



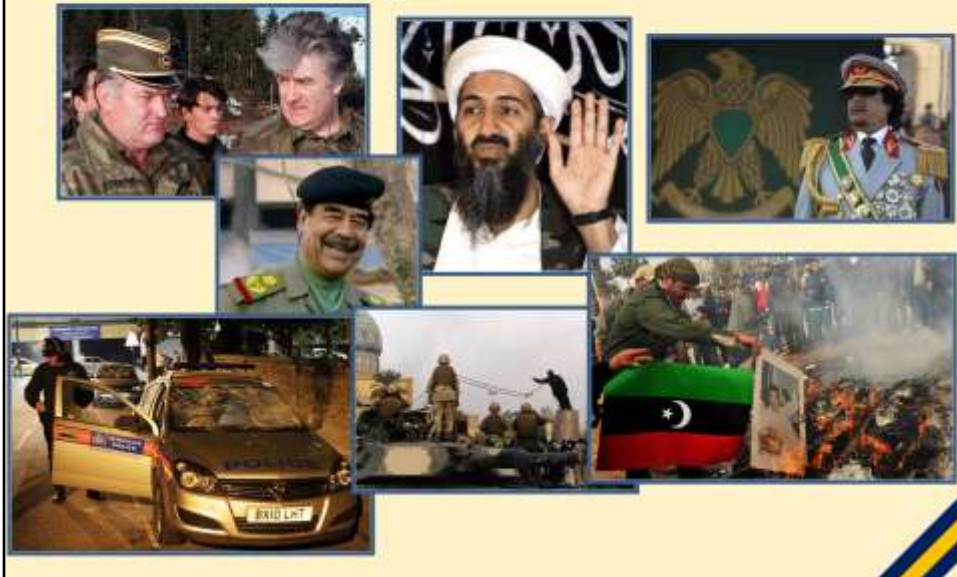
This presentation will cover how seminar war games can be used as part of analysis activity that helps make some sense out of that wicked, dangerous, and uncertain world out there.

Jeff Appleget is a retired US Army colonel who have been on the operational research faculty at the US Naval Postgraduate School for a few years now. He teaches one of the few courses in the academies throughout the NATO nations that is devoted to applications of war gaming.

I (Fred Cameron) have over a 35-year career with the Canadian Centre for Operational Research and Analysis. Over more than 20 years I have been heavily involved in seminar war gaming with members of the Canadian Army, with other military services, and with civilians who have roles in planning reactions to catastrophes, disasters, and other challenges from the non-military environment.

For the last couple of years Jeff and I have been teaching young OR analysts seminar war gaming so they can add this method to their toolbox. We want to reveal our views on seminar war gaming for use in OR analysis.

The Wicked, Dangerous, and Uncertain World



I will not dwell on the circumstances that make our world wicked, dangerous, and uncertain.

Our various military services have been dealing with international issues for many years. There are also domestic issues that demonstrate that the troubled times in which we live are not confined to the international realm.

Introduction



- Seminar War Games
 - “Seminars” and “War Games”
- Variants of Seminar War Games
- Applications
- The Decision-Action Cycle
- Roles for Seminar War Games within the D-A Cycle
- British Views – The Army, and the Joint Forces
- The Phased Approach for Seminar War Games
- Data Collection and Analysis
- Art, Science, or Craft
- So what?

During my talk I will cover these points. My main focus will be on how the military services use seminar war games, in various formats, as part of their decision making and problem solving.

During military operations there seems to be an endless cycle of action followed by the planning for a subsequent action: a decision-action cycle. I will provide some background for this, include where war games fit in.

Given where our venue is, I thought it best that I speak of British thinking on this, rather than Canadian or American. But Canadian and US military doctrine parallels British doctrine very closely in this area.

I will speak of how we are teaching the use of seminar war games, including a phased approach from initiating a new seminar war game activity, through to its conclusion. Since we are all from the OR/OA world, I will briefly cover some aspects of data collection and analysis to accompany war gaming.

Then I will take a bit of a philosophical departure to discuss whether seminar war gaming is an art, a science, or a craft.

And I will conclude with “so what”?

Summary of SWG Characteristics



- First: “Seminar”
 - Small groups meet for recurring meetings
 - Each meeting focuses a particular subject
 - All present are expected to participate actively
 - Participants are presumed to understand topics beyond the “beginner stage”
 - Civil discourse is an essential component
 - Facilitator or seminar leader assists, but does not lecture – Socratic dialogue is used
- Second: “War Game”
 - “A warfare model or simulation that does not involve the operations of actual forces, and in which the flow of events shapes and is shaped by decisions made by a human player or players.” Source: Peter Perla, Workshop of Military Op Research Society on “Wargaming”, 15 Oct 2007

Seminar war gaming includes characteristics of “seminars” and of “war game”. We are all probably familiar with seminars as used in academic circles. Rather than the “one-to-many” communication pattern of the lecture format, participants are expected to take an active part in a seminar. They are expected to come with appropriate knowledge of the topic so the group can get beyond a superficial (or “beginner”) level. Above all the leader (sometimes called a “facilitator”) does not lecture to the participants, rather he or she assists them through a Socratic process. War games of various sorts have been used throughout our military communities for well over a century. Modern military use of war gaming can be traced to the Prussian Army of the early 19th century. Peter Perla, author of a notable book from 1990 called “The Art of Wargaming”, provided a definition of war gaming during a workshop on the topic sponsored by the Military Operations Research Society. (Note: This definition is a bit different than the definition in his book of 1990. (Specifically the 1990 definition proposed that there are two sides in war gaming, but military operations in the last couple of decades have made it clear there are many stakeholders with diverse agendas and objectives. The newer definition allows that, of the players, only one may be human.)

Variants of Seminar War Games



- Seminar War Games in traditional military use:
 - Training
 - Course of Action development
 - Seminar War Games in a quasi-academic setting:
 - Military doctrine development
 - Concept development, including R&D proposals
 - Futures study, and related work
 - Education
 - Variants:
 - Command Post Exercises
 - Pol-Mil Gaming (political-military)
 - Hypotheticals for preparation for civilian crisis management and disaster planning
 - Entertainment games
 - Suitable for a full range of *wicked* problems
- Planning for/anticipating:**

 - Terrorist attack
 - Bio hazard
 - Transportation catastrophe
 - Massive medical emergency
 - Economic consequences
 - Police/public safety events

In the early days of war gaming, the military typically used them for training and education of young officers. They could also be used to assess potential courses of action before some battle.

In recent times, our military services have used them to explore more hypothetical situations, e.g., how might the military use some new technology, say satellite navigation.

In the civilian realm, seminar war games have been used to examine responses to terrorism, to plan the medical and health responses to a new and aggressive contagion, or to develop the means to respond to natural disasters like earthquakes and hurricanes.

Applications



- Technology Seminar War Games
 - NATO Land Ops 2020 and Urban Ops 2020
- Concept Development War Games
 - Canadian Army Concepts: EXFOR 01, EXFOR 02
- Doctrine Development War Games
 - Canadian Army Doctrine: “Four Corners” Games
- Training War Games
 - Canadian Army Staff College: Exercise Final Drive
- Tests of War Plans
 - Gen Zinni and post-Saddam Iraq: Ex Desert Crossing 1999



These are some military activities that used seminar war games. For the NATO studies at the top, the main source of OR expertise came from UK's Dstl. On the Canadian side, we have had a series of seminar war game activity to investigate military uses for new technology, to develop new concepts for military operations, to determine the strengths and weaknesses in draft military doctrine.

A notable seminar war game in the US, Exercise DESERT CROSSING, was conducted in 1999 by CENTCOM then under the command of General Anthony Zinni. It's objective was to investigate issues in military operations in Iraq should Saddam Hussein be removed from power. Do a Google search on Zinni and DESERT CROSSING to see the report.

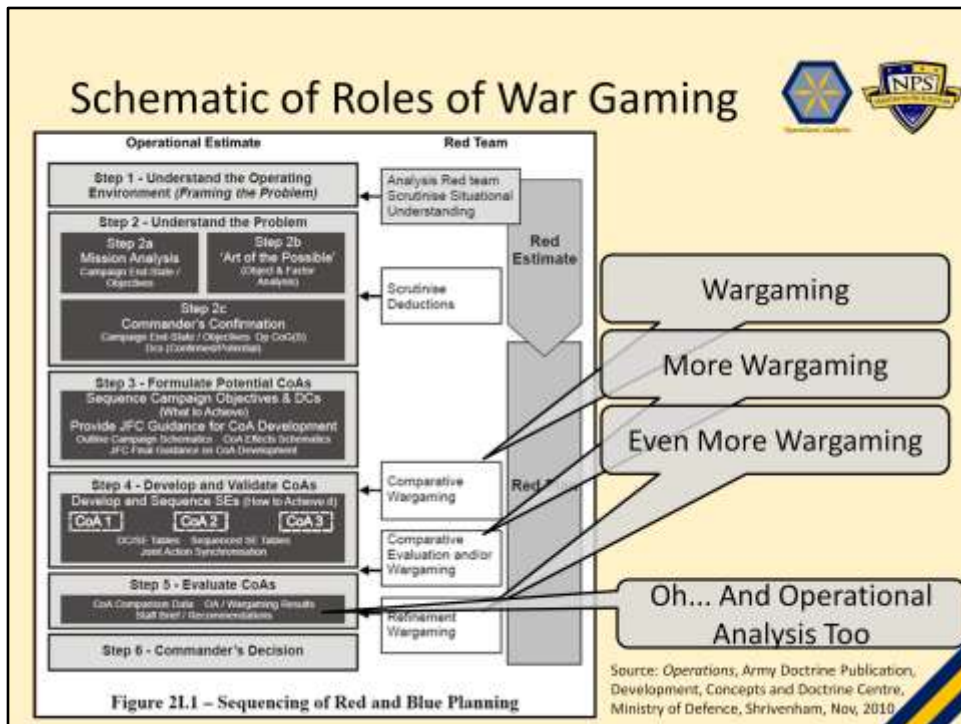
The Decision-Action Cycle



- Military Activity is a cycle of planning and operations
- John Boyd's OODA Loop provides a structure (See Wikipedia for John Boyd and OODA Loop)

Source: Operations, Army Doctrine Publication, Development, Concepts and Doctrine Centre, Ministry of Defence, Shrivenham, Nov, 2010

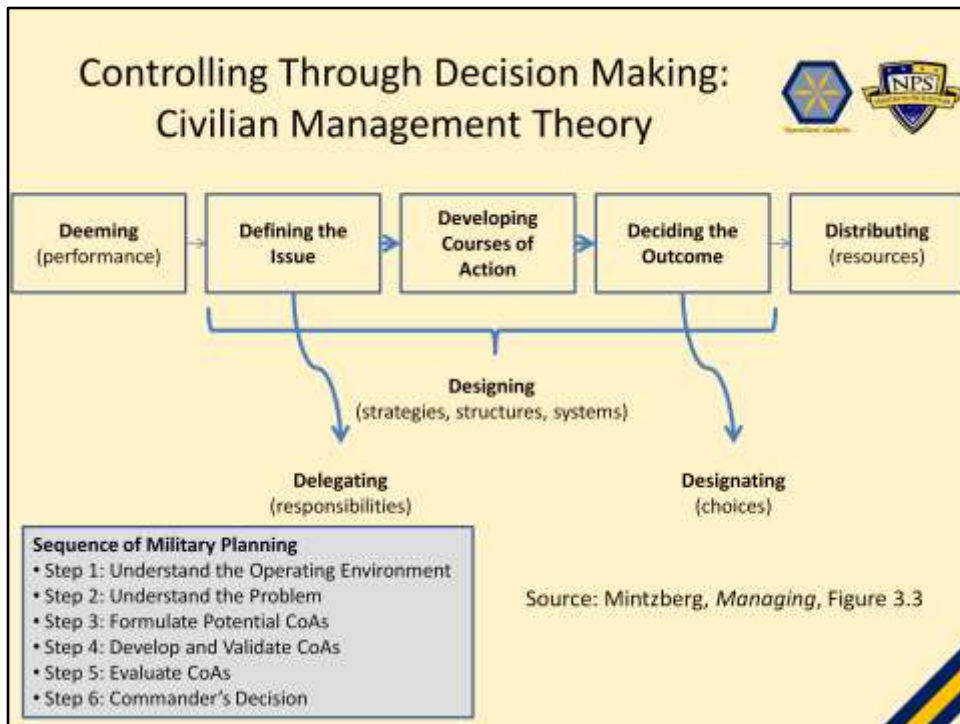
Military operations, in rather a simplistic view, means you are either on a mission, or getting ready for a mission. In a more formal sense, British Army doctrine provides a diagram of the "Decision-Action Cycle".



This diagram from British Army doctrine shows the step for planning military operations. Note that war gaming as a tool will play a major part in some of the more crucial steps.

Since this audience may be interested, I have also highlighted the Army's view that "Operational Analysis" also plays a significant role.

BTW, I see war gaming and OR/OA as overlapping considerably, although this doctrine tends to suggest they are distinct methods.



Henry Mintzberg provides a model of how civilian managers make their decisions, and use the process to control the organizations they lead.

Note the close parallel with the military model covered in the previous slide, particularly in the three steps in the middle of the chain, namely “Defining the Issue” (military steps 1 and 2), “Developing Courses of Action” (military steps 3 and 4), and “Deciding the Outcome” (military step 5 and 6).

There are several more elements in Mintzberg’s model, and I commend it as worth investigating at some length (see reference). But the main point for now is the similarity between the military and the civilian models of decision making.

British Army View of War Gaming... And of Operational Analysis



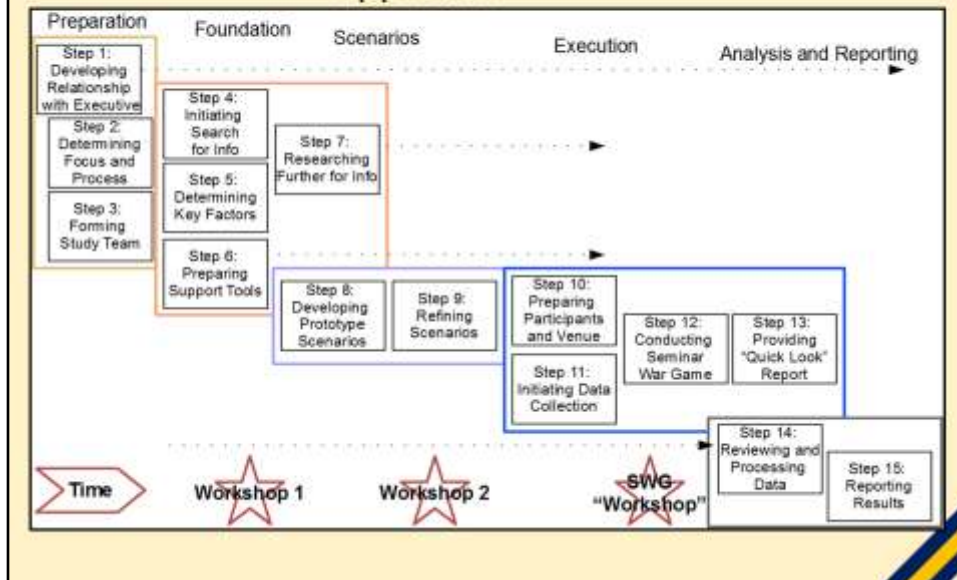
- **“Testing the Plan.** As the plan unfolds, it should be **tested to refine the decisions made and to identify potential flaws** that could flourish because of the tendency of organisations to ‘follow the herd.’ This is sometimes referred to as ‘groupthink.’ This prospect can be overcome by appointing an empowered red team, **by wargaming, or by conducting Operational Analysis (OA).**
- **OA is a modelling technique which allows the staff to better understand the potential outcomes of intended actions.”**
- *Source: Operations, Army Doctrine Publication, Development, Concepts and Doctrine Centre, Ministry of Defence, Shrivenham, Nov, 2010*

British Army doctrine provides a context for employing war gaming as part of the planning process. Specifically war gaming should be used to refine decisions and to identify potential flaws.

Note that war gaming should be used for this in conjunction with Operational Analysis (or Operational Research).

Here in the Army’s doctrine we see what the service’s thinkers have to say about OA.

Seminar War Games: The Phased Approach



Jeff Appleget and I teach seminar war gaming. In our approach we use five phases, with 15 steps. I will briefly outline those steps; in many regards they are counterparts to similar steps in an OR study that would use some other analytical method, say simulation-based experimentation.

Once practitioners become familiar with the 15 steps, we would not expect them all to be completed in meticulous detail for each seminar war game project – as with the steps in a major OR study using other techniques, a master of OR techniques may pass over several of the steps fairly briefly.

Analyzing a Seminar War Game

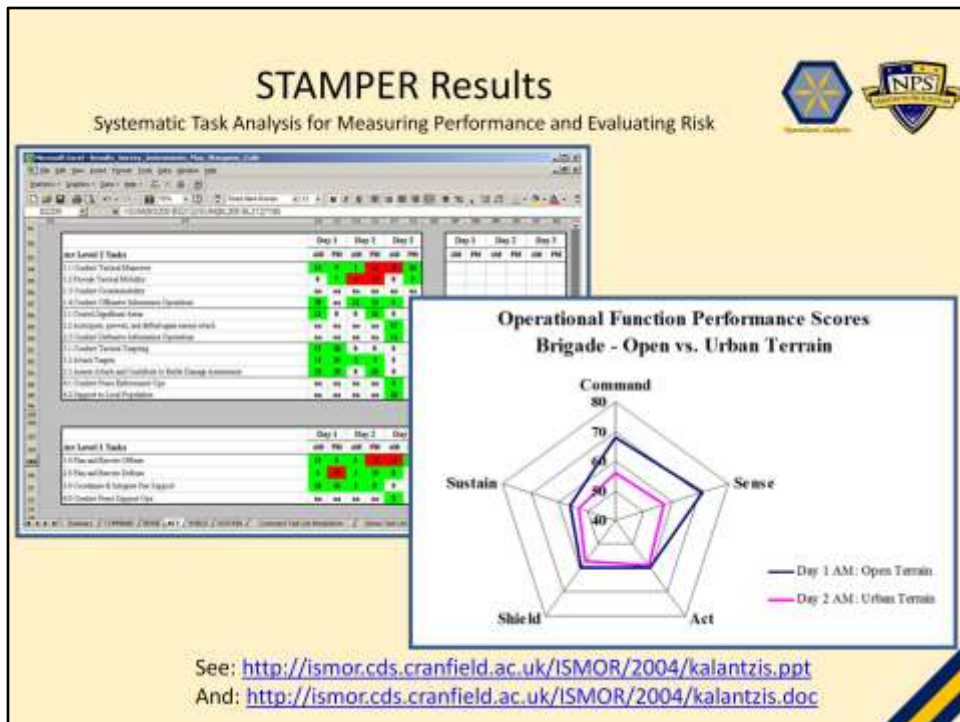


- Execution Phase
 - Step 13: Providing “Quick Look” Report.
 - Acknowledge (and correct) material from participants
 - “More study required” for remaining controversial directions
- Analysis and Reporting Phase
 - Step 14: Reviewing and Processing Data.
 - Step 15: Reporting Results.
 - Records
 - Feedback
 - Numbers

I will skip the first 12 steps in the process and jump to three steps where having data collectors and analysts on the study team begins to show real value.

Just as the execution phase is concluding, there is a need for a quick look report. Typically sponsors want this so they have some idea of where the study is going, and perhaps even so they feel better that it was not all a waste of time and energy. Military participants generally want to hear preliminary results so they have some idea of what they have contributed – an early acknowledgement of what they have accomplished. “Quick look” reports have value as well for the analysts as it is a chance to see that they accurately recorded points that participants raised, and to correct them where necessary.

“First in, last out” is the motto of many military units. But in this case it is apt for the OR analysts. Long after military players have left a seminar war game and moved on to other activities, the OR folks remain to sift through the data and write and re-write the reports.



Eugenia Kalantzis developed a method for “Systematic Task Analysis for Measuring Performance and Evaluating Risk” or STAMPER to assist with evaluation of courses of action within seminar war games. She presented this at ISMOR in 2004 and her material can be found at the archive site shown here.

STAMPER is essentially a spreadsheet-based scoring system that can be used by multiple users to award “point scores” to different alternatives. After considerable massaging (described in the Kalantzis material) results can be presented in a radar or spider-web diagram, with an example here.

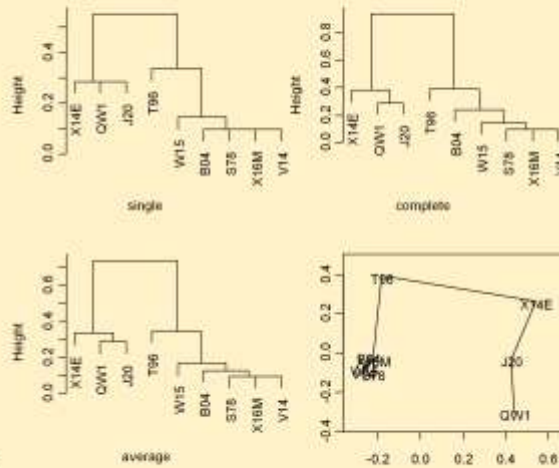
This shows two situations evaluated on five main criteria, namely capabilities to command, to sense, to act, to shield, and to sustain. The strengths and weaknesses of the alternatives can be viewed in gross terms, or, through the spreadsheet of scores, there is a “drill down” capability.

STAMPER was reported at a previous ISMOR (2004) and details can be found in the archives.

Schools of Thought Analysis



- SOTA develops
 - Individuals rank alternatives
 - Results combine individual ranks into a group ranking (called “Borda”)
 - Differences of individuals from each other and from “Borda” determine a configuration indicating “schools of thought”



See: <http://ismor.cds.cranfield.ac.uk/ISMOR/2010/CameronPond.pdf>

And: <http://ismor.cds.cranfield.ac.uk/ISMOR/2010/CameronPond2.pdf>

Another means of evaluating alternatives is shown here, based on papers presented at ISMOR by Cameron and Pond (see links).

Schools of Thought Analysis uses methods to determine distances between participants in seminar war games (or other group activities). From the distances, diagnostic diagrams are generated from cluster analysis and multidimensional scaling to determine if there may be minority schools of thought with differences in preferences to some more dominant school.

This was also reported at an earlier ISMOR and details can be found in the archives.

Benefits of War Gaming



“Regardless of which techniques are employed, **wargaming should provide:**

- a. A **thorough understanding of the likely actions and reactions** of friendly, neutral and hostile actors within the Joint Operations Area (JOA) and, where appropriate, beyond.
- b. An indication of **the likely effects of military activity, and the associated risks** – threats and potential opportunities – that such activity might generate.
- c. A **specific assessment of any friendly CoAs [Courses of Action]** versus those of an opponent.
- d. **Refinement and development of CoAs**, including the detailed determination of relevant timings, force (re-)deployments and logistic implications.
- e. **‘Bullet-proofing’** of a JFC’s [Joint Force Commander’s] **chosen CoA.**”

Source: *Campaign Planning*, Joint Doctrine Publication 5-00 (JDP 5-00) (2nd Edition), Development, Concepts and Doctrine Centre Ministry of Defence Shrivenham December 2008, p. 21-4

The British military view, at the joint level, is that war gaming brings many opportunities to analyse critical aspects of the problem solving and decision making process.

Art, Science, or Craft?



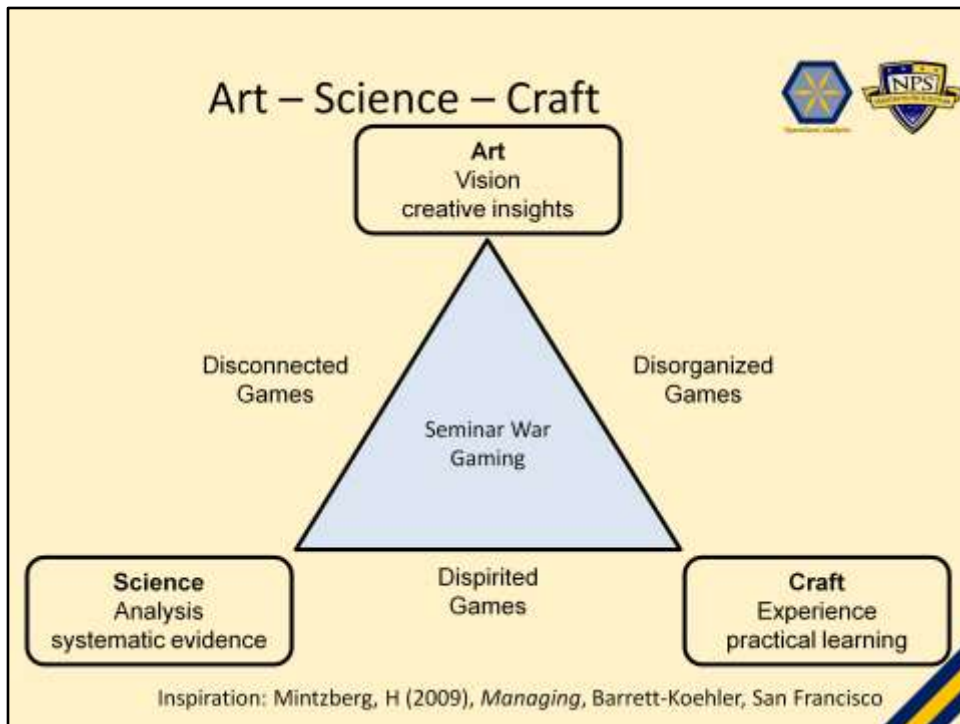
“Management is, above all, a practice where art, science, and craft meet”

~ Henry Mintzberg

“Seminar war gaming is, like managing, a practice where art, science, and craft meet”

~ Fred Cameron

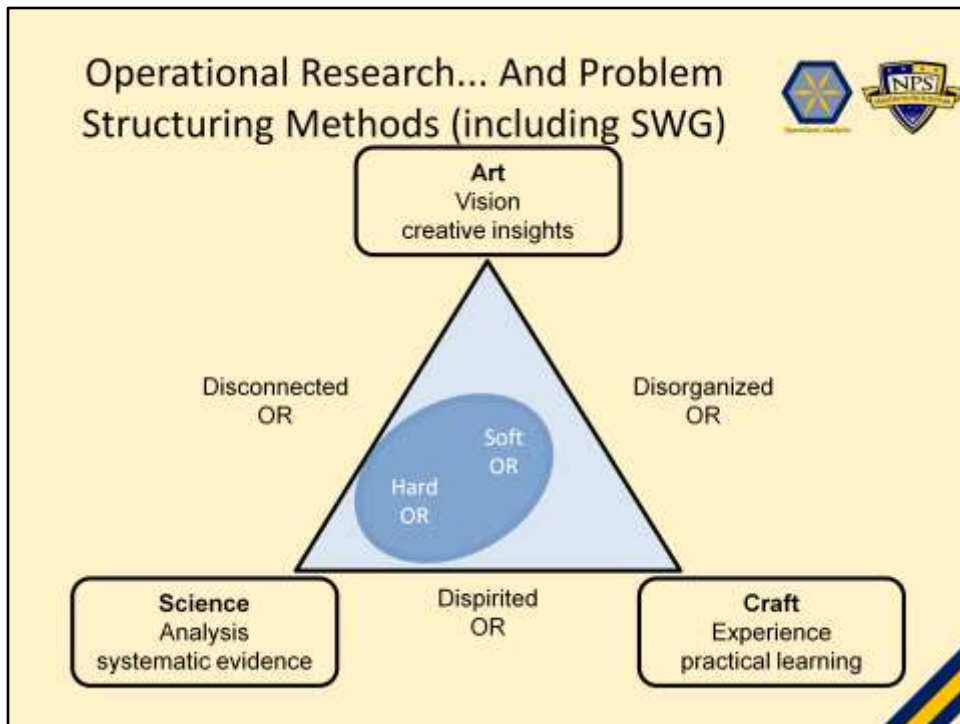
Noted management thinker, Henry Mintzberg has a notable quote about management in terms of it being an art, or a science, or a craft. I have been so bold as to adapt it to seminar war gaming.



Henry Mintzberg provides a triangle as a model of *management*. He associated the three corners with “Art”, “Science”, and “Craft”.

In a recent book he even provides a quick self-assessment tool to see where your style of management may lie within the triangle; are you more like an artist, a scientist, or a craftsman?

He also points out that when your management team has strength in art and science, but lacks craft, the results may be disconnected from reality. Where it has strength in science and craft, it may lack the spirit or energy we can associate with “art”. And, when strong in art and craft but lacking the analytic rigour associated with science, it may be disorganized. This mental model has counterparts in seminar war gaming, I suggest.



Mintzberg's triangle model might even be applied to recent practice in operational research. Over the last couple of decades there has been a dichotomy of what has been called "hard OR" and "soft OR". We might put "hard OR" close to the corner of the triangle associated with science – "hard OR" certainly has strengths in providing tools for analysis.

We might then see "Soft OR", and problem structuring methods, as a means to expand out into more poorly covered parts of the triangle.

Perhaps as more methods are developed that sit within the realm of soft OR, we can incorporate more of the art and craft that seem to have been lost with the emphasis on hard OR methods.

Problem Solving Methods, including Seminar War Games, clearly sit outside of the traditional "hard OR" methods, but are meant to provide more tools for the OR analyst, not replacement tools.

By expanding further into the triangle, soft OR methods may even reinforce the value of some "hard OR" techniques by providing more real-world context for their application (the diagram is not intended to show that soft OR is a replacement for hard OR).

Historians of OR may even say that in the early days, with its original multi-disciplinary approach, OR covered the triangle well, but then retreated into the 'science' corner – after all the term 'management *science*' offers an alter ego. And now, with interest in soft OR, we are merely reclaiming ground lost in the late 20th century.

The Craft of War Gaming



- “War gaming is **currently a craft**. There are a few highly experienced and skilled game designers and directors out there, and these individuals **each operate by rules of thumb they have learned over the years.**”
- Source: Rubel (2006)

Robert Rubel heads the war gaming activity at the US Naval War College in Newport, Rhode Island.

In a recent article he viewed war gaming still being a craft, and lacking the essential characteristics where it might be seen as a profession. While he did not use Mintzberg’s triangle to demonstrate his point further, he was critical of war gaming’s lack of more formal and agreed procedures, of codes of best practice.

We would agree that while we try to teach war gaming according to some rigorous principles, we are still talking about a craftman’s approach to his trade, more than a scientist’s approach to his discipline or an engineer’s approach to his profession.

Our approach to seminar war gaming with five phases, broken further into 15 steps, incorporates many “rules of thumb” from a few decades of personal experience. In that sense we teach it as a craft. Our feeling is that it cannot yet be taught as if it were a topic in a science or engineering program.

A Guild of Wargamers



- “The nation’s war and staff colleges all have war-gaming departments”. (as do other nations)
- “Certain academic institutions, notably the Naval Postgraduate School, teach courses in war gaming.”
- “These organizations could come together in a ‘guild’ of sorts to establish standards and promote the formalization and professionalization of a war-gaming discipline.”
- “All this is necessary if war-game output is to merit a level of epistemological confidence commensurate with the uses made of it.”
- Source: Rubel (2006)

Robert Rubel goes on to give a “call to arms” to see war gaming established as more than just a collection of “rules of thumb”.

Sponsors of war games often put considerable faith in the outcomes, and back recommendations with a multitude of resources. It behoves all concerned with the practice of war gaming to promote more ambitious activities to establish standards and to promote professionalism.

A Guild of Wargamers



- Guilds comprise:
 - Masters
 - Journeymen
 - Apprentices
- Guild framework led to the emergence of early European universities
- Conducted research on methods and materials and set standards
- The Dark Side:
 - Controlled of the secrets of the craft, but shared them within the guild
 - Controlled entry into the craft
 - Strived to keep prices high

One legacy of guilds is “the principle of granting a few people comfortable privileges at the expense of the rest” (*The Economist*, Special Report on Italy, 9 June 2011)

Here are some of the characteristics of guilds, reaching back to when they were at their zenith of power. Some of the early European universities were essentially guilds, where students, as apprentices engaged masters within their guild to educate them on specific topics.

One of the positive sides of guilds was work to research on methods and materials as used by guild members.

Of course, guilds also had their negative aspects.

In a recent issue *The Economist* attributes the residue of guild structures in Italy (even after some 300 years) as a barrier to improving its economy. By closing trades and professions to newcomers, those with “guild credentials” can charge unjustifiable rents for their services, e.g., as taxi drivers.

Courses in War Game Methods



- US Naval Postgraduate School
 - Academic course over three months
 - Students are enrolled in residential O.R. degree program
- DRDC Centre for Operational Research and Analysis/Canadian Forces Aerospace Warfare Centre
 - Practical course for O.R. staff and military counterparts, one-week long
 - “Just In Time” training for personnel who will conduct military war games

Jeff Appleget and I have now been involved in two education and training activities related to seminar war games. One is the long standing graduate course at the US Naval Postgraduate School. It is taught over a 12-week academic quarter. More recently Jeff and I have been involved in developing a course for the Centre for Operational Research and Analysis to be given at the Canadian Forces Aerospace Warfare Centre. This course is intended for analysts and military counterparts who will almost immediately use their new-found skills to conduct seminar war games of their own.

The Future



- A Guild of Wargamers
 - With a role for operational research analysts
 - With compilation of successes, failures, lessons, and best practice
- Training, Education, and Professional Development
 - Sharing of experience
 - An apprenticeship programme?

For me the “so what?” is about where the operational research community may go next with seminar war gaming. Robert Rubel has proposed there should be a guild of wargamers. While many “guild members” would not be from the operational research community – many would be military personnel with meagre OR/OA credentials – our community must be well represented. Thinking of the Mintzberg triangle for seminar war gaming, it would be the OR/OA community that could inject some of the rigor of science into the art and craft of seminar war gaming that is already well represented.

There is a growing body of literature on seminar war gaming. But the last best effort to draw the material together in one place was Peter Perla’s *Art of Wargaming* from 1990. Lots has been learned in the last two decades.

So far war-gaming techniques are largely passed on from master to apprentice through shared experiences at actual gaming activities. The US Naval Postgraduate School is one of the few academic facilities that actually provides education for the field. An education program should be expanded in this area, and it should be well grounded in practice, and not merely a compilation of theory.

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