Wargaming and AI: An Update and an Appeal

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18 May 2024

Outline: An Update and an Appeal

CAMPAIGN OF LEARNING

NAVY ANALYTIC MASTER PLAN & THE CYCLE OF RESEARCH

ENHANCING ADJUDICATION

NEXT-GEN WARGAMING

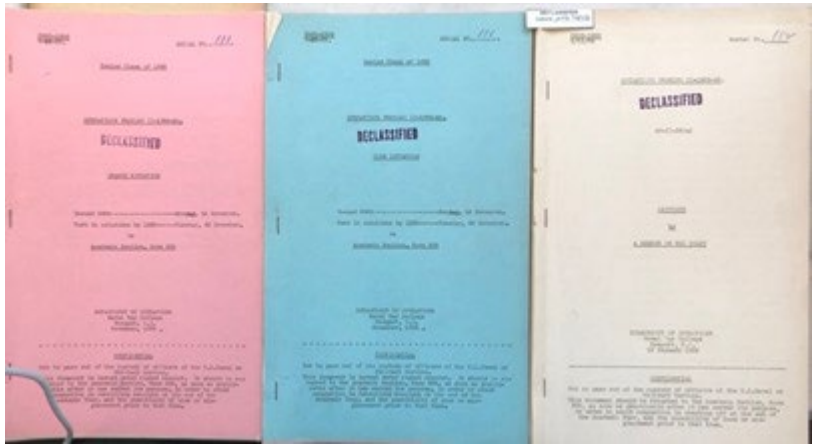
NEW PARTNERSHIPS

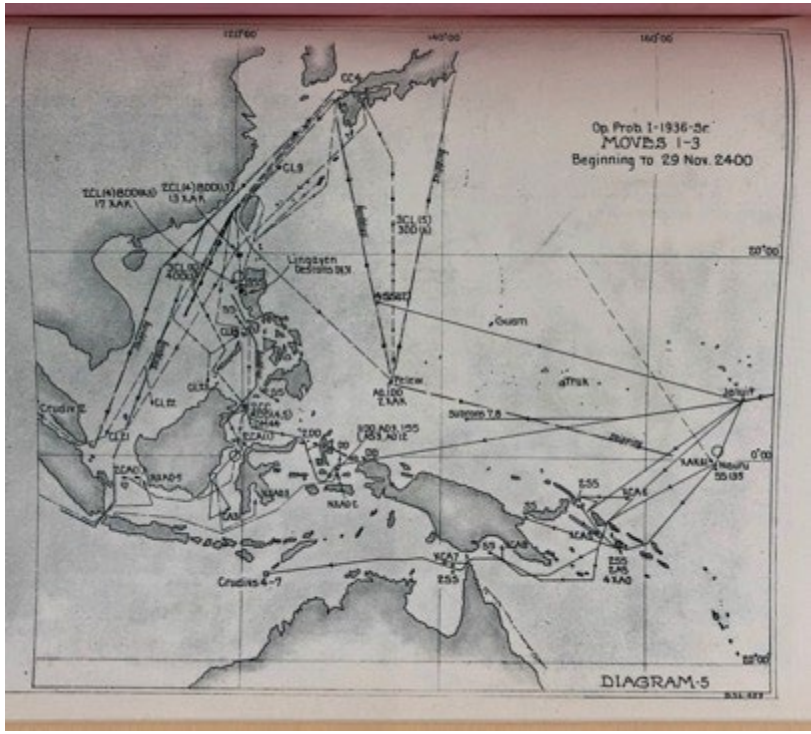
Campaign of Learning

The U.S. Navy as a “Learning System”: the individual, the unit, the institution

The Interwar Learning System (Hone, *Learning War*)

- "Learning System": OPNAV, NWC, and the Fleets
- Naval War College underpinned the framework:
  - War games
  - Analytical training in the *estimate of the situation*
  - Orders writing
  - War planning
- War games fostered a shared conceptual framework
- Plans → War Games → Fleet Battle Problems





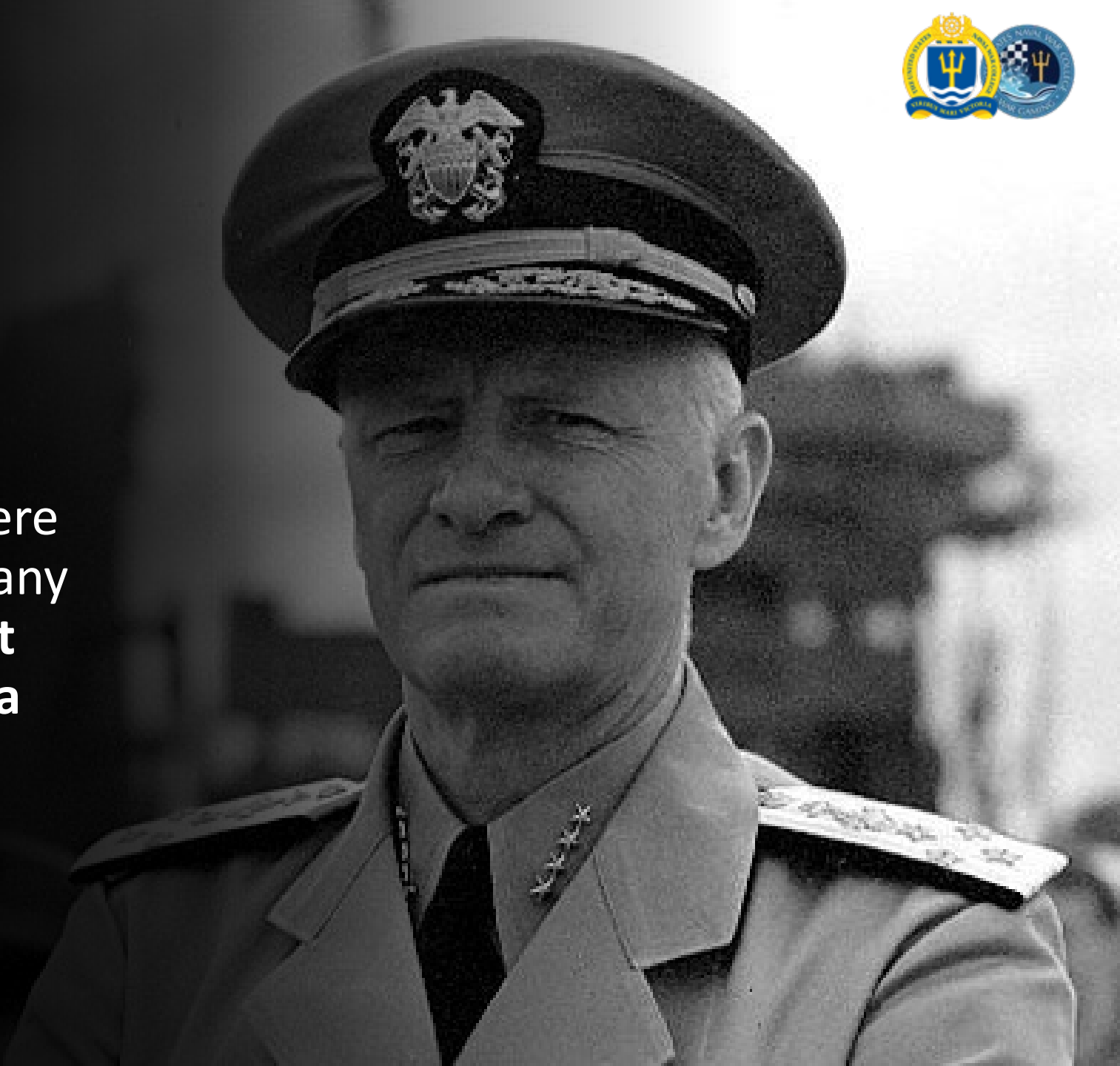
NWC 1936 Operations Problem

War Games Develop a “Habit of Mind”

“The war with Japan had been [enacted] in the game rooms here by so many people and in so many different ways that **nothing that happened during the war was a surprise** […] absolutely nothing except the kamikaze tactics.”

Fleet Admiral Chester Nimitz, U.S. Navy

Naval War College, 10 Oct 1960



Navy Analytic Master Plan & the Cycle of Research

DCNO N7: “War games are the ‘backbone’ of the analytic master plan”

Cycles of Research Drive the Analytic Master Plan

Intelligence (ONI)

Studies (DCNO N7)

War Games (Naval War College)

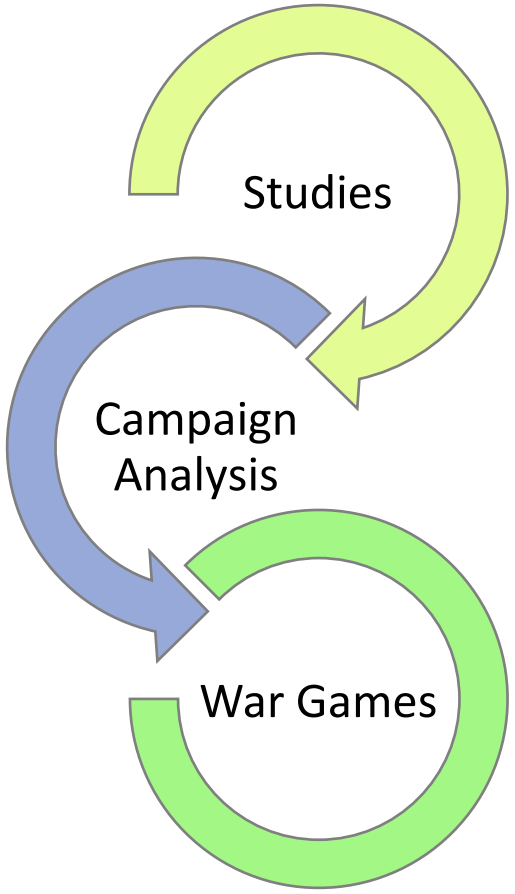
Exercises (USFF/CPF)

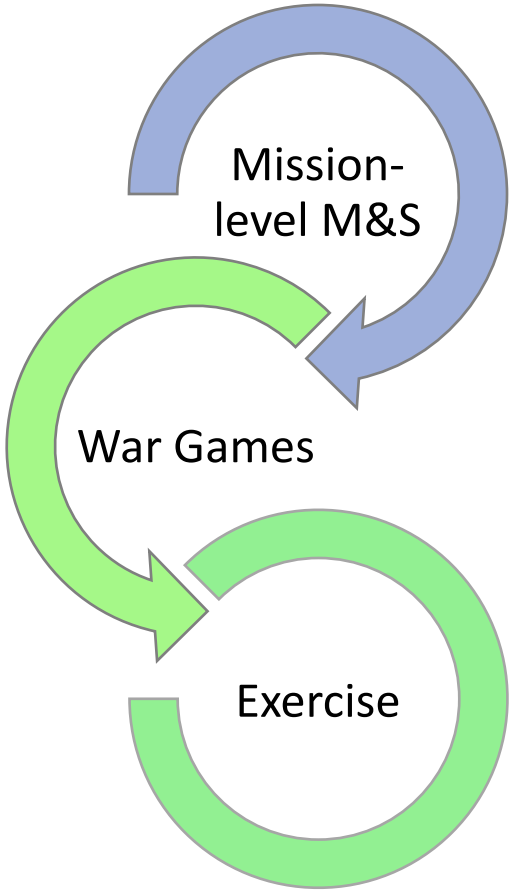
Experiments (NWDC)

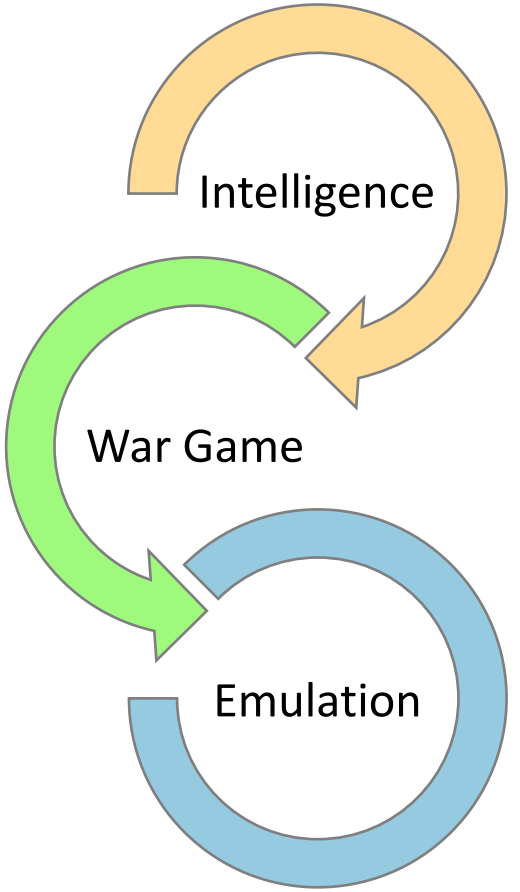
Test & Evaluation (OPTEVFOR)

Emulations (OPNAV N7)

Modeling & **S**imulation (NMSO)







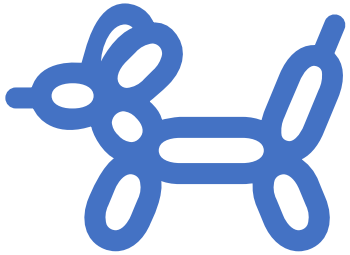
"ISWEETEMS"
OPNAVINST F5420.120

Enhancing Adjudication

Enhancing SME-based adjudication with Modeling and Simulation (M&S)

“This adjudication is B.S.!”

“Construct a believable story”



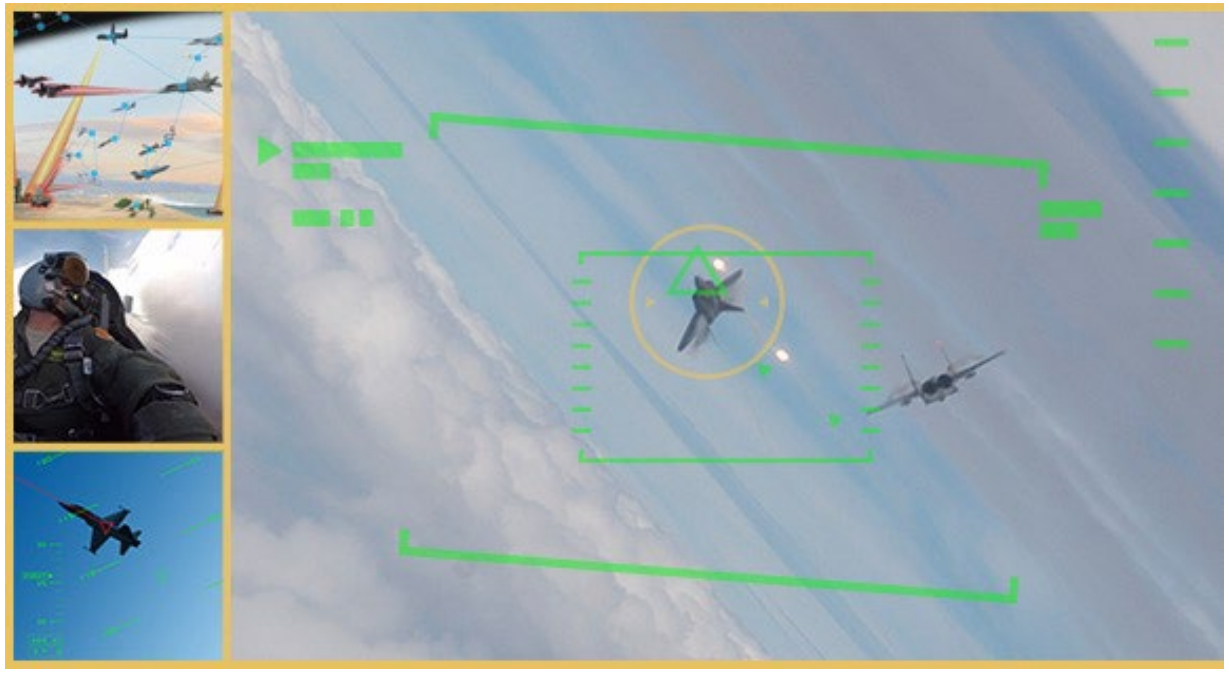
Wargaming can ”transform its participants”

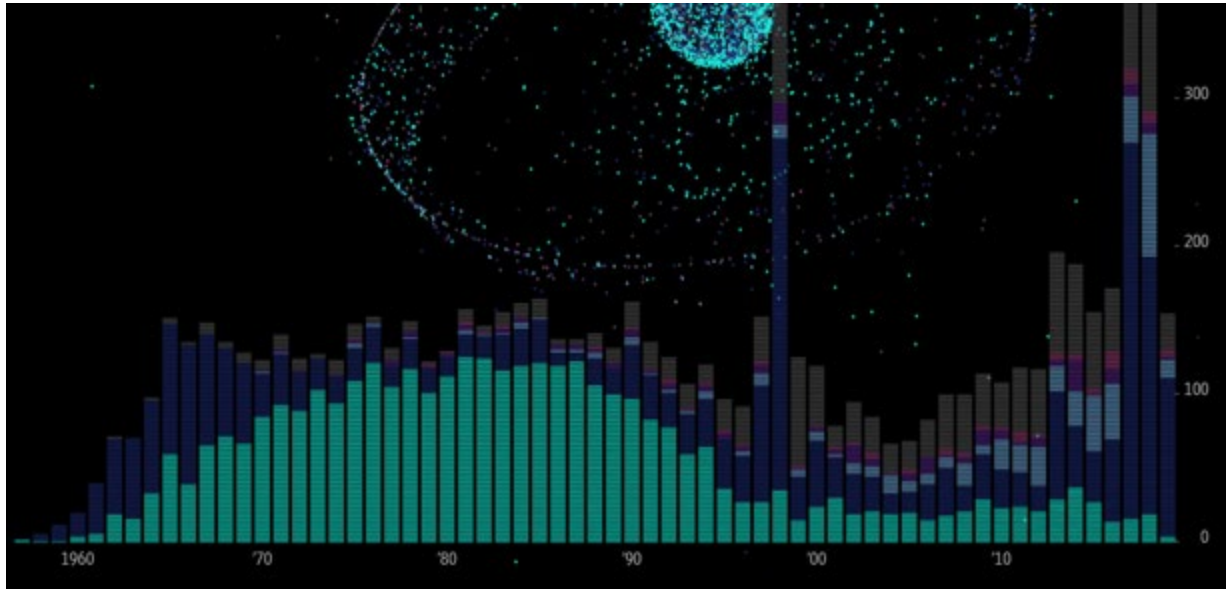
“Story-living”

“participatory narrative experience”

Perla and McGrady, “Why Wargaming Works,” NWCR 2011

Interwar Period 1930s

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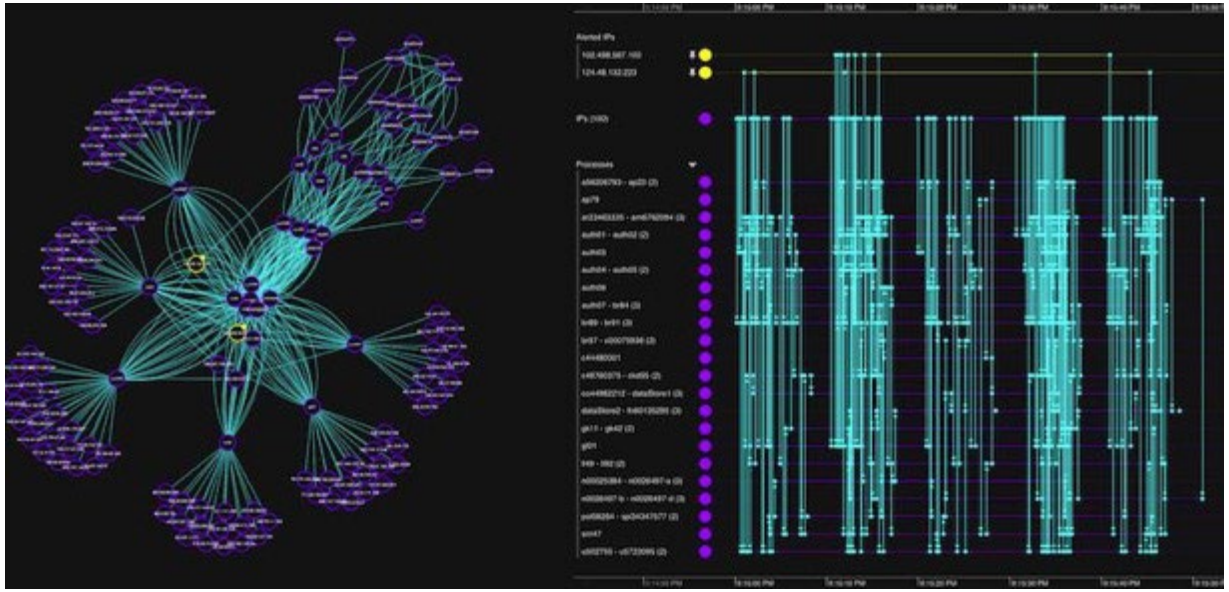


NWC War Gaming Research Forum Overview

Problem: A **mismatch between player expectation and game adjudication outcomes** causes players to question the usefulness of game play to make analytic decisions and inform real-world decisions.

Purpose: To **develop an adjudication framework for key battle engagements** and to support creation of NWC's *War Gaming Adjudication Guide* to enhance SME-based adjudication in future war games.
Increase transparency in war gaming adjudication by *explicitly stating methodology* used to obtain adjudication results.

Key Partners:

- **SYSCOM Warfare Centers (WC)** e.g., NAVSEA – NUWC/NSWC, NAVAIR - NAWC, NAVWAR – NIWC, and
- **Warfighting Development Centers (WDC)** e.g., NAWDC, NSMWDC, NIWDC, NUWDC
- **Office of Naval Intelligence** (ONI)

Objectives:

1. Identify and prioritize **key engagements** and mission threads
2. Identify by mission the **factors that influence** the **distribution of outcomes** for a given engagement or mission
3. Identify the relevant **warfighting function(s)** (e.g., ISR, C2, etc.) contribution when using Relative Combat Power Analysis (RCPA) to determine the likely outcome of an engagement (e.g., AAW, SUW, USW, etc.)
4. **Engage appropriate members of the AMP** for information sharing and potential collaboration; **leverage the AMP-DP** as an information-sharing repository at multiple levels of classification
5. Build **relationships** among SMEs from **Warfare Center** and **Warfighting Development Center** in support of a cycle of research that supports a campaign of learning
6. **Institutionalize** a recurring adjudication-focused Research Forum, similar to annual NATOPS conferences

Adjudication Workshop Sessions

See notes section

Primary Engagements of Interest

1. ASCM vs. Defending Ships (SUW/AAW)
2. ASBM vs. Defending Ships (SUW/AAW/BMD)
3. Bombers w/ Escorts vs. Defending Fighters (AAW)
4. Bombers vs. Defending Ships (AAW)
5. MARPAT vs. Defending Submarine (ASW)
6. M/SRBM vs. Ground Targets (STK)
7. LACM vs. Ground Targets (STK)

Secondary Engagements of Interest

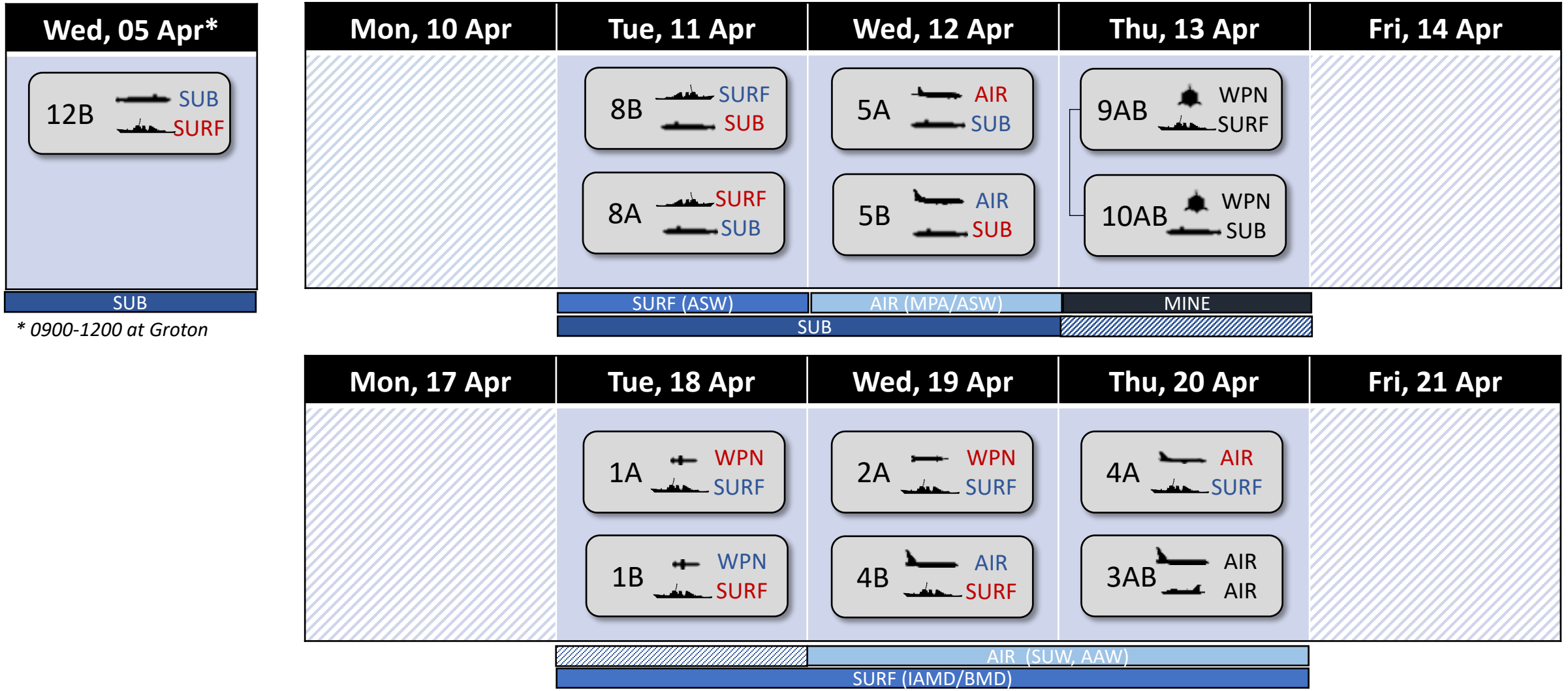
8. Ships vs. Defending Submarines (ASW)
9. Mines vs. Ships (MIW)
10. Mines vs. Submarines (MIW)
11. Submarine vs. Submarine (ASW)
12. Submarine vs. Ships (SUW)
13. Ground vs. Ground (STK)

Offensive vs. Defensive

A. Red vs. Blue
B. Blue vs. Red

All workshops in Sims Hall

C-110, C-112 0800-1630



Workshop: Key Outputs for 2024

Improved reference resource list

Updated format for structuring data – more operational, less tactical/technical

Added area denial improvements for Global 19

Two new engagements: missiles v ground and sub v sub

Updated M&S Catalog

Next-Gen Wargaming

Vision 2030: Future Warfighting Center

Target Condition: Next-Gen Wargaming

COMPACFLT 2022: **Bring "cutting-edge computing technology to the process [to increase] fidelity and confidence in move results and create a repeatable means to analyze war game outcomes across analytic pillars."**

"Step Change": Progress toward the target condition

- Data. NWC established an annual Adjudication Research Forum to inform game adjudication rules – 55 SMEs, 20 commands, 13 scenarios

- Tools. Global 17 featured seven (7) new M&S tools from Joint commands, Navy Warfare Centers, and Federally Funded Research and Development Centers

- Partnerships. Share information & best practices with other Service Title 10 wargaming centers

Target Condition: Next-Gen Wargaming

COMPACFLT 2022: **Bring "cutting-edge computing technology to the process [to increase] fidelity and confidence in move results and create a repeatable means to analyze war game outcomes across analytic pillars."**

CNO 2023: **"Develop a comprehensive plan to build a scalable, reconfigurable, human-centric, technology-enabled, next-generation war gaming capability at all classification levels. Leverage high-speed computing, artificial intelligence, machine learning, and other relevant technologies to enable in-stride modeling and simulation alongside traditional analysis tools."**

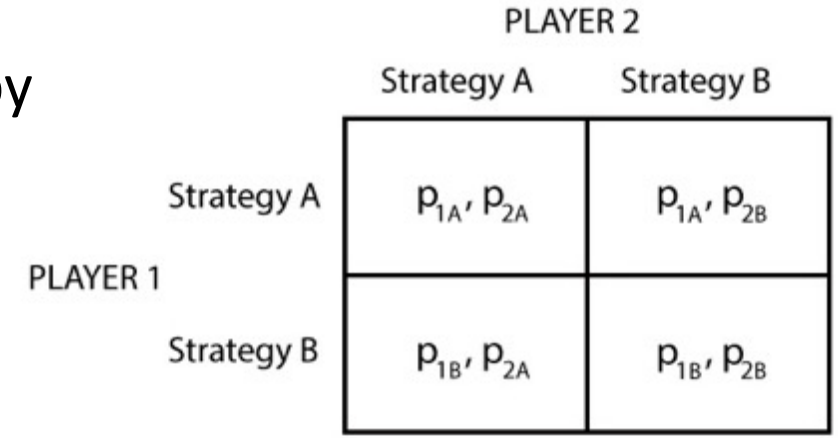
New Partnerships

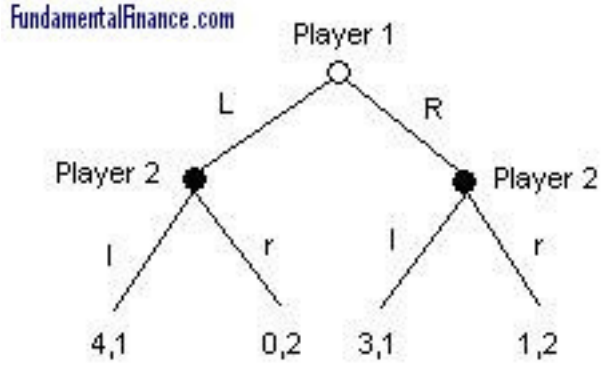
Artificial Intelligence with MIT-Lincoln Laboratory (FFRDC)

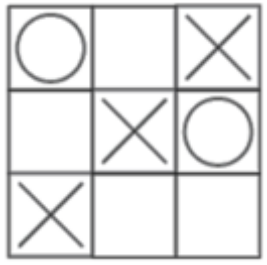
ML and Games

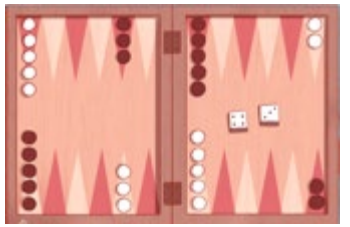
Game Theory: A game is defined by

- Players
- Strategies
- Payoffs/Utility functions
- Information







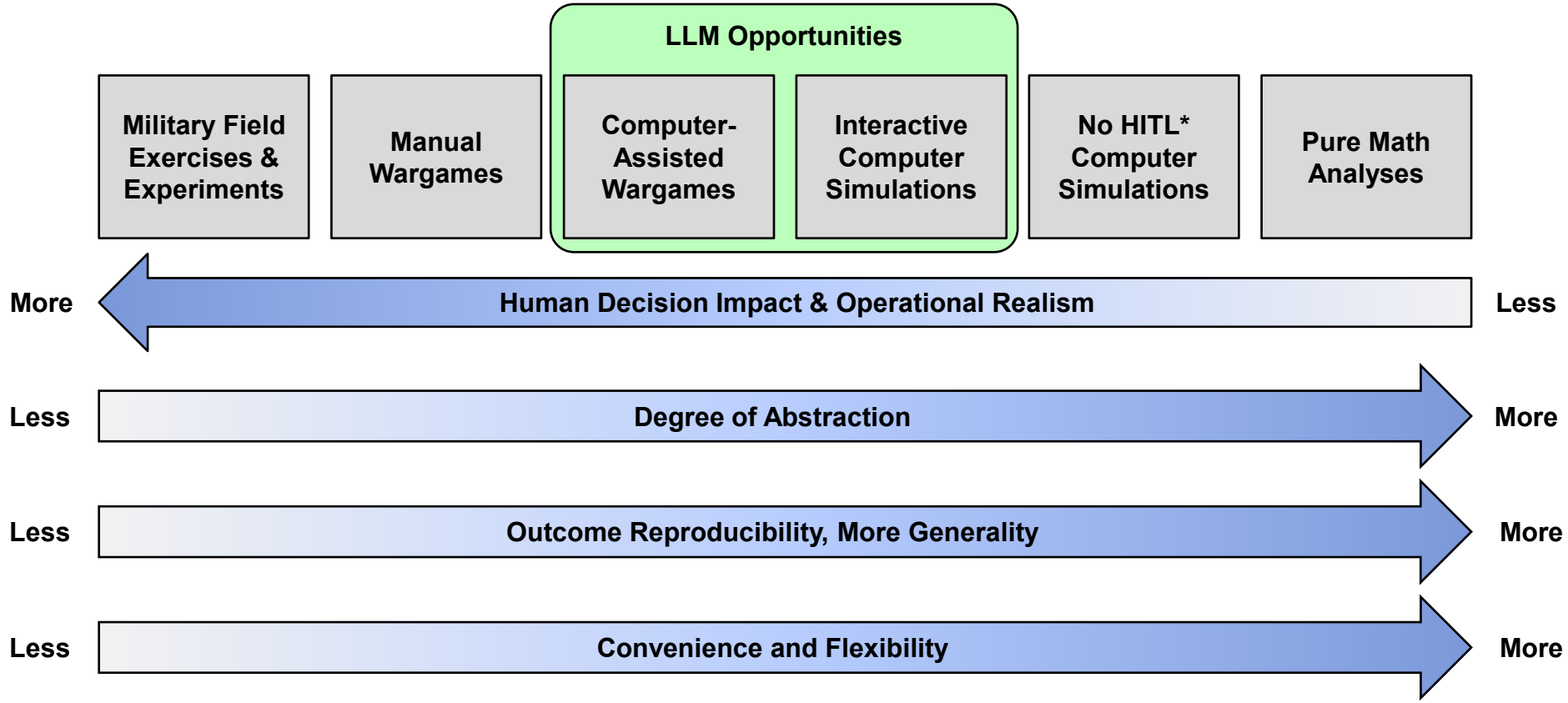


Positions	9	42	36	64	28	361
Possible Moves	10^3	10^{13}	10^{20}	10^{47}	10^{20}	10^{170}
Total Games Possible	10^5	10^{21}	10^{31}	10^{123}	10^{144}	10^{360}
Branching Factor	4	4	2.8	31 - 35	250	250

IBM Watson

AlphaGo

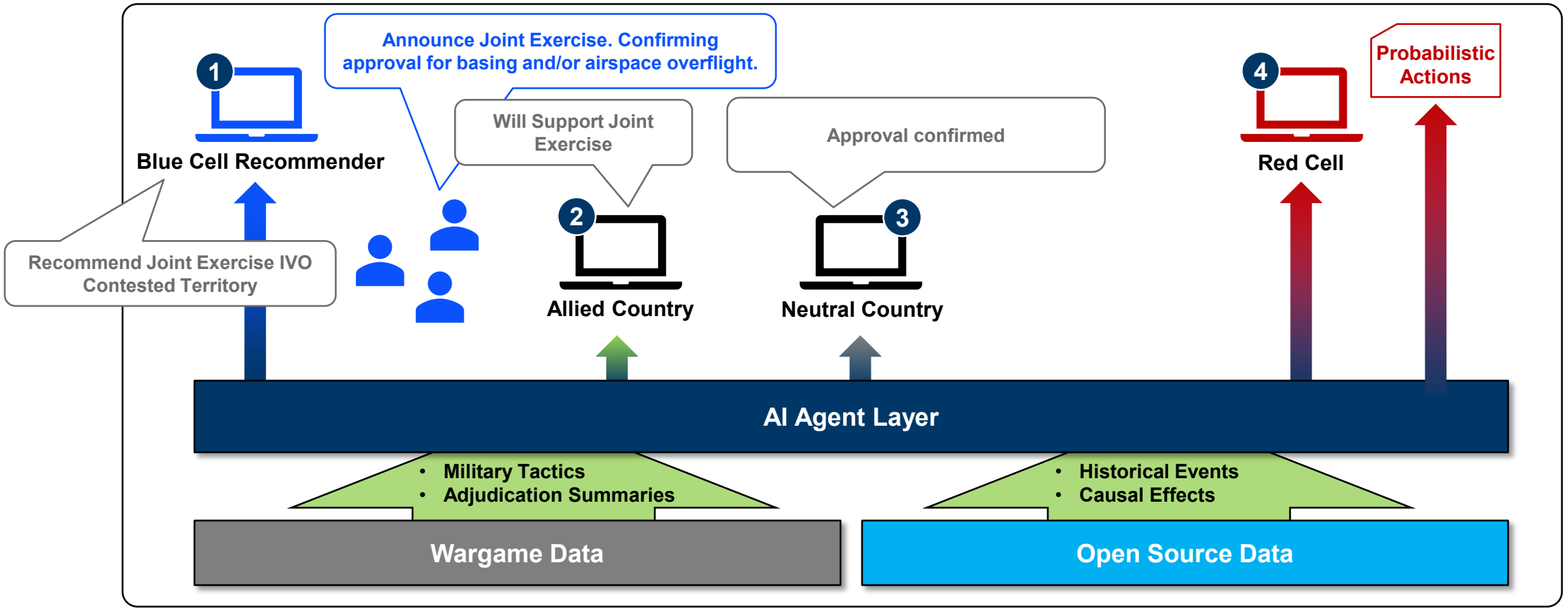
Exercise, Wargame, and Experiment Spectrum



LLMs can significantly improve wargames to achieve balance in realism, cost, convenience and reproducibility

*** HITL: Human in the Loop**

Human-informed AI Capabilities for Wargaming



AI-assisted emulation options augment efficiency and speed of wargame scenarios

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