

PHALANX

The Magazine of National Security Analysis | Spring 2026



Volume 59, Number 1

In This Issue:

- AI-enabled Analysis
- Treatment of Time
- In Memoriam: E.B. Vandiver, III

In This Issue

MORS

2..... MORS President: People. Partners. Profession.
Foundations for Tomorrow's Success.

6.....Six Decades of Analytics in Service

8.....Highlighting Women in OR and Their Achievements

Professional Features

12..... From Voice to Insight: AI-assisted Analysis
of Soldier Experimentation Recordings

18.....Game Design the Red Team Way

26.....Decision Advantage: The Treatment of Time

In Touch

32.....In Memoriam: E.B. Vandiver, III

34.....MORS Young Analyst

36.....Upcoming Events



Phalanx Staff

Editor: Mr. Harrison Schramm, *Schramm and Associates*, phalanx@mors.org

Production Editor: Ms. Joan Taylor, *MORS*,
joan@mors.org

Graphic Design/Layout: Mr. Romain Falloux, *MORS*,
romain.falloux@mors.org

Department Editors

Dr. Greg Parlier
NCSU and GH Parlier Consulting
Naval Analysis, Dr. Brian G. McCue, *CNA*,
brianmccue@alum.mit.edu

Letters to the Editor, *MORS Office*,
morsoffice@mors.org

Modeling and Simulation, Mr. James N. Bexfield, *FS*,
jim_bexfield@comcast.net

Numbers from Operations, Mr. George W.S. Kuhn,
Operations Patterns Analytics LLC,
gwskuhn@gmail.com

Book Reviews

Mr. Nick Ulmer, *CANA, LLC*,
nicholasulmer@gmail.com

MORS Publications Committee

(Chair) Dr. Jefferson Huang, *Naval Postgraduate School*

Mr. Scott Cohick, *CANA, LLC*

Dr. John Curry, *Bath Spa University*

LTC John Ferguson, *Center for Army Analysis*

Mr. Mike Garrambone, *FS, DCS Corporation*

Mr. Michael Kierzewski, *DEVCOM Chemical Biological Center*

Dr. Mike Kwinn, *FS, University of Arizona*

Dr. Ed McGrady, *CNAS*

Mr. Terry McKearney, *The Ranger Group*

Dr. Ed Pohl, *University of Arkansas*

Dr. Les Servi, *MITRE*

Ms. Sheilah Simberg, *FS, DEVCOM Army Research Laboratory*

Mr. Michael Warme, *Center for Army Analysis*

Ms. Melissa Wickers, *US Marine Corps Operations Analysis Directorate*

Dr. Fred Woodaman, *MITRE*



1550 Wilson Boulevard
Suite 700
Arlington, VA 22209
(703) 933-9070; FAX (703) 933-9066
e-mail: morsoffice@mors.org
www.mors.org

MORS Officers

PRESIDENT

Mr. Nick Ulmer
CANA, LLC

PRESIDENT ELECT

LTC Jaison Desai, Ph.D.
United States Army Reserve

VICE PRESIDENT (FINANCE AND MANAGEMENT)

Mr. Walt DeGrange
CANA, LLC

VICE PRESIDENT (MEETING OPERATIONS)

Lt Col Amanda Gustave
SHAPE (NATO)

VICE PRESIDENT (PROFESSIONAL DEVELOPMENT)

LTC John Ferguson
Center for Army Analysis

IMMEDIATE PAST PRESIDENT

Ms. Sarah Stewart
Center for Army Analysis

SECRETARY OF THE SOCIETY

Dr. Alicia Sudol
Lockheed Martin

CHIEF EXECUTIVE OFFICER

Ms. Jennifer A. Ferat
Military Operations Research Society
jennifer.ferat@mors.org

The *Phalanx* (ISSN 0195-1920) is published quarterly, \$85.00 for one year (U.S. rates) by the Military Operations Research Society. Principal office: 1550 Wilson Blvd., Ste. 700, Arlington, Virginia 22209. Periodicals postage paid at Arlington, and at additional mailing offices. POSTMASTER: Send address changes to *Phalanx*, 1550 Wilson Blvd., Ste. 700, Arlington, VA 22209. Please allow 4-6 weeks for address change activation.



Printed
On Recycled
Paper

DISCLAIMER: MORS is a professional society for people, not organizations. As such, the articles published in *Phalanx* represent the professional views and judgments of individuals independent of the organization that may employ them or contract for their services. Except where specifically identified, statements and opinions do not necessarily reflect policies or positions of the Department of Defense or any other agency of the US Government.

© 2026, Military Operations Research Society.



[The First Word]

Mr. Harrison Schramm, *Phalanx* Editor

Against the backdrop of AI advertisements flooding the Pentagon Metro Stations, I was asked what the difference is between having a very competent human assistant and an AI assistant with similar capability. On the surface they are the same, right? Right?

My response was that the key difference lies in what computer science types call 'BIOS'—built-in operating system. Any human assistant, no matter their level of competence, has some level of relatability. For example, they know what it's like to be with other humans, to give and receive affection. Barring that, they know what it's like to be hungry, thirsty, tired. In short, they know what it's like to be human. Future generations will look back upon this time in our history and see the explosion of large language models (LLMs) not as a statement of technology but rather an extensive examination of what it means to be human.

Some years ago, I proclaimed myself to be a "Carbon Supremacist," meaning that I would always prefer living (i.e., carbon-based) intellect over artificial (i.e., silicon/gallium) intellect, and furthermore, this is not an analytic statement but rather an emotional one. It's okay to be irrational so long as you own it. As I see the overwhelming market share that all things AI are taking in our world, I am becoming more entrenched in this perspective.

I will present the following theorem without proof: If you pull the thread on any human's action far enough, eventually it will be about an interaction with another human. For example, I'm writing this for the consumption of other humans—and also to stay in the good graces of the Executive Committee and *Phalanx* Team. There is no requirement that the other humans we are motivated by be known to us or even living. We give—and receive—from each other purpose and meaning.

An AI will never know what it's like to be human, although they may try very hard to mimic it (DeepSeek, for example does this). As we approach the singularity of artificial general intelligence (AGI), we stand on the threshold of something that the world has never seen before: an intellect without the capability to relate to others, or—in a word—to love. It is not required to give or receive love to be capable of it.

To be afflicted with the ability to reason with no purpose is a hell second only to being governed by such.

Till next time,



Harrison

PS: Your article is late!

MORS

PRESIDENT



People. Partners. Profession. Foundations for Tomorrow's Success.

Mr. Nick Ulmer, President, Military Operations Research Society

In my first article this MORS year, we looked back—honoring 60 years of achievement and the resilient foundation MORS has built. In my second, we looked squarely at the present, at the energy and action happening across our community right now. This third article turns our eyes forward. The world continues moving fast, and not always in predictable directions. Yet I find myself more certain than ever that this community is exactly what our profession needs to navigate it.

The winds of change are real. As organizational priorities shift, the role of technology, including artificial intelligence, continues to evolve in ways that challenge even the most experienced analysts. All while the demands placed on the national security community have rarely felt more acute. Our community has faced hard moments in history before. MORS fortunately offers not fragility, but a foundation.

The Foundation Holds

At its core, MORS has always been about three things: People. Partners. Profession. These are not just words on a banner or a tagline for the annual Symposium. They are the substance of what makes this organization durable. When circumstances are uncertain, organizations without a genuine identity struggle to hold their footing. MORS does not have that problem.

The people of this community—analysts, researchers, educators, practitioners, students, and leaders—bring skill, integrity, and purpose to their work every day. Our partners across government, industry, academia, and international allies continue to invest in this community because they know what it stands for. And our profession itself—grounded in rigor, evidence, and honest analysis—is

precisely the kind of discipline the world needs more of, not less, when conditions are complex and the stakes are high.

Once more, paraphrasing the late Clayton Thomas, a MORS Fellow and Past President whose words appeared in the February 1983 *Phalanx*: MORS will survive because it is worthwhile, and when survival seems uncertain, we suddenly see its importance. That observation has not aged a day. If anything, it has grown more relevant.

What the AI Workshop Revealed

The Artificial Intelligence Workshop, co-hosted by Carnegie Mellon University and the RAND Corporation, was a vivid demonstration of this community at its best. Bringing together leading experts and practitioners across government, industry, and academia to grapple seriously with how AI reshapes analysis, decision-making, and uncertainty management—is not a passive exercise. That is a community choosing to lean in.

The conversations were not comfortable in the easy sense. They were honest. They surfaced genuine tensions between capability and caution, between speed and rigor,

between enthusiasm and ethics. That is exactly the kind of hard thinking our profession is built for. And MORS provided the space for it to happen, thoughtfully, rigorously, and with a clear eye on what matters: delivering better analysis for national security decision-making.

Our community cannot afford to observe change from a distance. As change happens, MORS must stay at the front of the conversations—not as uncritical champions, but as analysts who ask hard questions, demand evidence, and insist on understanding the assumptions underneath new technology and techniques.

The 94th Symposium: Where the Future Takes Shape

This summer's 94th MORS Symposium, at the United States Air Force Academy, is where analytical rigor and service to the nation are not in tension but are partners. The Symposium is not just an event to attend. It is a place to **build**. Working groups are where the real work of our community happens—where ideas are presented, critiqued, refined, and professional relationships forged. If you have been meaning to get more involved, the Symposium is the most direct path.



NC STATE Engineering

Preparing for a career
in **military operations
research?**

Interested in solving
real problems?

Choose your degree path at
go.ncsu.edu/militaryOR



Continued from page 2

How You Can Help Build the Future

The future of MORS is not something that happens to us. It is something we build together. The strength of this community has always come from the willingness of members to contribute—not just to attend, but to lead, to create, to teach, and to mentor. Here is how you can be part of what comes next.

- ▶ **Participate in Working Groups at the Symposium.** Working groups are an intellectual engine. They are where subject matter expertise meets collaboration and produces something greater than either could alone. If you have never led or joined a working group, this is the year to start.
- ▶ **Engage with MORS Communities.** Our communities—including five new ones—provide year-round forums for practitioners to share knowledge, debate methods, and push the boundaries of what operations research can do. Find the community where your work lives and make your voice heard.
- ▶ **Write Articles and Papers.** The *Phalanx* and MORS journals remain vital channels for sharing insight across the community. If you have done work worth knowing about—and you have—write it down. Your peers will benefit from it, and the profession will be stronger for it.
- ▶ **Give Talks and Briefings.** Whether at the Symposium, at a working group, or through one of our special meetings, presenting your work is one of the most direct ways to contribute. It sharpens your own thinking and opens your ideas to the kind of rigorous scrutiny that makes analysis better.
- ▶ **Mentor the Next Generation.** The analysts who will lead this community in 10 years are working alongside us today. Many of them are looking for experienced voices to help them navigate the profession. Offer your time, your experience, and your candor.
- ▶ **Nominate and Recognize Excellence.** MORS awards and Fellows recognition exist to honor the people who have made this community what it is. If you know someone doing exceptional work, nominate them. These recognitions matter, and they are only as good as the community's willingness to put names forward.

- ▶ **Bring Someone New.** Introduce a colleague to MORS. Invite a student to the Symposium. Recommend a peer for membership. The best communities grow by invitation, not just by advertisement. If you believe in what MORS stands for, share it.

Steady in Uncertain Times

Some of what lies ahead is genuinely uncertain. The environment our members work in—across government, industry, and academia—is navigating pressures that are real and, in some cases, unprecedented. I do not minimize that. But I also believe, firmly, that the value of rigorous, honest, independent analysis does not diminish in hard times. It becomes more necessary.


MORS has survived and thrived through six decades of change—Cold War tensions, budget cycles, technological disruptions, and shifting national priorities—because our community has always understood that the mission matters more than the moment. That focus is a form of resilience that no single policy or circumstance can take away.

When I think about what MORS offers its members right now, it is not simply access to events or professional development. It is an anchor. A community and professional home whose standards hold even when external conditions do not. That is not a small thing. In uncertain times, that kind of anchor is exactly what people need.

Looking Ahead, Together

The fourth and final article in this series will reflect on the year and wish the best for those chosen to carry MORS forward. But before we get there, we have a Symposium to attend, working groups to run, ideas to test, and a future to shape. That work belongs to all of us.

In uncertain times, communities that know their identity have an extraordinary advantage. We know who we are. We are analysts, advisors, educators, and problem-solvers. We are rigorous by habit, curious by nature, and committed by choice. And we are building something together that will outlast the current moment and serve the next generation of national security professionals.

People. Partners. Profession. The winds may shift. The foundation holds. Let's build. 

SANDIA NATIONAL LABORATORIES

is a world-class institution providing real-world solutions for today's most complex problems. A strong science, technology, and engineering foundation enables Sandia's mission through a capable research staff working at the forefront of innovation.

We want you to join our team!

Sandia offers employees and interns exciting opportunities in National Security Analysis, Systems Research and Analysis, Hypersonic Flight Systems, Missile Defense, Cyber Security, Military System Modernization, Spacecraft Modeling, and much more.



**Sandia
National
Laboratories**

National Security is our business. We apply science and engineering to help detect, deter, defeat, and mitigate threats. Find out how you can be part of the solution.

World-changing technologies. Life-changing careers.

Learn more at sandia.gov/careers

All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, disability, or veteran status and any other protected class under state or federal law.



Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525. SAND 2023-02209M



Six Decades of Analytics in Service

Ms. Jennifer A. Ferat, MORS CEO

As we look back over the past 60 years, the Military Operations Research Society (MORS) has served as the quiet engine driving America's—and her allies'—most critical national security decisions. Since our founding, we have stood at the intersection of complex military challenges and rigorous analytical solutions. We transform raw numbers and operational and strategic uncertainties into clear, actionable decisions for leaders at all levels.

Our journey influences—and has been influenced by—the evolution of warfare. Across all fields, the constant push has been to create the best decision with whatever data—“big” or small—is available.

Today, the national security arena faces a renewed era of great power competition defined by hypersonics, cyber warfare, and artificial intelligence. Once again, MORS is leading the charge. Our members are actively shaping how the Department of War integrates machine learning into autonomous systems, optimizes multi-domain command and control, and secures vulnerable global supply chains.

As ever, our greatest strength is our people, and the right way to judge MORS is through the lens of the people we produce. MORS is the premier community where ready-to-deploy military practitioners, defense industry engineers, and academic researchers share breakthroughs securely and candidly. The peer-reviewed methodologies born in our

symposia, workshops and published in *Military Operations Research* do not just sit on shelves—they directly influence resource allocation, force design, and theater-level operations.

As we look back on six decades of excellence, my deepest gratitude goes to our members. Your brilliant minds and tireless dedication ensure that our warfighters never enter a fair fight. MORS will continue to cultivate the analytical elite, innovate relentlessly, and safeguard our nation through the power of precise analysis.

As MORS enters our next chapter, the operational environment demands an entirely new analytical paradigm. Slow, deliberate planning cycles have given way to compressed timelines which seconds can determine tactical survival. As a result, our focus has expanded beyond traditional operations research to include cloud computing, edge processing, and outside conventional battlespaces to Earth orbit, lunar orbit and beyond.

In this era of algorithmic warfare, MORS is at the forefront of merging classical OR with cutting-edge AI and data science. MORS analysts are pioneering the frameworks required to make AI dependable on the battlefield:

- ▶ **Algorithmic Validation:** Establishing rigorous mathematical standards to test, evaluate, and validate deep learning algorithms, ensuring that computer-

vision targeting systems are highly resilient against adversarial spoofing and deception.

- ▶ **Predictive Maintenance and Logistics:** Fusing machine learning with prescriptive optimization models to forecast part failures across complex fleets, allowing the Joint Force to preemptively repair hardware before a component fails in theater.
- ▶ **AI-Assisted Command and Control:** Re-engineering classic decision-tree analysis into advanced reinforcement learning frameworks, helping commanders process hundreds of sensor inputs to select the optimal course of action in milliseconds.

To successfully execute this transition, we need to deliberately cultivate our human capital. The weapon systems of tomorrow are useless without the analytical minds capable of optimizing them. To bridge this gap, MORS has aggressively expanded its suite of professional development opportunities. MORS is in a unique position to connect practitioners with how to employ the latest analytical techniques in a complex military environment. Our targeted [MORS Certificate Programs](#) provide the next level of specialized professional development, equipping military data analysts with actionable, high-demand skills rarely taught in traditional academia.

Through robust partnerships with elite institutions like Virginia Tech, analysts earn formal Continuing Education Units (CEUs) across a diverse catalog of core and emerging disciplines:

- ▶ **Critical Tools for Analytics Professionals (CTAP):** A foundational 5-day bootcamp immersing practitioners in hands-on optimization, simulation, regression, and time-series analysis.
- ▶ **Advanced Data Capabilities:** Specialized curriculum pathways including the *Certificate in Advanced Excel Functions for Data Analysts* and the *Certificate in National Security Risk Analysis*.
- ▶ **Emerging Threat Mapping:** Comprehensive, 3-to-5-day practitioner-led courses like the *Certificate in Survey Process* and *Campaign Analysis Methods*.

To ensure our workforce stays ahead of the technological curve, MORS is currently designing a dedicated suite of Artificial Intelligence courses and certificate programs. These upcoming offerings will explicitly focus on validating machine learning models, deploying AI at the tactical edge, and integrating neural networks into joint operations research frameworks.

Recognizing that human decision-making remains the ultimate variable in conflict, MORS achieved a historic milestone in the spring of 2026 with the official launch of the [Professional Gaming Society \(PGS\)](#), a spin-off from MORS. The PGS was conceived to bring together an international community of designers, researchers, and practitioners who leverage gaming to support high-stakes decision-making and test disruptive strategy. These professional games include not only traditional wargaming, but gaming to explore decision-making in the economic, health, organizational, and homeland security domains in addition to others.

Professional gaming gives us the opportunity to look at a diverse set of challenges inside and outside government. These include force on force operations, procurement strategies, innovation, and long-war industrial base challenges. To do this, like MORS, PGS sponsors workshops, conferences, communities of practice, a journal, and other ways to learn and document professional gaming. PGS grows the discipline into a profession by continuing our structured [MORS/PGS Certificate Programs](#). These programs focus directly on the design, facilitation, and rigorous reporting of professional games through real-world, experience-based training:

- ▶ **Certificate in Wargaming:** Utilizing Peter Perla's canonical "Architect, Artist, and Analyst" model to teach the theory and execution of comprehensive research game designs.
- ▶ **Certificate in Cyber Wargaming:** Placing analysts directly into decision-making roles within a simulated environment to practice real-time response procedures, budget allocations, and policy outcomes.
- ▶ Upcoming certificate in advanced game design.
- ▶ **Multi-Domain Specialty Courses:** Providing mission-relevant skills through cutting-edge offerings like *Gaming Space Operations*, *Designing Tactical Games*, and specialized public health applications like the *Gaming Emergency Response to Disease Course*.

Looking forward, the fundamental mission of MORS remains unchanged: to bring mathematical clarity to the chaos of war. Through advanced AI research, rigorous continuing education, and the visionary launch of the Professional Gaming Society, we will continue to provide the intellectual foundation for responsible analysis. Together, our analysts ensure that our nation's leadership always operates with the highest degree of analytical certainty. 🌐

Highlighting Women in OR and Their Achievements

The Women in MORS Community of Practice is highlighting groundbreaking women in operations research (OR) past and present.

Ms. Gladys B. West



Ms. Gladys Mae Brown was born October 27, 1930, in Sutherland, Virginia, in Dinwiddie County. Her father worked for the railroad and her mother worked in a tobacco processing factory. Additionally, Gladys, her three siblings, and her parents worked on the family farm.

Gladys knew early on that she wanted to escape farmwork. She quickly learned that education could pave her way. Her high school offered two full scholarships to Virginia State College (now Virginia State University [VSU]), a historically black public university, to the top two students. In 1948, Gladys graduated as the class valedictorian and earned that scholarship.

In 1952, she earned a Bachelor of Science degree in mathematics. She worked as a teacher for a couple of years and later earned a Master of Science in mathematics from VSU in 1955. In 1956, Gladys was the second black woman and one of only four black employees hired to work at the Naval Proving Ground (later Naval Surface Warfare Center) in Dahlgren, Virginia. One of those black colleagues, Ira West, would later become her husband and father to their three children.

At that time, Dahlgren was the Navy's primary computing center. Its newest acquisition, the Naval Ordnance

Research Calculator (NORC), was considered the world's most powerful computer and was used to do more than just calculate trajectories. Engineers and mathematicians were looking to solve all kinds of problems cheaper and faster. One of Gladys West's first major projects was an award-winning study using the NORC to determine the movements of Pluto in relation to Neptune.



Ms. West and Mr. Sam Smith look over data from the Global Positioning System at Naval Surface Warfare Center Dahlgren Division in 1985.

Later, she began using satellite data to create models of the Earth's shape. In 1978, West was named project manager of Seasat, an experimental U.S. ocean surveillance satellite designed to provide data on a wide array of oceanographic conditions and features, including wave height, water temperature, currents, winds, icebergs, and coastal characteristics, proving satellites could provide

useful oceanographic data. Following this work, West worked on programming an IBM 7030 computer with increasingly refined algorithms. She was then able to create an extremely accurate model of the Earth's shape, known as the geoid, factoring in details such as gravitational and tidal forces that distort the Earth's shape. This model would later become the foundation for the Global Positioning System (GPS), which is widely used today for countless applications from navigation to communication.

A lifelong learner, West earned a second graduate degree, a Master of Public Administration, from the University of Oklahoma in 1973. West worked at Dahlgren for 42 years, retiring in 1998. Following her retirement, she earned her PhD in public administration and policy affairs from Virginia Polytechnic Institute in 2000 at age 70.

While her contributions to science were not recognized at the time of her service, in 2018 West was formally recognized for her contribution to the development of GPS by the Virginia General Assembly. Later that year, West was inducted into the U.S. Air Force Space and Missile Pioneers Hall of Fame and named one of the British Broadcasting Corporation's 100 Women of 2018, a list designed to honor inspiring women worldwide. Gladys B. West died earlier this year on January 17, 2026, at the age of 95.

Ms. Kathleen Hill



Ms. Kathleen Hill is a data scientist with Systems Planning and Analysis, Inc. (SPA), where she provides decision support for multiple government clients. Her analytical career began with a decade of service as a U.S. Marine Corps Cryptologic Arabic Linguist, including two deployments to Iraq

in support of Operation Iraqi Freedom. That foundation led her through a multidisciplinary path spanning biotech research and academic degrees in biology (BS, 2019) and data analytics engineering (MS, 2023) from George Mason University, prior to her return to the defense sector. Kathleen serves as an advisory director on the MORS Board of Directors, chair of the Junior Analyst program, and co-chair for the Critical Infrastructure Working Group and Community of Practice. Residing in Alexandria, Virginia, with her husband, mother, and five children, she remains focused on lifelong learning and building resilient analytic communities.

What is an aspect of your career that you are most proud of?

I am most proud of my willingness to remain curious and to pursue challenges even when they sit far outside my comfort zone. My career hasn't been a straight line, but rather a series of deep dives into specialized domains that required rapid learning and adaptation.

From learning a foreign language and leading Marines, to supporting military families as a civilian Family Readiness Officer, to a detour into immunoassay development before returning to the defense world, each transition required me to treat my own skill set as a dynamic system that must be continuously upgraded. Today, as I move deeper into the artificial intelligence space, I don't stop at understanding models as a data scientist; I am pushing into cloud and DevOps engineering through additional coursework (shout out to Code Platoon, a wonderful resource for veterans) to ensure I can support the full lifecycle of analytic solutions. This approach allows me to look at problems not just through one lens, but through multiple perspectives. I take immense pride in being a lifelong student who is never intimidated by a steep learning curve.

What are the key events that got you where you are now in your career?

My foundation as a Marine laid the groundwork for everything that followed. Military service gave me early exposure to complex, high-stakes environments where clear communication, accountability, and teamwork are essential. It also shaped how I approach problems.

Leaving active duty and pursuing formal education was another pivotal step. My degrees allowed me to translate operational instincts into rigorous analytical methods and scalable technical skills. That transition ultimately enabled my return to the defense sector in a data science role where I can combine mission understanding with modern analytics to support decision makers. Each phase, be it military service, scientific research, or advanced analytics training, added a different layer to how I now evaluate risk, structure problems, and design solutions.

What advice would you offer to young analysts?

Get involved. Seek out communities of practice, professional societies, and projects that align with your interests. Even a small time investment each week can compound into strong mentorship networks and unexpected opportunities.

Don't fear the pivot. My background in biology and linguistics didn't slow me down in defense analytics—it became a differentiator. Your "nonlinear" experiences are often your greatest competitive advantages.

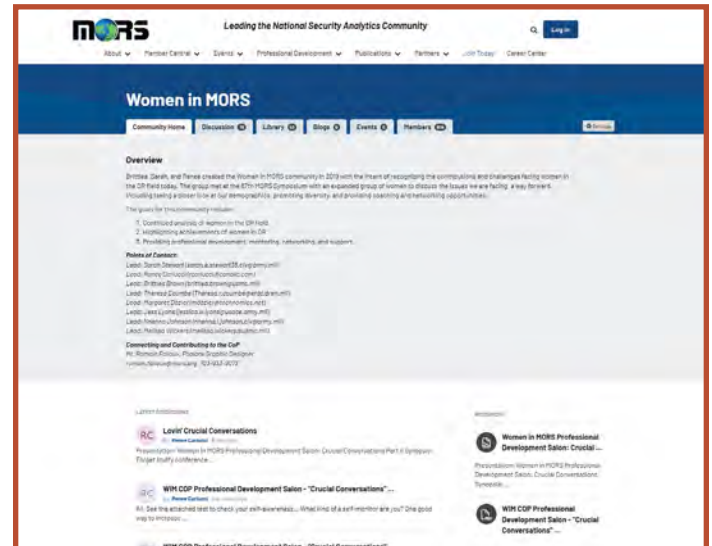
Stay curious under pressure. This field evolves quickly. Whether it is cloud infrastructure, new modeling techniques, or emerging AI frameworks, make continuous learning part of your routine. At the same time, do not neglect fundamentals; operations research, statistics, and systems thinking remain essential anchors as tools change.

Who are your role models?

I admire leaders who operate effectively at the intersection of national security and technology, and who can convey complex technical concepts in a way that both strategic decision makers and the average individual can understand and act on. I've been fortunate to have mentors and colleagues throughout my career who exemplify that kind of leadership and who I can rely on for honest advice and perspective.

I have also been deeply influenced by colleagues and mentors within the MORS community, particularly within the critical infrastructure realm, including Norm Reitter and Jaison Desai, as well as leaders in the data science community such as Iain Cruickshank. Their commitment to mentorship and cross-disciplinary collaboration reinforces my belief that strong analytic communities are built through service, not just technical excellence.

Finally, I would be remiss not to mention my husband, who models integrity, service, and perseverance every day in both his professional and personal life. His example continually reminds me that leadership begins at home and extends outward. 🌟



WIM Community of Practice Website

A compilation of female MORS oral histories, past articles on historical and contemporary female OR trailblazers, as well as links to some of their work can be found on our WIM CoP website. We will be continuing to add to these, so please let us know if there is an analyst you'd like to see interviewed or someone from the history books you'd like to learn more about or whom we should include.

THE SECURITY OF PARTNERSHIP.

Global security encompasses a broad spectrum of challenges. Today's leaders look to companies with wide-ranging capabilities, technological expertise and broad perspectives to solve complex challenges. Our global team partners with customers and approaches each challenge as our own. When it comes to success in complex environments, we know partnerships make a world of difference.

Learn more at lockheedmartin.com

LOCKHEED MARTIN 

From Voice to Insight: AI-assisted Analysis of Soldier Experimentation Recordings

Robert M. DeMarco, Jose Rodriguez, Lucas Hess, Alexis Cady, Florence B. Chua, Dominic T. Cheng, and Elizabeth Mezzacappa, Tactical Behavior Research Laboratory, DEVCOM Armaments Center

Why This Matters

Across modern experimentation and Soldier touch points, we capture more audio than we can realistically analyze. After-action reviews, radio traffic, small group discussions, and in-the-moment coordination are rich sources of insight about human performance, workload, teaming, and trust in autonomy. The problem is not collection. The problem is throughput.

Traditional approaches are slow and labor intensive. Manual transcription and qualitative coding can take weeks or months for a single event, especially when the recordings include multiple speakers, background noise, and operational jargon. That delay matters. If insights arrive after the next iteration of an experiment, they do not influence decisions when it counts.

This article describes a practical workflow we used to convert recorded event audio into decision-ready insights in days, not months, without removing humans from the loop. The core idea is simple: use AI to do the heavy lift,

then use subject matter experts to spot check, calibrate, and interpret.

The Core Challenge with “Doing It the Old Way”

Most teams already know the pain points:

- ▶ **Volume:** Multi-day events produce dozens of hours of recordings.
- ▶ **Noise:** Field audio is messy, overlapping speech is common, and radio traffic varies widely in quality.
- ▶ **Terminology:** Acronyms and domain-specific terms create transcription errors and slow down new analysts.
- ▶ **Time:** Transcription and coding compete with every other priority on the schedule.

Even when teams attempt manual analysis, the reality is that results often become a small set of selected quotes and anecdotal impressions. That is useful, but it is difficult to scale and difficult to compare across events.

A Four-Stage, Human-in-the-Loop Workflow

We implemented a modular pipeline with four stages. The workflow is designed to be repeatable across events and flexible enough to handle both structured discussions and noisy field audio.

Stage 1: Data Preparation

The goal is to improve intelligibility without changing the substance of the recordings. We normalize audio levels, apply basic noise reduction, and log metadata such as event name, scenario, unit or lane, date, and recording source. These metadata tags matter later because they enable filtering and quick retrieval when analysts need to validate a theme or trace a finding back to its original context.

Stage 2: Automated Transcription

We generate time-stamped transcripts using an offline deployment of OpenAI Whisper so the processing can remain on controlled systems rather than external services. Whisper performs well on noisy recordings and supports multilingual speech when it appears in the data.

We do not attempt to validate every line of transcription. Instead, SMEs perform spot checks across each dataset to estimate whether the transcription quality is sufficient for downstream analysis. Errors tend to cluster in predictable places: acronyms, proper nouns, and rapid cross-talk. A common example is acronym confusion, where an operational term may be interpreted as a common English word. When these errors materially affect meaning, we correct them and track the correction pattern so the team can recognize it quickly in later events.

Stage 3: AI-Assisted Coding and Quantification

Once transcripts are generated, we use a large language model (LLM) to label segments for themes relevant to the event goals. In our case, trust and human autonomy teaming were recurring priorities, but the same approach works for workload, usability, communications, or tactics and procedures.

The model output is treated as a first pass accelerator. It produces labeled segments, candidate themes, and sentiment estimates. The advantage is speed. Instead

of analysts reading hundreds of pages end-to-end before identifying patterns, the workflow produces a structured map of where themes appear, how frequently, and in what context.

Stage 4: SME Review, Calibration, and Visualization

This is where the workflow becomes defensible. SMEs review a sample of labeled segments, check whether the themes match operational intent, and refine the prompts so the model behaves consistently. The team then aggregates outputs into simple tables and visualizations such as theme frequencies, sentiment distributions, and trust-matrix style summaries.

SMEs do not need to re-code everything. Their role is calibration and interpretation, plus validation of high-impact findings before those findings are briefed.

What This Enabled in Practice

Using this approach, we were able to reduce the labor required to go from recordings to a structured set of



The Ranger Group specializes in analytic services in support of evolving national security and military policies.



- ▶ **Assessment and Evaluation**
- ▶ **Strategic and Operational Concepts**
- ▶ **Future Requirements**

findings by roughly 80% to 90% compared to typical manual workflows. The exact numbers vary by event and audio quality, but the effect was consistent: the bottleneck shifted from transcription and first-pass coding to SME review and interpretation.

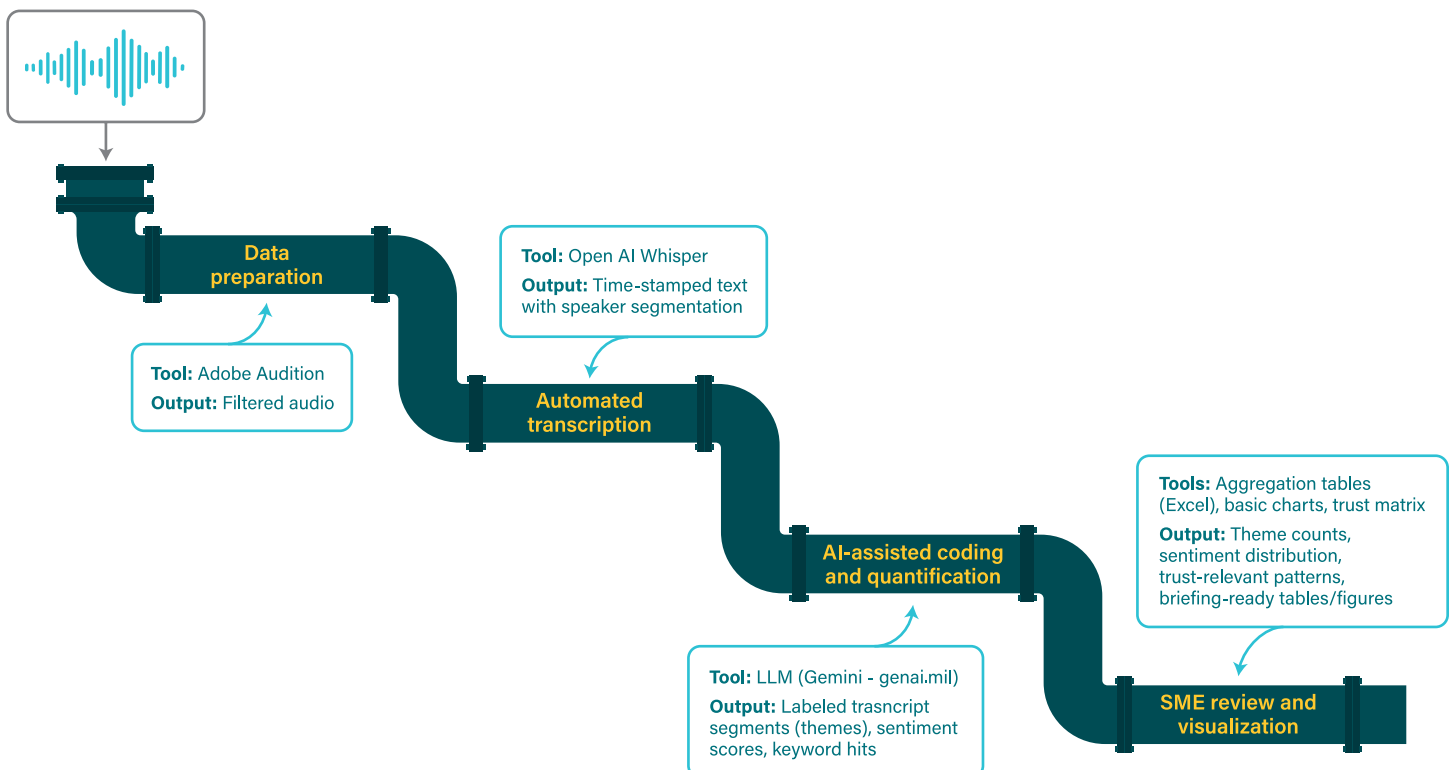
Just as important, the workflow preserved context. Because transcripts are time-stamped, analysts can jump from a finding back to the exact audio moment, confirm nuance, and pull quotable evidence with minimal overhead. This helped us maintain Soldier voice while still producing summaries that decision makers can act on.

What We Learned: Practical Lessons for Teams Adopting This

1. **You need an accuracy strategy, not perfection.** Trying to achieve perfect transcription across large datasets is a trap. The goal is to be accurate enough to detect stable patterns and support decisions, and then to focus SME time on the segments that matter most. Spot checking and correction logs are sufficient for many applied use cases.
2. **Acronyms and jargon are the main failure mode.** Expect recurring misinterpretations. Keep a running list of common terms and correction patterns. Over time, this becomes a powerful accelerator for new events and new analysts.
3. **Prompting is part of the method.** Treat prompt design as a controlled procedure. Small changes in instructions can alter labeling behavior. Keep a versioned prompt set, document changes, and avoid ad hoc edits that cannot be reproduced.
4. **Human oversight is not optional.** AI output should be reviewed before it becomes evidence. SMEs are the difference between fast and credible. The sweet spot is letting AI do the scaling, while SMEs do targeted verification and interpretation.
5. **Outputs should match decisions.** Do not generate visualizations because they look good. Generate outputs that answer practical questions: what issues appeared most often, what changed over time, where trust degraded, and what system behaviors triggered those changes.

Continued on page 16

Figure 1. End-to-end, human-in-the-loop analytic pipeline used to convert raw multi-speaker audio from Army experimentation into structured, decision-ready outputs.



Pursue BIG ideas.



SOLVE NATIONAL SECURITY CHALLENGES

Systems Analysis

At Lawrence Livermore National Laboratory, applying cutting-edge science and technology to challenging security questions is an everyday thing.

Systems Analysis is one way we solve problems—by bringing analytic rigor to missions like strategic deterrence and critical infrastructure defense.

Working with the brightest minds in science, technology, and engineering, systems analysts at LLNL bring state-of-the-art analytic tools to bear on problems of national importance.

From ensuring the safety, security, and effectiveness of our nation’s nuclear stockpile to shaping the future of inertial fusion energy—if you have a penchant for problem-solving using modeling and analysis tools—we have a place for you.



Science and Technology on a Mission

Interested in systems analysis at LLNL?

www.llnl.gov/join-our-team

Inquire today.



SystemsAnalysis@llnl.gov

Follow us A row of social media icons: Instagram, YouTube, X, Facebook, and LinkedIn.

Continued from page 14

Where This Goes Next

The Army does not have an audio collection problem; it has an analysis tempo problem. Every experiment that ends with unanalyzed recordings leaves usable evidence on the table and pushes learning to the right, often past the point where it can shape the next iteration. This workflow changes that. It turns recorded Soldier experience into structured, reviewable insight at a pace that matches modern experimentation cycles.

The real impact is not that AI makes transcription faster. The impact is that teams can finally treat recorded dialogue as a first-class data source, not an afterthought. With a repeatable pipeline and SME oversight, organizations can compare themes across events and detect trust or teaming failure modes earlier. They can then feed those findings back into design, training, and test planning while decisions are still in motion. If you are already collecting audio, you are already paying the cost. This approach helps you capture the value. 🌐

Acknowledgements

Distribution Statement A: Approved for public release: distribution is unlimited.

About the Authors

Robert M. DeMarco is a computer and biomedical engineer in the Tactical Behavior Research Laboratory at the U.S. Army DEVCOM Armaments Center. He leads efforts involving AI-assisted analysis of operational recordings, custom instrumentation workflows, wearable sensing, and human-machine teaming assessment in operationally relevant environments. He is also an instructor at the New Jersey Institute of Technology, where he teaches courses related to virtual instrumentation, measurement, and automation.

Dr. Jose J. Rodriguez is a biomedical engineer and Principal Investigator at the U.S. Army DEVCOM Armaments Center's Tactical Behavior Research Laboratory. His work focuses on developing novel virtual testbeds for the test, evaluation, verification, and validation of AI-enabled weapon systems, with an emphasis on Soldier trust and human-machine teaming. He earned his PhD in biomedical engineering from a joint program at the New Jersey Institute of Technology and Rutgers University.

Dr. Lucas Hess is an engineering psychologist in the Tactical Behavior Research Laboratory at the U.S. Army DEVCOM Armaments Center and an assistant professor at the U.S. Army Armament Graduate School. He has previously served as a DoW SMART scholar at the U.S. Army DEVCOM Armaments Center, a research fellow at the Air Force Research Laboratory 711th Human Performance Wing, and a human factors researcher and instructor at Texas Tech University. He received his PhD in experimental psychology (human factors) from Texas Tech University.

Alexis Cady, MHSI, is a human systems integration specialist with the U.S. Army DEVCOM Armaments Center. She leads research initiatives focused on the intersection of human performance and system design to enhance operational effectiveness. Her work involves analyzing human-system interactions and integrating safety and performance metrics into modernization programs. Ms. Cady serves on the faculty of the Armament Graduate School and holds an MS in human systems integration from the Naval Postgraduate School.

Florence B. Chua is a biomedical engineer at the U.S. Army DEVCOM Armaments Center, where she supports Soldier-centered evaluation of armament systems at the Tactical Behavior Research Laboratory. Her work integrates usability testing, human performance measurement, physiological monitoring, and operational research to inform the design of systems used in time-sensitive military environments. She holds an MS in biomedical engineering from the New Jersey Institute of Technology.

Dr. Dominic Cheng earned his doctorate from the University of Wisconsin-Milwaukee and completed a postdoctoral fellowship at The Johns Hopkins University School of Medicine. Following faculty positions at Johns Hopkins and Auburn University, he joined the Tactical Behavior Research Lab at DEVCOM AC in 2020. He is a senior principal investigator and his research interests include warfighter performance as it relates to armament systems.

Dr. Elizabeth Mezzacappa received her PhD in medical psychology from the Uniformed Services University of the Health Sciences. She is a scientist and research lead at the U.S. Army DEVCOM Armaments Center, Tactical Behavior Research Laboratory and an associate professor at the Army's Armament Graduate School. Her awards include Military Operations Research Society Journal Award (2018) Army Research and Development Achievement Awards (2012 and 2013), and a 2008 Best Paper Award, 26th Army Science Conference. Currently she is chair of the Human Machine Teaming work group under the RAAIT/TEV&V track under AUKUS and a member of NATO SAS-194 Research Task Group for Validation and Enhancement of the Soldier System Weapon & Equipment Assessment Tool.

TWO PROUD

LEGACIES

ONE BRIGHT

FUTURE



IST became a DCS company in 2012. For more than a decade, the companies worked and grew together—leveraging cross-corporate capabilities including a complementary portfolio of aerospace and defense technologies.

Now operating as one united DCS, the integrated organizations continue to provide program support excellence across key technical areas including:

- Military Systems Effectiveness Assessment using Simulation-Based Research and Development
- System-of-Systems Synthetic Environment Development and Applications
- Sensors, ISR and Intel Research, Analysis and Production to Address National Security Need
- Human-Centered Research for AI and Autonomy
- Human-Machine Interface Systems for Research and Operations
- Aerospace Physiology Research to Optimize Aircrew Safety and Airman Readiness

Our customers and partners are assured that DCS will continue to provide the same people, same expertise, and same quality of service that have become synonymous with the IST brand.

Learn more at www.dcsCorp.com



Game Design the Red Team Way



Mr. Steve Sallot, Center for Army Analysis

Wargame design is an extremely challenging task. One must balance a client's requirements, playability, schedule, outcomes, and participants. Each of those elements is complex, or at least complicated. The task is daunting, especially for those without experience, and it remains challenging even for those who do it regularly.

Ultimately, game design resembles an artisan trade guild where experience and creativity matter more than the algorithmic step-by-step process of task or project management. Fundamentally, game design is more art than science, a concept easily forgotten by the Department of Defense professional wargaming community that typically draws from the operations research and systems analyst (ORSA) and models and simulations career fields. Both fields are heavy in the quantitative and computer science fields—the science. This creates a potential shortfall and challenges integrating art into the design process. Arguably, the most significant barrier in stimulating art and creativity is failure of imagination, whether it is a result of availability bias or functional fixedness. It's difficult to force creativity in the best of circumstances. Anecdotally, after interacting with new game designers, the greatest difficulty

is the equivalent of “writer's block.” Getting started from a blank piece of paper or empty whiteboard is a significant challenge.

An effective method to overcome this initial blockage, kickstart the creative process, and inject the art into the wargame is by way of the Red Team. Specifically, by using Red Team techniques and mindset, one can both break the creativity block and enhance the depth and richness of the overall game design. This article shares a design process used within the Analytical Wargaming Division at the Center for Army Analysis. The methodology is useful for both seasoned designers and newcomers to the trade.

This article has three main parts. The first establishes the background and context with a brief introduction to Red teaming and an overview of the design process. The second portion describes how Red Team techniques assist in the framing and design phases of building a wargame. The article will close with key insights and conclusions.

Continued on page 20

Think.KBR.com



Looking to Unlock the Power of Data for Mission Success?

 **THINK KBR.**

KBR delivers solutions for complex defense challenges.

- Advanced predictive analytics
- AI & machine learning solutions
- Wargaming and simulation
- Custom decision support tools

Join leading defense agencies and military organizations leveraging our expertise to drive mission success and stay ahead in an evolving security landscape. Let's collaborate to shape the future of military operations.

We do things that matter.®



Continued from page 18

Red Teaming

Like most concepts, “Red Team” has various meanings depending upon experiences and fields. For instance, to a cyber warrior, the Red Team is a group of friendly hackers attempting vulnerability penetration of friendly systems. Typically, in the realm of wargaming, the Red Team is the adversary, unless you live in Red China or the Soviet Union, then it’s the Blue Team. This categorization may not be wrong, but it is not completely correct. The more precise term is “Red cell,” as the team is executing threat emulation.¹ The point is not to stir up a debate, but to highlight that Red teaming has a wide range of meanings and context matters. This article will use the decision-support characterization of Red teaming, which is where the Red Team aids and assists Blue in making better decisions, through critical review, challenging assumptions, devil’s advocacy, exploration of alternative perspectives, and critical thinking.²

As a seasoned practitioner, I further refine Red teaming as a *mindset* that allows for the *exploration and critical review* of prevailing ideas to *enhance understanding to improve decision making*, facilitating *better outcomes*. This refinement highlights several key themes that are germane to wargame design. First, it’s a mindset—a different way of thinking. Second, it is exploratory—a way to learn more through curiosity and creative processes and embracing experimentation. Third, it is an iterative process that continuously improves products, either additively or through a subtractive epistemology.³ This implies that learning something will not work is just as helpful as finding something that will work.

Lastly, and rarely discussed, Red teaming is not just a collection of tools and techniques, but it has its own tradecraft. The *Red Team Handbook*,⁴ along with its collection of techniques, is the basis for Red Team

tradecraft. Red teaming, like wargame design, is both art and science. The art of Red Team tradecraft is in the *how* and *when* to implement the forms and methods used, whether it’s the selection of structured analytical techniques or iteration. The science largely consists of Red Team techniques, such as those referenced in this article, some of which were developed by Red teamers, though most are borrowed from other sources, such as the intelligence and business communities.

Game Design

Generally, game designers attempt to share their best practices through step-by-step processes. Often, though, the magic of the process of creating the game system is skipped over or embedded as a matter of fact, leaving the student at a loss. For example, the legendary James Dunnigan shared his 10-step process in *The Complete Wargaming Handbook*⁵ and makes casual reference to building the game, step three. Dunnigan’s 10 steps are 1) concept development; 2) research; 3) integrate and build prototype; 4) flesh-out prototype; 5) draft ruleset; 6) game development (improvement); 7) blind-testing; 8) editing; 9) production; and 10) feedback. Even Dr. Peter Perla cites Dunnigan’s process as the basis for the design chapter in his own pivotal work, the *Art of Wargaming*.⁶

Jeff Appleget in *The Craft of Wargaming* takes a different tack and addresses the design process as a journey with assumptions, objectives, and measurement space as the core.⁷ Philip Sabin’s *Simulating War: Studying Conflict through Simulation Games*⁸ also avoids providing a descriptive process and instead focuses on considerations such as accuracy versus simplicity and utility. In *Wargames According to Mark: A Historian’s View of Wargame Design*,⁹ Mark Herman emphasizes the players’ experiences to include an immersive historical experience. Furthering the guiding principles, Dr. James Sterrett at the U.S. Army

1. Joint Chiefs of Staff. 2011. JP 5-0 Red Cell. “Red cell . . . performs threat emulation . . . Red cells role play and model the adversaries during planning and specifically during wargaming.”
2. *Red Team Handbook 9.0*, accessed on May 26, 2025, <https://home.army.mil/wood/application/files/6115/8222/0759/RedTeamHB.pdf>. “Red teaming is a flexible cognitive approach to thinking and planning that is specifically tailored to each organization and each situation,” p. 3.
3. Nassim Taleb in *Anti-Fragile* popularized the term *Via Negativa* to suggest we learn more about something by describing what it is not.
4. *Red Team Handbook 9.0*, accessed on May 26, 2025, <https://home.army.mil/wood/application/files/6115/8222/0759/RedTeamHB.pdf>

5. Dunnigan, J. F. 1992. *The Complete Wargames Handbook: How to Play, Design, and Find Them*. Quill William Morrow, 114.
6. Perla, P. P. 1990. *The Art of Wargaming: A Guide for Professionals and Hobbyists*. Naval Institute Press, 189.
7. Appleget, J., Burks, R., and Cameron, F. 2020. *The Craft of Wargaming: A Detailed Planning Guide for Defense Planners and Analysts*. Naval Institute Press, 101-131.
8. Sabin, P. 2012. *Simulating War: Studying Conflict through Simulation Games*. Bloomsbury Publishing, 3-134.
9. Herman, M. 2024. *Wargames According to Mark: A Historian’s View of Wargame Design*. GMT Games, et passim.

Continued on page 22



**The Battlespace is Evolving.
Tailored Solutions are Needed More Than Ever.
Join CANA and Let's Design the Future Together!**

At CANA, we don't just process data; we map the DNA of your operations. By fusing **focused analytics** with the relational power of **knowledge graphs**, we explore, design, and deploy advanced solutions that illuminate the 'why' behind the 'what.' From complex logistics to mission-critical theater operations, we transform fragmented data into a unified digital ecosystem, delivering high-impact insights that de-risk your largest decisions and **streamline the operational spectrum.**

CANA is a veteran & woman-owned small business (VWOSB) that empowers federal and commercial organizations to thrive in a global digital world through precise and **adaptable technology solutions.** We fuse our rigorous analytics and top-tier talent with deep expertise in complex logistics to design customer-centric, powerful solutions. We deliver highly tailored models and solutions designed to command an evolving digital landscape, and we turn **data into dominance.**



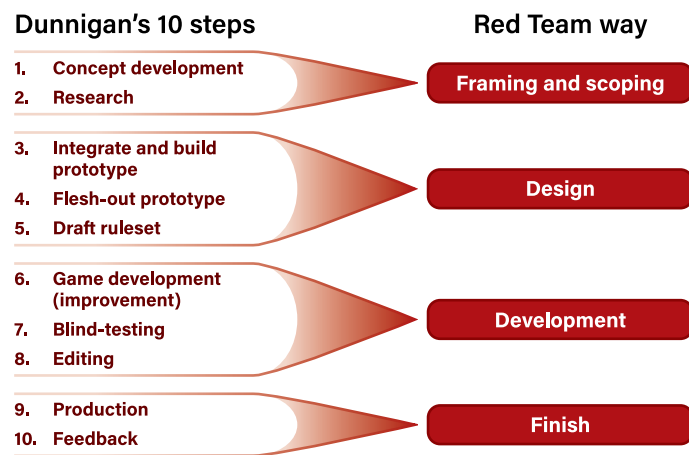
Powerful Analytics. Precisely Applied.



Continued from page 20

Command and General Staff College emphasizes three core overarching elements of game design: purpose of the wargame, decisions of participants, and interactions. All provide sage advice on game design and are generally not in contradiction. Nearly all agree that the design process is iterative. It is nonlinear and experience based, lending itself to more artisan approach—hence a guild-like trade.

Figure 1. Map of Dunnigan’s 10 Steps to the Red Team Way



The Red Team Way borrows from the above and distills the process into four phases. The phases often overlap, resembling a Venn diagram rather than discrete periods. The four phases are framing and scoping, design, development, and finishing. For a quick reference, the four phases map to Dunnigan’s 10-step process in Figure 1. There is nothing unique or novel in this categorization. However, the Red Team Way provides techniques and methodologies to stimulate the creativity to complete the task. For instance, Dunnigan’s step 3, integrate and build prototype, describes the result or outcome. Unfortunately, building the prototype is the hardest part, and his only practical counsel is to keep it simple and plagiarize.¹⁰ Though simplicity and plagiarizing are sage advice, this is not very helpful. The Red Team Way offers a handrail or structure for designers to initiate the design process and complete Dunnigan’s step 3.

The Red Team Way

The Red Team Way is most beneficial during the first two phases: framing and scoping and design. This is largely due

to the emphasis placed on “thinking” during the first two phases and “doing” in the latter two. The bulk of cognitive load—heavy thinking—occurs early in the process.

Arguably the most important step in any venture is the framing and scoping phase. In any problem-solving methodology, ensuring you understand the problem and have identified the right problem is critical. In this case, starting with a rudimentary or general topic, such as campaigning during competition, is sufficient for the Red Team Way. Analytical wargame designers typically can be frozen or frustrated at the start without a clear direction, which is generally in the form of research questions. The Red Team Way not only embraces vagueness but expects it. Additionally, the agility of the Red teaming mindset offers mitigation to shifting requirements of a sponsor or client.

Multiple Red Team techniques and other structured analytical techniques (SAT) are extremely beneficial in jumpstarting the scoping and framing process. Specifically, the 5 Whys¹¹ and Lotus Blossom¹² will kickstart thinking critically about the topic, as well as structure the brainstorming process. The initial interrogation should yield core assumptions and critical components of the topic. Most importantly, the Lotus Blossom will yield core interactions and interdependencies. For example, when designing a campaigning (competition for influence prior to conflict) wargame, we used the Lotus Blossom to identify the core interactions through the frequency and causal relationships of the petals. This allowed us both to narrow the factors and aggregate the effects. These techniques are generally more beneficial after preliminary research and literature review. Much like the overarching design process, Red teaming is inherently iterative with constant refinement.

Another useful technique to use during the framing and scoping phase is stakeholder mapping.¹³ There should be at least two iterations of the technique. The first is content oriented: the technique should be aimed at determining the forces, factors, and agents who have an interest or influence in the subject of the wargame. It should not be limited to actors that can make decisions, but should include actors without agency, such as the weather and other external influences. The second version should include the stakeholders related to the execution of the

11. *The Red Team Handbook*, 81.

12. *The Red Team Handbook* v9.1, 166 or <https://online.visual-paradigm.com/knowledge/brainstorming/lotus-blossom-technique/>, last accessed June 11, 2025.

13. *The Red Team Handbook*, 186.

10. Dunnigan, 114.

wargame and communication of insights. This will assist the design team in shaping the game and event for communication between the sponsor and participants. The iterations are likely to overlap, though the initial content stakeholder map is the driver of the game engine's players, artifacts, agents, fungible resources, goals, and decision space. The second stakeholder map also informs the participant list, data collection, analysis, buy-in, and the drafting of the final report and key insights. *Stakeholder mapping* allowed us to reduce the number of players, from over 15 stakeholders to four, through aggregation and alignment of interests or impact for a semi-cooperative resource-allocation game. Despite the extensive reduction, the technique allowed us to ensure we accounted for the stakeholders and other influences, such as Congress, through other mechanics.

The goal and output for the initial phase of the Red Team Way is a refinement of the problem, root cause(s) and related core assumptions, principal agents or actors, items of interest, and generalized understanding of the goals and objectives of the agents—in short, how to win! The emphasis of the next phase, design, is to build out the relationships between the above items—their interactions. Arguably, the interactions between decisions, artifacts, consequences, and player goals are the core engine of any game.

In the Red Team Way, the primary tools for organizing the outputs of the framing phase are *mind mapping*¹⁴ and systems thinking. *Mind mapping* is a visualization method that allows for a semi-structured way of building out ideas, which is best done with a dynamic toolset, such as sticky notes on a whiteboard, to encourage and reinforce the iterative process. The mind map serves as a jump-off position for thinking in systems. The value of systems thinking is identifying the causal relationships between the elements. Viewing the problem as a system allows the design team to develop the mechanics for interaction. For instance, consider how the deployment of a new capability in theater may be perceived as escalatory by an adversary while also providing assurance to an ally. Drawing the topic as a system reduces the complexity of the problem while illuminating a path forward in designing discrete decisions, effects, and interactions of the wargame. After all, a game is a simplified representation of the dilemma related to the wargame topic.

Additionally, designers should look for key systems elements, such as delays, reinforcing loops, or balancing loops. Morgan Jones in his *Thinker's Tool Kit*¹⁵ provides an excellent practical approach to developing causal relationships. Depicting these relationships will aid in simplification of the system—a core principle of game design—as the team will find actions or effects that can be aggregated or subsumed into a larger mechanic or element. An example includes aggregating all the external variables, such as economy, elections, political intrigue, and so on into a simple output, such as an available budget, determined by a die roll and lookup table. Again, this process is iterative, with the goal to simplify, simplify, and simplify!



Systems thinking is extremely helpful. In nearly all our game designs, there is a sketch on a nearby whiteboard. In a recent design, systems thinking provided the core breakthrough for a campaign-plan wargame designed to explore more than five years in less than two days of play. Having been primed by the client to focus on certain activities, our brainstorming, facilitated by the systems drawing, illuminated that the desired effects were the foci. Once we embraced the desired effect as the core, the remainder of the game mechanics fell into place.

A frequent roadblock in game design is the absence of knowledge—the unknown. Inevitably, the design team will stumble into a space where information is unknown, whether it's unavailable or truly does not exist. Again, the

14. *The Red Team Handbook*, 164.

15. Jones, M. D. 1998. *The Thinker's Toolkit: 14 Powerful Techniques for Problem Solving*. Crown, 94–105.

Red Team Way provides a lifeline and offers a number of techniques to assist the team in avoiding the block. The Fermi method¹⁶ of estimation is a great tool to reduce ambiguity and provide a reasonable estimate to fill in gaps. Other approaches include an *outcome tree* or *decision tree* to brainstorm the range of possible outcomes. The outcome tree, inspired by a decision tree, is a technique created by the U.S. Central Command Red Team to explore the range of possible outcomes while considering a range of plausible interventions. Moreover, by pairing weighted anonymous feedback with a pairwise comparison, the design team can develop a reasonable distribution of outcomes if required. Finally, Douglas Hubbard validates several similar approaches in his *How to Measure Anything: Finding the Value of Intangibles in Business*.¹⁷

Again, Red Team tradecraft means continuing to ask good, thought-provoking questions. Asking the right questions improves the game by finding blind spots and illuminating assumptions. Naturally, there are a few techniques that designers can use to assist in refining their working model. The *pre-mortem* focuses on failure and weaknesses, while a related, but lesser-known, technique, *crystal ball*,¹⁸ forces the exploration of changing conditions or context that may invalidate assumptions or suppositions.

As the team progresses into the development and production phase, the Red Team Way focuses on critical review and questioning throughout the playtests. The intent is the continuous simplification process of the game while enhancing players' experiences. Again, Red Team tradecraft bears fruit by asking the right questions and leveraging the power of semiotics (the study of symbols and their interpretation). Examples include: Why is this mechanic included? Is it necessary? How can we leverage an existing mechanic or artifact? How can we best communicate this idea? How might a player be confused by this mechanic or artifact? Additionally, a *4 Ways of Seeing*¹⁹ exercise may enhance the team's understanding of how players may perceive the wargame system. We routinely use these methods to simplify the wargame mechanics and

determine the best ways and tools to ease a participant's cognitive load while learning the system.

Conclusion

Returning to the sage advice of master Dunnigan, the Red Team Way fully incorporates the core principles of keeping it simple and plagiarizing. The Red Team Way borrows tools and techniques from across many fields and thinkers and tailors them to wargame design. Specifically, the Red Team Way reinforces the core concepts of iteration, simplification, and continuous refinement—nothing new.

The novelty of the Red Team Way lies in its explicit use of SAT throughout the process. Fortunately, the techniques are easy to learn and apply, though it takes discipline to use the techniques. Once applied, design teams will find value in the use of semi-structured techniques both as creative lubricant and critical thinking tools, ultimately consistently enhancing the wargame and the players' experience.

In summary, the Red Team Way provides a framework and handrail for wargame designers as they struggle through the most difficult periods. Specifically, the Red Team Way provides methods and approaches to kickstart the creative process and overcome information shortfalls—the art side of wargame design. 🎮

About the Author



Mr. Steve Sallot is currently battle rostered as a wargame designer at the Center for Army Analysis. He is a retired Army intelligence officer and served as joint planner in United States Africa Command, United

States Central Command, and International Security Assistance Force. Additionally, he served as the Chief U2 for United Nations Multidimensional Integrated Stabilization Mission in the Central African Republic. Finally, his Red Team experience includes Chief for United States Central Command Red Team and a faculty member at the University of Foreign Military and Cultural Studies.

16. "Fermi Problem" provides a methodology to estimate a solution; https://en.wikipedia.org/wiki/Fermi_problem, accessed May 26, 2025.

17. Hubbard, D. W. 2024. *How to Measure Anything: Finding the Value of "Intangibles" in Business*, third edition. Wiley, et passim.

18. This technique is not in *The Red Team Handbook*, accessed May 26, 2025, https://www.researchgate.net/profile/Marvin-Cohen-2/publication/236174874_Training_the_Naturalistic_Decision_Maker/links/02e7e516d92a1360e7000000/Training-the-Naturalistic-Decision-Maker.pdf

19. *The Red Team Handbook*, 74-75.

The Institute for Defense Analyses (IDA) is seeking research professionals with analytical experience in:

- Systems and acquisition management
- Resource allocation and force planning
- National security economic issues
- Operational testing and evaluation
- Among others!



Rigorous Analysis
Trusted Expertise
Service To The Nation

IDA fosters a unique environment where professional growth is supported alongside work that serves a greater purpose. **Advance your career in national security at the Institute for Defense Analyses.**

Apply today:





Decision Advantage: The Treatment of Time

CAPT Brian Morgan (USN/Ret), Naval Postgraduate School

Harold Clayton Lloyd Sr. in his famous clock scene from his silent movie hit, Safety Last!

The best analysis is worthless if it is not communicated clearly, logically, and accurately. You must know your audience and speak their language because the decision space is noisy, often chaotic, and subject to widely varying perspectives. In addition, senior executives must synthesize information from a multitude of sources prior to making a decision. To dominate the battle of decision support, the practitioner must rapidly establish and maintain credibility for the decision maker to trust the insights and/or act upon the recommendations.

One characteristic of a well-communicated presentation or report is a compelling narrative. Herein lies the challenge. Whether you are a systems analyst developing recommendations for the solution to a problem in a set of interconnected elements or an operations research analyst applying scientific method in the study of complex structures, the art is to take a complicated national security challenge and explain its solution with appropriate context. One aspect of the art is the manipulation of time. Time manipulation can be a critical enabler to constructing

products that effectively communicate your work to senior-level decision makers.

Structuring Time for Narrative Effect

Have you ever witnessed time manipulation? Of course you have! Recall any movie you have seen. Film directors treat time flexibly, compressing or expanding it through techniques such as fast/slow motion, match cuts, time loops, and ellipses (skipping time). These dramatic effects control narrative pace, build tension, convey emotion, and fit stories into a runtime, often making events seem to pass faster or slower than real life. They seek to highlight key moments and skip mundane details, thereby creating a subjective experience for the audience.

As analysts supporting the national security community, we recognize these same elements of time in every presentation we have either listened to or given. It causes us to ask ourselves how we should manipulate time when

constructing a presentation. In structuring time, we make it a variable storytelling tool rather than a rigid constant; it should be attentively considered in every presentation and self-review process that consider the quality, clarity, and standard of your presentation.

Time Manipulation Techniques

We now explore three techniques that a film director uses to manipulate time and how they can be adopted by the national security analyst when constructing a presentation. The three techniques are:

- ▶ **Temporal narrative.** This technique is the structure that conveys the passage of time, which may be treated as continuous or discontinuous. An example of continuous time is the Star Wars movies, which begin with a scroll that serves to orient the audience on the state of affairs in the galaxy and character story arcs are told in chronological order. In contrast, movies such as *Pulp Fiction*, *Saving Private Ryan*, and *The Godfather II* each treat time in a nonchronological, discontinuous manner.
- ▶ **Pacing.** Movie pacing is the speed and rhythm at which a film's story unfolds. The film director controls how quickly the plot advances and how the audience experiences events through choices in writing, editing (shot length, cuts), dialogue, music, and action, to build tension, develop characters, and maintain engagement. We recognize that many of these elements apply to a presentation. As analysts, we are often tempted to present everything we learned in the course of our research. It is unnecessary to do so. According to legendary director Alfred Hitchcock, drama is "life with the dull bits cut out."¹ A compelling presentation does not include the dull bits of analysis.
- ▶ **Visual cues.** In a movie, time may be established and manipulated using onscreen text/graphics such as dates or times. The Terminator movies are one example. National security analysts often explore time-series data. For example, they may first describe the current state and then one or more anticipated or desired future states or show resource allocation over a period of time. The choice of graphics in a presentation is critical to revealing and conveying insights.

First and foremost, you must recognize that your presentation has many elements of a movie. As previously

described, the scrolling text at the beginning of a Star Wars movie orients the audience to the state of affairs between the Rebels and Empire and seeks to "hook" the audience with the central tension. When briefing, the analyst must orient the audience to the operational challenge, which may be accomplished using an OV-1 diagram, and then "hook" the decision maker with the challenge's relevance.

The "hook" is critical. It is believed that many moviegoers follow an informal 20-minute rule when watching a movie: if they are not interested in the movie within the first 20 minutes, they stop watching (when home viewing) or mentally check out (when watching in a movie theater). In either case, the filmmaker has not gained your intellectual market share.² We have all likely experienced the unfortunate circumstances of listening to a brief where within the first two or three slides, the subject's importance is not stated, not believable, or unintelligible. As when watching a box-office bomb, we mentally check out.



*An early master of movie pacing, Charlie Chaplin used it to perfection in *Modern Times*, a 1936 American comedy film he produced, wrote and directed about a character who struggles to adapt in the modern, industrialized world.*

Temporal narrative in film is the framework that organizes how a story is told, encompassing the sequence of events, character development, and thematic progression. World-class analysts recognize the imperative of effectively organizing their brief. We begin by asking ourselves several rhetorical questions. Which treatment of time is better, continuous or discontinuous? When should I use one or the other? At least we know that the answer is not "it depends." We can provide a more practical response. I will examine two common presentation formats and describe when they

1. Quote from interview with syndicated columnist Leonard Lyons. 1956

2. There are other movie faults such as plot holes, factual errors, historical inaccuracies, continuity errors, and logical mistakes. These are also applicable to presentations but beyond the scope of this article.



The opening sequence of Saving Private Ryan cemented the film as an instant cinematic classic. (Paramount Pictures)

might be used. It should be noted that if you know the style that the decision maker prefers, naturally, use that one.

The first format is bottom line up front (BLUF). It is characterized by providing recommendations or insights at the very beginning of the presentation and then a narrative description of the task. The presentation ends with justification for the statements in the BLUF. Thus, the presenter treats time in a nonchronological order by first providing the end-state answer and then justifying it. The BLUF format is appropriate if the senior leader's availability is limited or typically subject to change. To be effective, the BLUF must succinctly provide actionable recommendations or a deeper understanding of the national security challenge. Otherwise, the presentation can be "derailed" if the bottom line is too benign, where you give an initial impression of not providing any new insights. This circumstance is another aspect of not providing a "hook." Alternatively, if the BLUF is too provocative, causing detailed questions to be asked that are answered in subsequent slides, the presenter's desired timing is derailed.

The other format is outside-in. Here, the presenter begins with the problem statement . . . why you conducted

the study or research . . . then follows with a narrative description of the task in increasing detail. The presentation ends with results, insights, and recommendations. We see in this case, the presenter treats time in chronological order. This construct reminds the senior leader at the beginning why the study or research was conducted, who directed it, and who the stakeholder community is. The outside-in format seeks to immediately "hook" the decision maker on the national security challenge by immediately conveying its importance. This format tends to minimize the cognitive load placed on the audience because it aligns with how humans intuitively structure information. However, if the decision maker's time is uncertain, you may not be able to cover key details or only provide a superficial understanding of the insights or recommendations.

Pacing controls how audiences experience events. The film director and analysts must each fit their material into the allotted time. This concerns how you edit your presentation—the amount of time used to orientate your audience to the research topic balanced against results and insights revealed by the analysis. The analyst should

Continued on page 30

SEA

LAND

AIR

SPACE

CYBER



Delivering results that matter.

Trusted to support US and our Allies' most critical national security missions.

Better approaches and strategies supporting better Government decisions and outcomes.

OBJECTIVE | RESPONSIVE | TRUSTED

→ STRATEGIC ANALYSIS AND FORCE DESIGN

→ MODELING AND SIMULATION

→ DIGITAL WARGAMING

→ ADVANCED DATA ANALYTICS

→ DIGITAL PROGRAM MANAGEMENT

→ DIGITAL SYSTEMS ENGINEERING

→ DEVSECOPS



To learn more about SPA, please visit spa.com and connect with us on [LinkedIn](#), [YouTube](#), [Instagram](#), and [Facebook](#).

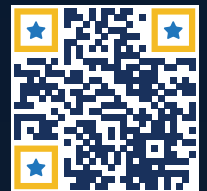
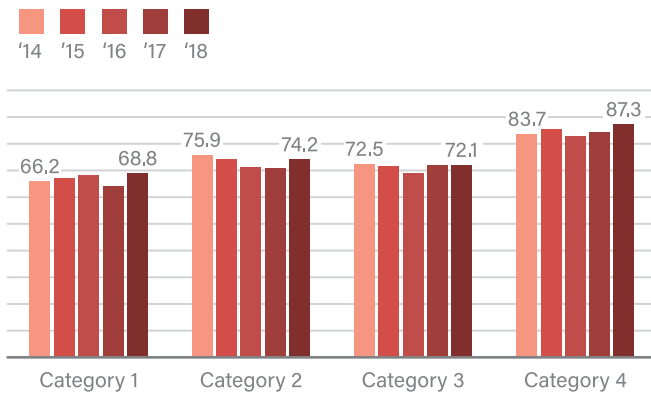
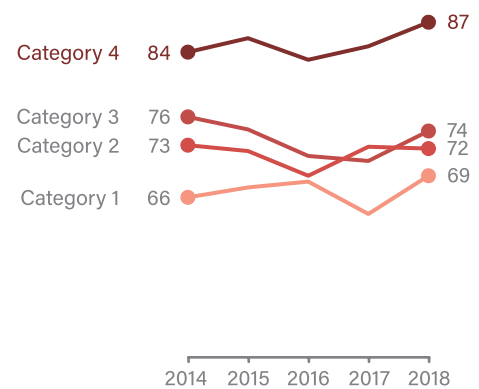


Figure 1. A comparison of the same notional data using two different figures

System reliability by category



System reliability by category



Continued from page 28

expand time by slowing down to cover critical details and compress time by placing extraneous elements in back-up or simply not including them. In addition, the analyst may need to change the pacing, depending on the audience's foundational knowledge of the underlying warfighting domain. For example, Army officers are likely to be familiar with infantry tactics and unit symbols, but Navy officers would require additional explanation.

A film director uses onscreen visual indicators such as onscreen text (dates, times) to quickly communicate time jumps without relying solely on editing and/or avoid audience confusion about the chronological setting of a scene. The analyst utilizes tables, figures, and graphs to create connections between text, data, and insights. They serve as a vital tool for establishing context and minimizing the cognitive load placed on the audience. For example, a slope graph is typically a better option than a bar chart for visualizing time series data. See Figure 1. Arguably, it is relatively challenging to derive any meaningful insights from the bar chart on the left. In contrast, the analyst reduces 25 bars to 4 lines that use a common x-axis. In addition, it is difficult to identify insights from the bar chart. However, the slope graph on the right reveals the insight that Category 1, 2, and 3 data are correlated immediately and at the cost of zero mental energy, i.e., no cognitive load.

Conclusion

Techniques and considerations for how a film director treats time can be adopted by professionals in the national

security community. Trip Barber's guidance to analysts includes: "Senior leaders deserve clear, concise products that have a point and go directly to it with a compelling, understandable logic flow driven by analysis and anchored in operational reality."³ We see that the treatment of time is implicitly contained within this guidance. A filmmaker wants to create the next blockbuster movie, and you want your brief to gain the decision maker's intellectual market share. 🎬

3. Quote provided in innumerable forums.

About the Author



CAPT Brian Morgan (USN/Ret) is a senior lecturer in the Operations Research Department at the Naval Postgraduate School. He instructs courses in probability and statistics, joint campaign analysis, and systems analysis.

His current research interests include campaign analysis, the intersection of game theory and great power politics, military capabilities that produce a "crisis in warfighting confidence" in an adversary, and decision advantage . . . from data to insights. Brian Morgan served as the 55th President of the Military Operations Research Society and is a Fellow of the Society.

LAYERED DEFENSE MAXIMUM DETERRENCE

Raytheon integrates solutions across every aspect of strategic missile defense – from early detection, to mid-course and terminal intercept. No matter the threat, trust the leader in proven defense.

Learn more at [RTX.com/missiledefense](https://www.rtx.com/missiledefense)



Raytheon
An RTX Business

Edgar Bishop Vandiver III

September 19, 1938 – March 15, 2026

Colleagues Remember

“He was an innovator, an analytical savant, a cherished mentor and friend—the last of the great titans of the Army analytic community. Part of a generation that rebuilt a destitute Army from the shambles of Vietnam into the juggernaut of Desert Storm.”

— Dr. Forrest Crain, FS
Van’s successor at CAA

“Van was a giant in the Army analysis community. He created a culture of excellence and a team that became a family—insisting on communal activities from chili cook-offs to formal dinner dances. He was one of a kind.”

— Dr. Steven Stoddard, FS
Current Director of CAA

“I am one of probably hundreds that Van challenged, mentored, and then boosted in their careers. Military Operations Research has lost a great leader, and the Fellows of MORS will remember him with fondness and reverence.”

— Dr. Cyrus Staniec, FS

“He made CAA more professional in manner and performance—and more collegial. CAA became a proud family.”

— Ms. Renée Carlucci, FS

E. B. Vandiver III, 87, of Fairfax, Virginia, passed away peacefully at home on March 15, 2026. With his passing, MORS and the broader OR profession lost one of their most enduring and consequential figures. Van rose to the highest analytic ranks in both the Army and MORS, earning its most prestigious awards. He was the analytic memory of the Army and a mentor to generations of analysts.



From Cotton Fields to Command

Van earned a bachelor’s and master’s in Physics from the University of Missouri. Through ROTC, he entered the Army in 1962 as a Chemical Corps Lieutenant, quickly learning that theoretical models were only as good as data gathered under grueling field conditions. After active duty, he joined the pioneering Combat Operations Research Group (CORG), served on the ground in Vietnam for the ARCOV Study, and co-founded analytic firm CVA Inc. in 1967 before returning to federal service.

28 Years at the Helm of CAA


By the 1970s, Van was a fixture in the power corridors of the Army Staff. In 1984, he became the fifth Director of the U.S. Army Concepts Analysis Agency (CAA)—a position he held for an unprecedented 28 years, retiring in 2012 with the Presidential Rank of Distinguished Executive. His two guiding principles—analytic excellence grounded in real-world reality, and people first—became CAA’s culture. He championed professional development through speaker series, military history programs, and required reading designed to combat confirmation bias.

“Real war is messier than hell!”

“Never let the facts get in the way of a good story!”

“We (ORSAs) are smart, but a little on the weird side.”

A MORS Legacy Spanning 40 Years

Van’s connection to MORS began in 1966. He served on the Board from 1983 and as President from 1992–1993, initiating the Journal of Military Operations Research, the Education Colloquium, and the MORS Heritage Committee. He received the Wanner Award in 1995 and was elected Fellow of the Society in 1996. His legacy of keen analysis, field support, steadfast mentorship, and deep appreciation for history and institution will endure in the analysts he shaped, the agency he built, and the Society he served. MORS extends our deepest condolences to Van’s family. For more information on Van please see his oral history at <https://www.mors.org/publications/oral-histories>. 

The MORS Mentorship Program



→ Sign Up Today!

The new MORS Mentorship Program is designed to match members with a mentor who can help them develop their career and become more involved in MORS. Members can achieve their professional goals by improving their analytic skills, deepening their understanding of the national security analytical community, and engaging further with the Society and other MORSians.

Highlights of this program include:

- » Access to an online mentor matching program that connects members to meaningful mentoring relationships anytime
- » Ability to increase membership engagement and professional development
- » Resources for both mentees and mentors
- » Tools to help manage and assess the overall program

Participants have the opportunity to create connections with other members, share their knowledge and experiences, and seek information on specific topics.

The online program is open to all active members of MORS and we encourage everyone to sign up and participate in this great member benefit!

OPEN TO ALL MEMBERS



For more details, visit mors.org/mentorship or contact mentorship@mors.org.

MORS Young Analysts

The Next Generation of Leaders

The future of operations research and the national security community depends on new analysts taking the helm. MORS' Young Analyst Initiative facilitates this process by providing paths for emerging analysts to engage with MORS through publishing, meeting participation, volunteering, mentorship, and recognition.

To highlight the achievements, interests, and aspirations of young analysts, we turn the spotlight on one deserving individual in every issue of the *Phalanx*.

To learn more about the Young Analyst Initiative and connect with other young analysts, please visit

Juliani Lee
Senior Associate, Technomics, Inc.



When did you join MORS?
I joined MORS on August 11, 2025.

What was your childhood ambition?
My childhood ambition was to become a firefighter. While my professional aspirations have evolved since I was five years old, I have always been drawn to purpose-driven, hands-on work. In many ways, my current role supporting operational sustainment for the Navy reflects that same sense of purpose.

Why did you become an operations analyst?
I initially developed an appreciation for operations research during my undergraduate internship with J.B. Hunt. Although the industries I have supported have changed over the course of my five-year career, I have consistently worked as an operations analyst focused on improving processes and solving logistical challenges.

Where do you see yourself in five years?
In five years, I hope to continue supporting process improvement efforts on behalf of the government while continuing to grow as a leader in the domain of federal logistics support.

How has your MORS membership benefited you?
My MORS membership has provided me with access to valuable resources such as *Phalanx*, case studies, and professional commentary that have helped me better understand the operations research landscape. I especially value the working groups and communities of practice that bring like-minded practitioners together to discuss strategies and approaches to real-world challenges.

<https://www.mors.org/member-central/ja>



Become a MORS Partner!

Earn exposure, memberships, advertising, and more! MORS offers your organization continuous visibility and access within the worldwide military operations research and national security analytic communities.

Benefits can include:
(depending on level)

- ▶ Up to 12 individual MORS memberships per year
- ▶ 2 Symposium registrations per year
- ▶ 4 full-color ads per year in the *Phalanx*, which has a circulation of 1,200 and a readership of 6,000
- ▶ Free exhibits at select MORS events

Current Industry Partners

Platinum

- ▶ Institute for Defense Analyses (IDA)
- ▶ KBR
- ▶ Lawrence Livermore National Laboratory
- ▶ Lockheed Martin
- ▶ Raytheon
- ▶ Systems Planning & Analysis

Gold

- ▶ Accenture
- ▶ DCS Corp.
- ▶ KaDSci, LLC
- ▶ L3 Harris
- ▶ MITRE
- ▶ Northrop Grumman
- ▶ Sandia National Lab
- ▶ Technomics

Silver

- ▶ Argonne National Lab
- ▶ Bear Cognition
- ▶ CANA

Bronze

- ▶ DEFCON AI
- ▶ George Mason University Volgenau School of Engineering
- ▶ ITA International
- ▶ JMP
- ▶ Johns Hopkins University – Engineering for Professionals
- ▶ NC State Engineering
- ▶ Sentient.Solutions
- ▶ Sentir Laboratories
- ▶ Serco
- ▶ The Analytical Group
- ▶ The Ranger Group

For further information, contact Katherine Miller, Director, Partner and Member Relations: kmiller@mors.org or (703) 933-9078

www.mors.org/Partners/Partner-Program

Upcoming Events

The Military Operations Research Society (MORS) offers opportunities for professional development and training via courses, tutorials, workshops, and the annual Symposium. Payment can be made via credit card, check, or form SF182.

94th Symposium

Jun

8-11

Location:
Colorado Springs, CO

The premier opportunity for the national security community to exchange information, examine research, and discuss critical national security topics. Operations research professionals from military, government, industry, and academia gather to participate in tutorials, CEU Courses, and various presentations across 30+ working group topics.

Certificate in Survey Process

Sep

14-17

Location:
Online

This four-day course is designed for analysts seeking a practical understanding of research survey methodology. The course covers the basic principles of survey research and guides participants in the design and execution of high-quality surveys while avoiding common pitfalls.

Global Critical Infrastructure Workshop

Sep

15-17

Location:
Mystic, CT

Global security is closely tied to the reliable provision of physical and cyber infrastructure. Recent infrastructure attacks highlight the risks to global defense and military operations. This meeting gathers global security partners to discuss various challenges of infrastructure creation, modernization, protection, and recovery.

Wargaming Emerging Technologies Workshop

Sep

22-25

Location:
Alexandria, VA

This increasingly popular, multi-day event includes lectures, discussions, and active wargames that cover relevant wargaming topics. The agenda is determined by the interests of the presenters and panelists who submit abstracts, set up panels, and volunteer their games.

Certificate in Wargaming

Oct

19-23

Location:
Online

This five-day course examines wargaming theory, research, design, development, execution, analysis, and reporting. Building on Peter Perla's theory of the "Architect, Artist, and Analyst" model for game designers, the course covers each style of wargame design. On the last day, students develop and execute their own games.

Designing Tactical Games Course

Nov

3-5

Location:
Online

This three-day course focuses on the intricacies of building tactical games, requiring the game designer to manage many complex variables so players can make appropriate warfighting decisions. Through lectures and exercises, participants examine challenges and explore possible solutions in theoretical and practical terms.

Gaming Space Operations Course

Nov

17-19

Location:
Online

Gaming Space Operations is a three-day course focused on how we develop and execute games that involve operations. The course will cover the basics of game design, so that students with no background can understand gaming, but will focus on building games that deal with operations in space. There will be an emphasis on the role that orbital mechanics and space flight considerations play on game design, and students should be prepared to engage with quantitative concepts.

MORS has a lot of upcoming events and activities. Make sure to visit mors.org/events to stay updated.



If you have any questions, please don't hesitate to contact Ms. Sarah Madonia, Billing & Office Manager, at sarah.madonia@mors.org or 703.933.9074.

Coming Soon to *Military Operations Research*

Preemptive Attack Planning Using Defender-Attacker Optimization of Integrated Missile Defense Interdiction

Gerald G. Brown, W. Matthew Carlyle, Emily M. Craparo, and Jeffrey E. Kline

This article proposes a model for preemptive, launch-site strike mission planning to significantly reduce the potential impact of a ballistic missile attack from a hostile adversary. The goal of this analysis is to determine the best positioning of visible defender platforms to minimize the worst-case expected damage that results from optimal (i.e., expected-damage-maximizing) attacker positioning and use of attacking missiles. A follow-up analysis then determines optimal defender employment of a set of hidden strike platforms to preemptively attack the most concerning launch sites within range, and these solutions inform effective early strike planning.

Reinforcement Learning for Threat Analysis and Resource Allocation

Kevin McDonald, Michelle Blom, and Michael Papisimeon

Threat evaluation weapon assignment (TEWA) algorithms are used as decision aids by air battle managers to help coordinate the defeat of threats in an informed and timely way. As battlespaces continue to rapidly evolve, due to the increasing prominence of aspects including all-domain capability, autonomous systems, and system interdependencies, threat defeat decision support algorithms need to adapt to ensure they are operationally relevant. The results show that the RL TARA algorithm significantly outperforms these alternatives. RL is able to learn concepts including force orchestration, threat evaluation, and the sequential ordering of higher-level actions over time.

Military Operations Research Society (MORS) Oral History Project Interview of Natalie W. Crawford

Jim Bexfield, Fellow of the Society (FS), and Bob Sheldon, FS

Natalie W. Crawford was a senior fellow and distinguished chair in Air and Space Policy at the RAND Corporation. She was vice president and director of RAND Project AIR FORCE from 1997 to 2006. Natalie was the MORS Wanner Award laureate in 2003. Also in 2003, she received the Air Force Analytic Community's Lifetime Achievement Award and the Lt Gen Glenn Kent Leadership Award. The interview was conducted on April 26, 2021, via Zoom. Her oral history appears in the online version of Volume 31, Number 1 of *Military Operations Research*.

Modifying the Lanchester Equations to Analyze Conflict Dynamics with Reserve Forces in Modern Warfare

Vikram Mittal and Stephen Gillespie

This article introduces a new variation of the Lanchester equations that accounts for reserve forces, which replenish losses to keep the active fighting force constant. These reserves are modeled with different attrition coefficients, reflecting variations in training, tactics, and readiness. The approach is solvable both analytically and numerically, with emphasis on force size and attrition rates. A case study applies the method to armored vehicle losses in the Russia-Ukraine war, showing Russian reserves outperforming their initial forces, while Ukrainian reserves underperformed. The technique offers broader insights into readiness, training, and force composition across modern conflicts.

Two Approaches to Measure the Military Power of the Country: Relative Efficiency and Linear Ordering

Namsu Ahn, Jahoon Jeong, and Junyeol Ryu

In general, military power is defined as having larger defence expenditures, greater troop numbers, and more extensive weapons systems. But what if we define military strength from another perspective? In this study, military power is defined in terms of efficiency and consistency, and the results are presented accordingly. The operations research methodology employed in this article is based on a linear programming model, and modeling as well as simulation techniques were applied using data collected from the Internet. The findings of this study may provide useful insights for national defense decision makers in strengthening military capabilities.

LEADING THE NATIONAL SECURITY ANALYTIC COMMUNITY



1550 Wilson Boulevard, Suite 700, Arlington, VA 22209

Main: (703) 933-9070 | Fax: (703) 933-9066

e-mail: morsoffice@mors.org | www.mors.org

Check our website at www.mors.org for the latest updates.