Course Catalog

Who Should Attend an Alidade Institute Seminar?

Alidade Institute Seminars are designed for military, civilian and defense industry professionals responsible for assessment and analysis of:

Distributed Network Operations
Cyber and Information Warfare
Complex Military Operations
Innovative Logistics Concepts

Alidade Institute Seminars provide a unique combination of breakthrough research in emerging technical disciplines and insightful application to some of the most vexing new defense and homeland security operational challenges.

On-site Seminars can be presented under Non-Disclosure Agreement (NDA) and tailored to meet the operational objectives of an organization, the technical skill set of a target audience or a more specific research topic.

Operations Research for Cyber Analysis

One of the biggest challenges facing today's operational commanders is the lack of tools for formally assessing Cyber Operations. Although there is a substantial capability to analyze more traditional operations such as kinetic combat and logistics, cyber analysis remains highly idiosyncratic and imprecise, and Measures of Effectiveness for Cyber Operations remain elusive. As a result, decision makers cannot plan and execute with the same confidence that the discipline of Operations Research has brought to traditional plans and operations.

Recent research by Alidade Incorporated, however, offers new methods for overcoming this challenge. A full-day seminar, part of Alidade Institute's "Where's the Math™" seminar series, will present and discuss fresh approaches for quantitatively assessing the full range of Cyber Operations.

This seminar will introduce participants to new quantitative techniques for analyzing Cyber Operations. Topics covered will include:

- Review of the strengths and weaknesses of existing techniques
- Introduction to new mathematics to describe social, cultural, information and influence networks
- Application of the mathematics to cyber disciplines such as Computer Network Attack, Computer Network Defense, Influence Operations and Strategic Communications
- Procedures for developing Cyber Operations Measures of Effectiveness
- Design of Cyber Common Operational Pictures (COPs) for Operational Level of War decision making
- Case studies from recent real world analyses

Technical Seminar in Network Science

From Euler's 1736 solution to the famous "Seven Bridges of Konigsberg" problem to Information Age research into predictions of the size of the worldwide market for internet routers, Network Science has been a valuable tool for analyzing arrangements, flows and interactions in connected systems. Also known formally as "Graph theory," this subject has enjoyed a recent renaissance, providing new insight into the structure, dynamics and evolution of such systems as genomics, the internet, the worldwide web, scientific collaborations, ecological food webs, open source software and patterns of employment the motion picture actor industry. While most of this research has focused on the many variants of distributed, networked systems in nonmilitary contexts, a growing community of practitioners are applying new developments in network mathematics to distributed, networked military systems.

As part of Alidade Institute's "Where's the Math™" seminar series, a new, full-day seminar presents an overarching review of recent developments in Network Science, specifically tailored to a technical military audience.

This seminar will discuss the fundamentals of Graph Theory, beginning with classical approaches and updating the subject with the recent developments most relevant to military, intelligence and Homeland Defense audiences. Specific topics covered include:

- New classes of network structures
- Statistics developed to describe the characteristics of these new classes
- Techniques for analyzing the structure, dynamics and evolution of complex networks
- New research into how networks compete with networks
- Case studies from recent real world analyses
- Measures of Effectiveness for networked systems

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Understanding Swarms: The Fundamentals of How to Build and Fight Swarming Systems

Although swarms have always had a place in conflict between humans, they have received renewed attention as information technology and advanced robotics present new opportunities for distributed adaptive forces. Because the underlying technologies can be very affordable, many types of adversaries can exploit these opportunities across the full spectrum of combat. Indeed, even unsophisticated adversaries can hold first-tier military platforms at great risk with swarms.

Recent research by Alidade Incorporated offers new methods for understanding this challenge. A full-day seminar, part of Alidade Institute's "Where's the Math™" seminar series, will present and discuss fresh approaches drawn from the fields of complex system research and network analysis for understanding a wide range of human and machine swarms.

This seminar will introduce participants to the fundamentals of swarms and other distributed, adaptive systems. Topics covered will include:

- The operational history of swarms, melees and other decentralized, adaptive systems
- Introduction to new concepts and mathematics to describe swarming systems
- Application of the concepts and mathematics to the engineering and acquisition of swarming systems
- Application of concepts and mathematics to tactics and operational art
- Recent operational and acquisition case studies

Operations Research for Networked Military Systems

As we learn more about operations in the Information Age, every person involved in new defense systems recognizes their program's heavy dependences on networked systems and concepts. Yet, the standard industry tools and models for evaluating how systems work are, in many cases, more than a century old. As a result, analysts find themselves struggling to answer such fundamental questions as:

- What is the value of networking in warfare?
- How should new systems be designed, built and operated?
- What new command and control arrangements are most appropriate for networked systems?
- How should legacy military systems be integrated with new, networked enterprises?

Operations Research for Networked Military Systems explains why legacy models are unsuitable for answering these questions. This full-day seminar describes a new set of principles and methods:

- Mechanisms of advantage for distributed networked operations
- Design architects for distributed networked forces
- Important C2 patterns observed in networked military operations
- New models for search and detection
- Distribution networks for adaptive logistics

This seminar will reviews mathematical models of networked competition and provides examples from recent studies of network-centric military systems.

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Command and Control Network Analysis (C2NA)

The biggest change in military operations in the Information Age has been the extraordinary advance in command and control (C2) networks. Military operations centers are now state-of-the-art electronic nerve centers fed by an increasing desire for more data and better collaboration. This change is mirrored in federal/state emergency management and metropolitan first responder command centers. It is surprising, then, that while a great deal of effort has been expended to engineer and protect the IT elements of these networks, far less has been put forth to understand how operators actually *use* their networks. The development of new mathematics, tools and techniques is changing this situation, however, and there is a growing community of analysts who are mining network usage patterns to help organizations reach a deeper understanding of how to design, build and use today's sophisticated command and control suites.

Alidade Incorporated is one of the very few firms with experience studying real-world C2 Network usage patterns and analyzing what these patterns mean for mission accomplishment, executive decision making, network defense and system architecture. Drawing from its analysis of Joint Task Force and four-star Command Post Exercises (CPXs), Alidade Institute's will conduct a full-day seminar that presents new approaches for quantitatively evaluating C2 networks.

The Command and Control Network Analysis seminar explains why legacy Operations Research models not suitable for assessing C2 systems and describes a new set of principles for military network analysis. Topics include:

- New techniques for preparing, conducting and briefing the results of C2 network analyses
- Recent mathematical developments that have revolutionized the analysis of C2 systems
- Overview of the new types of analytical packages that analyze C2 networks
- Methods for developing C2 Network Measures of Effectiveness

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Fundamentals of Adaptive Logistics

Although advanced information networks and RF commodity tags promise to provide greater in-transit visibility for military networks, experience in recent operations shows that visibility is not enough. The extreme uncertainties found in tactical level battlefield conditions create turbulence in delivery systems, and quite often the speed at which information flows on the battlefield far out-strips the ability of distribution systems to respond to new demands, revised delivery locations or unexpected interruptions. Alidade Incorporated has been at the forefront of research into adaptive logistics concepts, developing innovative processes and doctrine for informed, flexible information and delivery systems that provide more operationally useful logistics structures.

The Alidade Institute Fundamentals of Adaptive Logistics seminar provides new theoretical and technical research that is inspiring a new breed of sustainment capabilities. Topics covered in the seminar include:

- Review of classic operational logistics theory
- Presentation of new technical and mathematical models of logistics networks
- Development of a new theory of Demand Networks
- Discussion of when and how Demand Networks outperform Supply Chains
- Summary of the application of Demand Networks to new operational concepts, particularly those envisioned for unmanned, autonomous forces

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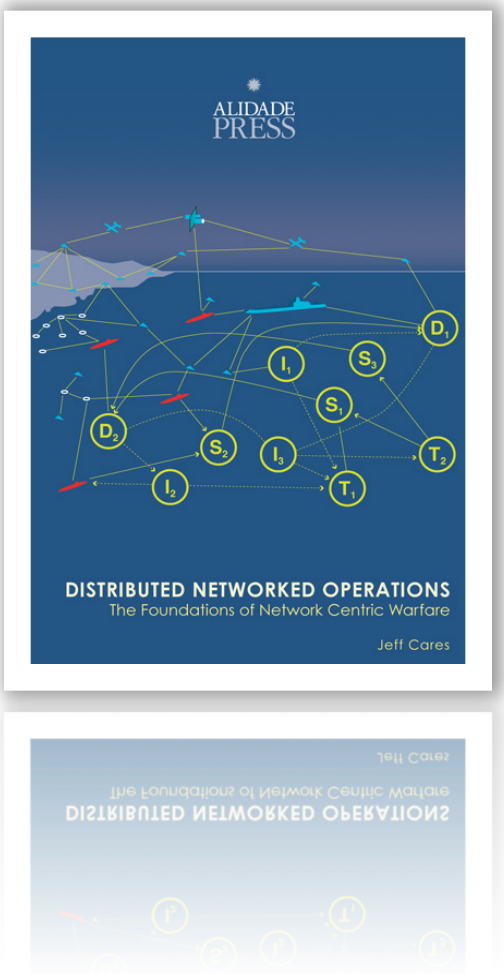

Contact Betty at (401) 662-9842 or betty@alidade.net for group and on-site rates.