24/48H of Operation.
 - Run-up of base scenario - The Foreign Military “Blue Force” vs “Red Force” that was chosen for 24/48H of Operation.
 - Assessment of outcome and the changes that were made between both scenarios – with regard to Area that was captured, the number of casualties among the fighters and means, on the timeline and in the cut of the severity of the injury, to the “Red Force” and to the “Blue Force”.
 - Assessment of Implications based upon findings. It is expected that the results enable us to identify the pros and cons of the “Blue Force” by comparing them to a fixed enemy.
- ❑ The level of Classification for the exercise is to be determined in partnership and will be implemented accordingly.



Questions?



We look forward to seeing you and your
colleagues in the upcoming Operational Simulation
Summit in November 2019!