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FROM SYSTEMIC OPERATIONAL DESIGN (SOD) TO A SYSTEMIC APPROACH TO DESIGN AND PLANNING: A CANADIAN EXPERIENCE

by John Anderson

*A good chess-player having lost a game is sincerely convinced that his loss resulted from a mistake he made, and looks for that mistake in the opening, but forgets that at each stage of the game there were similar mistakes and that none of his moves were perfect. He only notices the mistake to which he pays attention, because his opponent took advantage of it. How much more complex than this is the game of war, which occurs under certain limits of time, and where it is not one will that manipulates lifeless objects, but everything results from innumerable conflicts of various wills!*¹

Introduction

The international security environment has been characterized as uncertain, volatile, and fraught with risk. A literature review reveals that while large-scale, ‘force-on-force,’ nation state vs. nation state conflict is considered unlikely, it can never be entirely ruled out, necessitating the continued existence of conventional military force structures.² Therefore,

operational staffs will continue to use design and planning tools to best translate strategic direction into tactically executable actions that conform to the application of conventional force on force engagements. However, equally important to operational staffs is the changing character of modern conflict. Globalization and technological advances that have heralded the so-called information age have added a new measure of complexity to modern conflict. As Dr. Paul T. Mitchell, an Associate Professor of Defence Studies at the Canadian Force College demonstrates, geographical and state defined boundaries are less relevant as new communications methods permit people the means to “... direct their destinies in radical new

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ways by enabling them to bypass traditional sources of power – the state, the family, religion and corporations.”³ And it is by virtue of these technological advances that a networked approach has emerged.

This networking of state and non-state actors has prompted Western militaries to embrace the notion of a comprehensive approach to operations, marshalling all aspects of national power – economic, diplomatic, and military – to achieve a coherent national approach to dealing with national security issues. And as non-state confrontation over perceived grievances emerges, the likelihood of irregular war, resulting from disparity between the capabilities of the aggrieved, and the means to deal with it, demands that Canada explore “... new capabilities and new approaches to combat new adversarial means and weapons” because “increased complexity in future conflict will require increasingly complex responses from Canada.”⁴

The aim of this article is to demonstrate that these new approaches apply in the cognitive realm as well, in the way in which staffs design and plan military actions to deal with the complexity of modern conflict. It will use the findings of a three year experiment with an alternative approach to operational design to argue that when dealing with the operational problem of conflict that is complex, asymmetric, and irregular, tried and true methods, or the way in which these methods are typically employed, may not be the optimum approach to campaign designing and planning.

“From an operational level of war perspective, effects-based planning assigns missions and tasks to subordinate tactical level formations to achieve desired effects.”

cess. It has remained largely unchanged in its basic principles. While new concepts are not yet mature enough to be formally incorporated into CF doctrine, these changes are reportedly focused upon reflecting the need for a whole of government comprehensive approach using effects-based planning.⁵ From an operational level of war perspective, effects-based planning assigns missions and tasks to subordinate tactical level formations to achieve desired effects. Taking this approach offers the opportunity to take a broader and arguably more creative view of the application of combat power, and its integration into the whole of government comprehensive approach, to achieve desired effects.

The OPP Manual acknowledges that in order to command effectively, the commander must lead in conditions of risk, violence, and fear, and make decisions despite uncertainty, ambiguity, and rapid change. The staff is organized and focuses and synchronizes its efforts to assist the commander. It is by practicing the operational art, which is the employment of military forces to achieve strategic objectives, that they can collectively accomplish this. It is acknowledged that conflict is a human activity that occurs under conditions of imperfect knowledge by multiple participants acting and reacting, based upon perceptions. It is confusing and complex, and can appear chaotic and non-linear in that inputs and outputs are often disproportionate.⁶

The objectives of the OPP include standardizing the planning process and maximizing commander and staff creative thinking and associated thought processes.⁷ These two objectives, or the way in which they are approached, can be seen to be in conflict. In standardizing the process, the manual is presented as a series of steps, or a linear approach, that details what must be achieved at each step. Furthermore, the way in which this is accomplished is through the continental approach to staffing functions. Each sub-element of the design and planning team is focused upon a specific aspect of the overall problem. In effect, the process is compartmentalized, with each sub-element contrib-

uting their analysis of their component of the problem. In short, the problem is broken down into its constituent parts and analyzed. The aggregate of these analyses define the nature of the whole. The combination of describing the process in linear terms, and applying an analytical problem-solving approach, stifles the desired maximization of the staff’s creative thinking and associated thought processes.

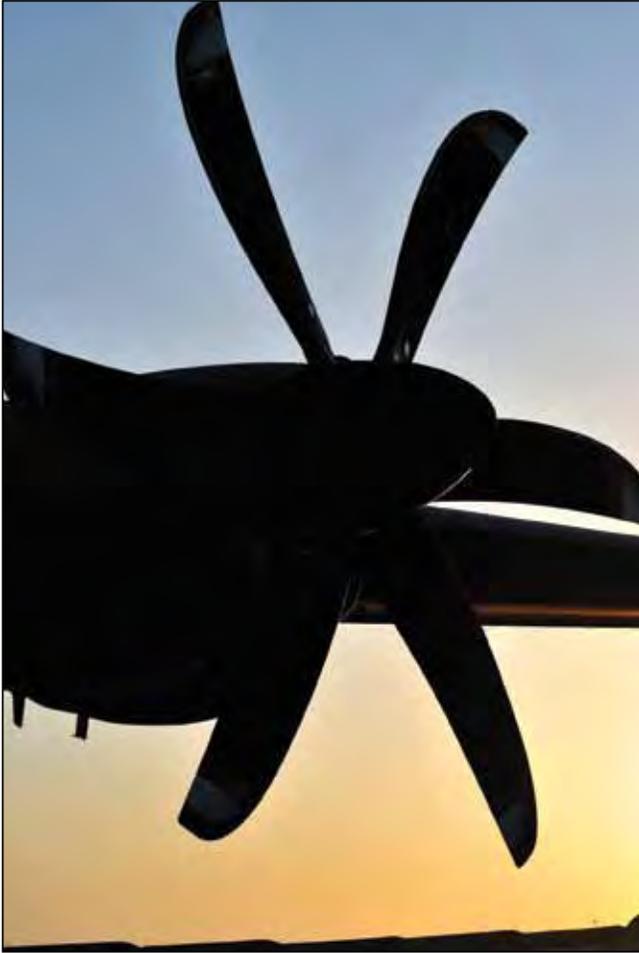


Armour Heights Officers' Mess, Canadian Forces College

The Planning Process – Setting the Conditions

The Canadian Forces College Joint Command and Staff Program (JCSP) focuses a large part of its curriculum upon operational design and planning and the Canadian Forces Operational Planning Process (OPP). The OPP was derived in response to the need for a common operational planning pro-

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In order to maximize creative thinking, it is important to consider the nature of the problem before determining the best method of dealing with it. It is suggested that as a starting point, there are two kinds of problems that the operational staff faces: complicated and complex. While these two words are often used interchangeably, there is a fundamental difference between them. A complicated problem is one for which there exist cause and effect relationships, there is proportionality between inputs and outputs, and the whole is equal to the sum of the parts. In contrast, a complex problem is one for which, as a result of the adaptive nature of the interdependent variables or components of the problem, there are no direct cause and effect relationships, inputs and outputs are not proportional, and the whole is different than the sum of the parts.⁸ Complex problems are human or social problems that are often referred to as 'wicked' problems.⁹ The confounding factor that wicked problems present to the operational staff tasked with deriving a plan based upon an analysis of the problem is that each attempt to solve the problem changes the problem *itself*; one wicked problem begets the next, or no plan survives first contact with the enemy. Another way of looking at this is that, if the perception of the problem does not 'see' the root cause, attempts to apply solutions will likely have unexpected effects that can facilitate the learning process towards a better understanding of the problem. Implicit in this is that perception and metacognition, or the ability to think about the thinking being used to form perceptions, are fundamental in understanding wicked, or complex operational problems.¹⁰

In setting out to standardize the operational planning process, the OPP and the way in which it is used is conducive to solving complicated problems; those problems where an understanding of the constituent elements yields an understanding of the whole. For a complex problem, an analytical approach will not yield an understanding of the whole. To illustrate this fundamental distinction, consider the following: The addition of hydrogen fuels a fire. The addition of oxygen fuels a fire. In both cases, the addition positively contributes to the fire. But when two parts hydrogen and one part oxygen combine and are added to fire, the fire extinguishes. In this case, understanding the properties of each element, hydrogen and oxygen as they relate to fire, cannot provide an understanding of the whole, H₂O, and its relationship to fire.¹¹

It is for this reason that when dealing with complex operational problems, it is important to consider the interrelationships of the constituent elements of the problem, as opposed to the characteristics of elements themselves, as separate entities, to understand the whole. Moreover, applying a solution in order to better understand a complex or wicked problem implies concurrent activity that is mutually supportive: the solution, or the plan, ameliorates the understanding of the problem, or the design that articulates that understanding.

If the evolution of conventional warfare, the application of force-on-force, to achieve military victory over an adversary is considered to have largely occurred as a means of dealing with a complicated problem - how to marshal large formations in a coordinated fashion under the constraint of limited ability to communicate dynamically with every element of the force - it is logical for the process of designing and planning to have followed a similar trajectory. As armies became larger and the ability of the commander to direct individual efforts became more unwieldy, formations were constructed, armed, and drilled to perform tasks in a predictable manner. This gave the commander the advantage of being able to 'stand atop the hill' and to direct subordinate element leads to execute broad actions to engage the adversary forces where it was most advantageous to do so. This mechanistic approach offered the commander the ability to predict the effects of the actions he directed. As the battle progressed, formations could be manoeuvred as large units in response to the ebb and flow of battle. This allowed the commander, constrained in his ability to reach out and touch individual soldiers, to manoeuvre his forces most efficiently, effectively, and, ultimately, predictably. Designing and planning operations and campaigns would have logically been done in a similar manner. Moving and provisioning, as well as preparing forces for large-scale coordinated manoeuvres would have necessitated it. The creativity the commander used would have been in *how* and *where* to apply actions he understood against those similarly constrained actions of his adversary. The structural and organizational construct of forces and their application was hierarchical, with an understanding of the range of functions and actions of each formation, element, and sub-element of his forces. It is akin to the game of chess. The roles, functions, and moves available to the pieces are prescribed by the nature of the game. Similarly, the roles, functions, and moves available to his forces are prepared for and practiced in advance. The ultimate aim is clear: to achieve the capitulation of the

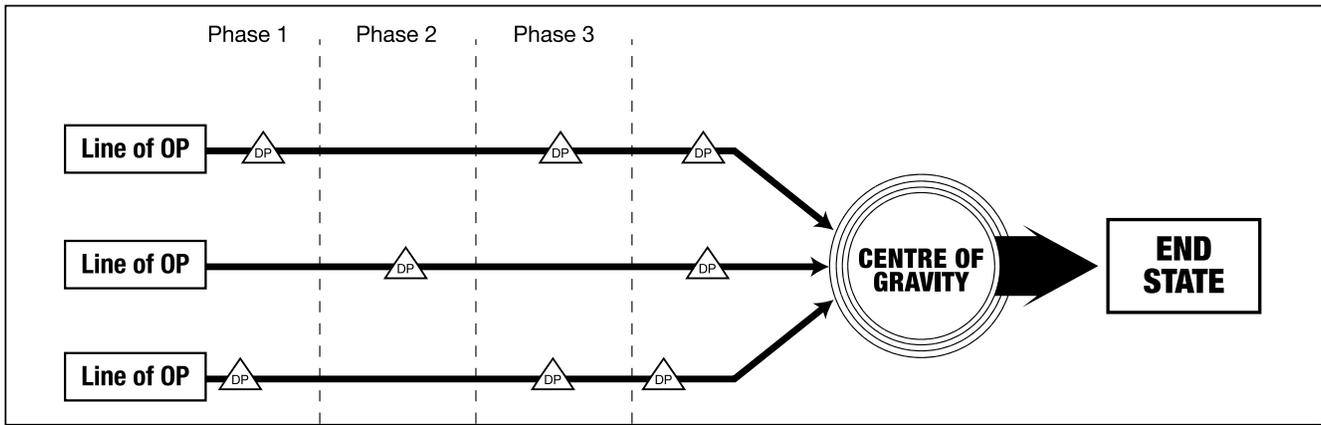


Figure 1: Sample Linear Campaign Plan

adversary through the defeat of his forces, who, in turn, function in accordance with the game, because the adversary is also constrained in the same way as the commander.

However, if the adversary is not engaging in conventional war, there are no discernable structured forces, or the forces themselves do not equate to the adversary's source of strength, defeat of which would lead to capitulation, then applied military actions would *change* the problem rather than *solve* it. John Arquilla of the US Navy's Postgraduate School and RAND Corporation analyst David Ronfeldt use the game analogy of chess versus Go. In Go, while the board may be similar – a grid of squares – the stones used to play are not constrained by the same rules that apply to the pieces used to play chess. In other words, if the commander is expecting chess and the adversary is playing Go, there is a mismatch in approaches, and therefore expectations, that will affect the outcome.¹²

As the technology of warfare has evolved, the ability to communicate has increased to the point where time and distance have become less significant. The information age has increased the interconnectedness of state and non-state actors. It is possible to reach out and touch individuals faster and more directly. This offers opportunity to the commander and the adversary alike.

In the Canadian context, this opportunity is exploited through mission command, or the inherent flexibility and freedom of action afforded to formations, elements, sub-elements, and even the individual soldier, to seek desired effects informed by an understanding of the commander's intent. The way in which the commander's intent is articulated using the OPP, is in a mission statement that the *staff propose* and the *commander approves*. It is a concise statement answering the basic questions: What is to be done? When, where, and why is it being done? It is developed during mission analysis, and it is a statement of task and purpose, intended to achieve the end state, or the set of conditions that describe the achievement of policy goals.¹³ It is acknowledged that at the strategic level, the end state can change over the course of the campaign as a result of changing situation or how the government decides to use its resources.¹⁴ The OPP answers four key questions: What conditions are required to achieve the objectives? What sequence of actions will likely produce these conditions? How

should military resources be applied to produce these objectives? What are the associated risks? In answering these questions an operational design emerges that depicts all the elements necessary to move from the current state to the desired end state. An example of an operational design is depicted in Figure 1.

Decisive Points are sequenced and synchronized along and across Lines of Operation. Achieving Decisive Points contributes to undermining the CoG which permits the attainment of the End State.

However, while the degree to which mission command can be manifested remains constrained by the institutional organizational hierarchical construct of modern nation state military forces, the degree of autonomy to act, at any level, is not absolute. The non-state adversary, in contrast, is not necessarily subject to the same constraint. How then can the operational art be used within the aforementioned constraints to better deal with the kind of complex problem modern militaries face in dealing with information aged non-state adversaries?

The current version of the OPP makes reference to Systemic Operational Design (SOD), Strange Analysis, and Operational Net Assessment as concepts whose aim is to develop a more complete understanding of the environment to aid in decision-making. As well, it is acknowledged that mission analysis is a cognitive activity, and may be conducted through a brainstorming process.¹⁵ Both these references are steps towards a more appropriate means of accomplishing operational design and planning for complex problems. They offer subtle adaptation to the way in which the staff can implement the OPP. They represent steps towards a more network-centric approach.

The Experiment

When CFC commenced its three-year experiment, the initial aim was to explore SOD as an alternative to the OPP. SOD is an attempt to operationalize complexity and systems theory into an intuitive approach to operational design and planning. It is comprised of a series of seven discourses whose aim is to understand the problem holistically and solve it based upon this understanding.

The Systems Frame comprises four discourses aimed at problem setting or understanding. They attempt to put boundaries on the system by identifying what has changed, and what is the cause for the intervention. The second bounds the rival, or those elements that oppose the desired system trend expressed in the strategic guidance. The third and fourth examines the tension that exists between the current command and logistics structures that are required by the emerging design, the rival, and the logic of the strategic directive. In other words what is the system; those elements relevant to the problem? Where is the problem itself, the rival? And what are the tensions between existing command and logistics constructs and that of the rival; are we postured appropriately to deal with the rival? This portion of the process is akin to an appreciation of the adversary and an analysis of the mission.¹⁶

The Operation Frame comprises three discourses that affect the transition from design to plan. The first conceptualizes the operation to exploit the tensions identified within the system during system framing. The aim is to influence or shape the system towards more favourable conditions through the positioning of forces in time and space, and it is akin to operational or campaign design. The second explores conditions within the system that, if achieved, may move the system towards the desired strategic direction. This is like the establishment of objectives and decisive points. The third builds upon the previous two discourses to add substance to the operational design: an emerging course of action (COA).¹⁷ The SOD process is depicted at Figure 2.

“The Operation Frame comprises three discourses that affect the transition from design to plan.”

The final exercise in the JCSP *Warrior Lance* series is a complex scenario involving the potential for the full gambit of military operations required to deal with modern conflict. The students exercise the OPP to determine a campaign design and recommend a COA, from several possible COAs, which requires collaboration with other government and non-governmental agencies represented by staff subject matter experts.

First Year

The challenge in the first year was to determine if it was possible to use a fixed methodology or process to deal with complex problems. The reference material used to guide the exercise was a draft document that put the seven discourses into a seven-step, sequential process: an analytical or linear approach to establishing an intuitive methodology.¹⁹ Although it was not known at the time, what has emerged over time is a growing well-founded skepticism for the claims of the suitability of analytical approaches to deal with complex problems. Two examples where attempts to modify intuitive thought processes into analytical tools have failed are Effects Based Operations (EBO), and Network Centric Warfare (NCW).

EBO acknowledges the vagaries of complexity, confounding attempts to identify with precision concrete effects as a direct result of specific actions; i.e., establishing a cause and effect relationship. Yet, its proponents make the assertion that a series of orders of effects can be predicted, and that the theory supports precision air strikes as the means of achieving desired effects with minimal collateral damage, citing the results of the air campaign during the first Gulf War as evidence.²⁰ This rationale for an effects-based approach to planning and the means to achieve desired ends – precision air strikes – was questioned and discarded as a replacement to the joint planning process by the Commander USJFCOM.²¹ Equally unsuccessful have been attempts to turn the concept of NCW into an analytical tool. System of Systems Analysis (SoSA) determines the nodes or constituent elements within a system, permitting identification of potential targets – disrupt the nodes, disrupt the system. Neither approach places the requisite emphasis on the nature of the relationship between the elements of the system as illustrated in the hydrogen and oxygen analogy. It is the *nature*, and therefore, the *ability* of the system to adapt that confounds attempts to achieve desired effects by focusing upon the physical elements of the system alone.²² In both EBO and NCW, effects-based *operations* were translated to effects-based *targeting*.

The parameters of the experiment used to compare and track the progress from year-to-year were the composition of the group, the approach to the process of dealing with the problem, the means of articulating the work being accomplished, and finally, how this experiment compares with the traditional approach to the OPP.

The normal composition of the Joint Operational Planning Group (JOPG) for CFC exercises is a mix of 25-or-more students from the three environments – land, sea, and air. It was decided to conduct the experimental JOPG using this standard

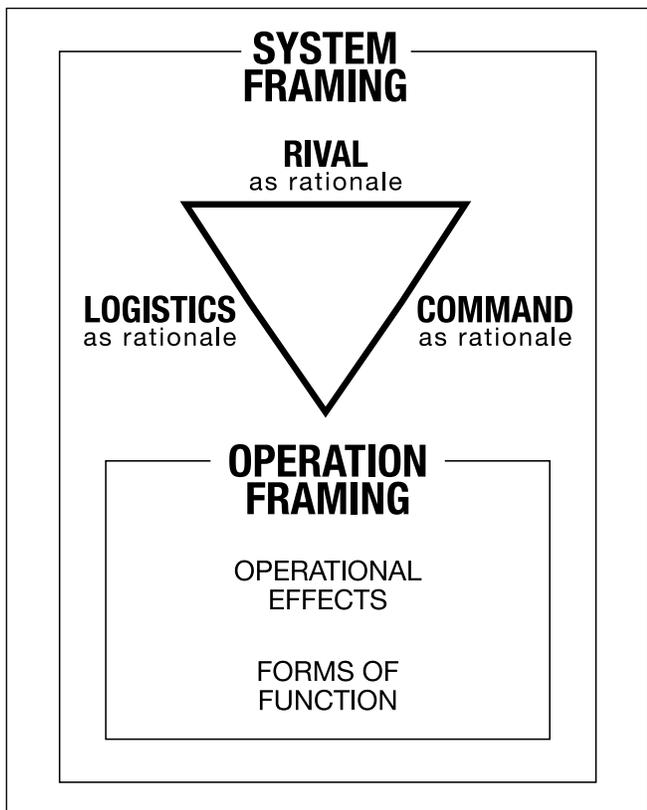


Figure 2: SOD Schematic¹⁸

Canadian Forces Aerospace Warfare Centre

composition. The SOD appointments included a student commander, chosen for his experience gained in researching SOD for his Master of Defence Studies (MDS) paper, and student leads for each of the four Systems Frame and three Operations Frame discourses. All the students participating in the experimental JOPG were asked to read an introductory paper on SOD.²³

Rather than sub-divide the group, parsing the activity in an analytical fashion to following the SOD process, the entire group worked through each of the discourses. It was found that this was less than optimum, as it was difficult to have such a large group effectively discourse. The process of using a step-by-step or linear approach, working on one discourse at a time, while effective in giving the whole group a better appreciation of the nature of the operational problem, inhibited the intuitive thought process.²⁴ Group intuition is based upon the collective sharing of mental models, or up having a common understanding.²⁵ This common understanding is accomplished through active listening, the ability to construct an argument, and representing personal views.²⁶ In a large group, this is difficult to achieve without imposing some constraints and order on the discourse, which, in turn, inhibits individual members of the group. And because intuition is holistic in nature, following a step-by-step process was also found to inhibit the group's intuition.²⁷ It was concluded that the optimum size for a SOD JOPG was considerably smaller than the one used in the first year.²⁸

The OPP Manual does not specify the type of products each of the steps should yield to facilitate communicating the group's work to the commander. However, there are commonly accepted tables and schematic representations of the various analytical activities undertaken. They have been compiled in a variety of iterations of the student guide to the OPP used at CFC as suggested formats. This guide is not an official publication, in that it is only meant to assist students in developing their understanding of the OPP, and how to communicate their work. However, presenting specific forms, rather than describing the desired aim of specific analytical activities, results in an expectation of the form or medium used to illustrate the analytical outcomes. In other words, standard templates emerge, offering not *a* means, but *the* means of capturing the analysis. The experimental group's understanding of outcomes or products generated through the various discourses essentially amounted to a series of relationship diagrams, each of which depicted the elements of the system and the nature of the interrelationships between them. They were free to depict these relationships in ways that suited the group. A representation of the type relationship diagrams each group derived is offered at Figure 3.

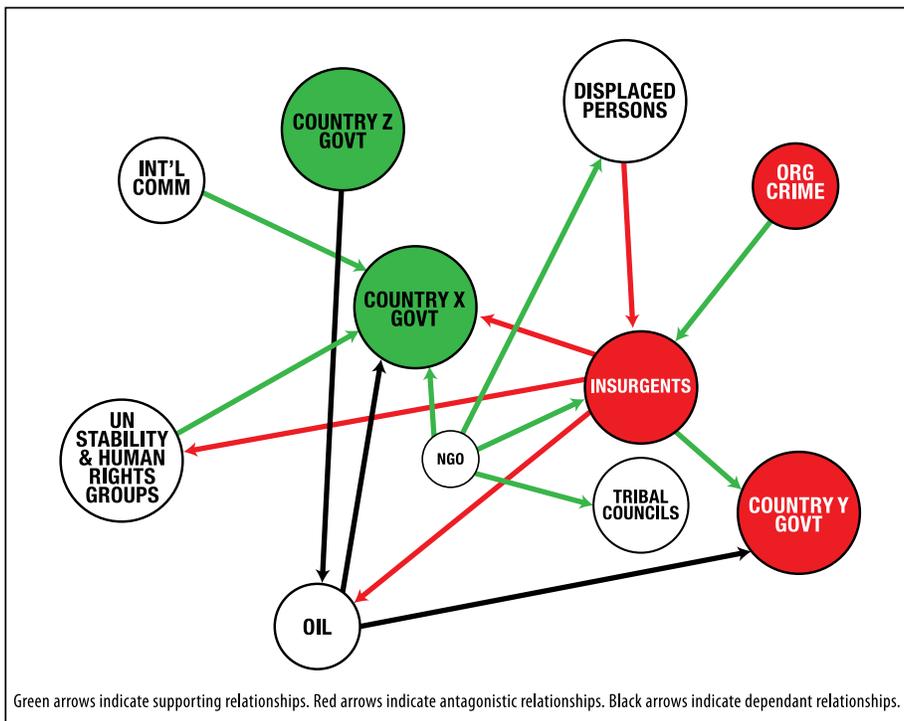


Figure 3: A simplified relationship diagram

The purpose of these diagrams is to capture the group's collective understanding of the problem. The other product the group generates is the narrative.

This product was not explained well enough in the reference material accessed by the group, and, as such, was not well understood nor employed effectively by the group. The result was that as the group progressed, it was difficult for an observer who was not present for the entire discourse to get a full appreciation of how well the group understood the problem, or equally, to give the observer the same understanding of the problem that the group shared.

Due to time constraints, it was difficult to accomplish all seven discourses. The decision was made at the outset to focus upon the systems frame, or their understanding of the problem. The group did make some progress on the operations frame, but found the transition from design to planning difficult. The systems frame outcomes did not naturally offer a clear or obvious segue to the operations frame. It was difficult to attribute a cause. Rather, there were a series of constraining factors: the documentation consulted did not offer sufficient guidance or explanation; the group's understanding of the theoretical underpinnings of SOD was insufficient to facilitate adaptation of the reference material; and insufficient time to complete the process as it was understood at the time.

Nevertheless, the consensus from the group regarding where and how SOD would best fit within the current approach to design and planning was that the complex nature of conflict made it a more appropriate tool for a whole of government, or comprehensive approach. It was also concluded that as a result of the greater collective depth of understanding of the problem the group felt they had acquired, SOD could be an addendum or replacement for OPP mission analysis.²⁹

Second Year

Encouraged by these positive results, the decision was made to continue to experiment with SOD during the same exercise in the next serial of the JCSP. As well, in order to develop a greater understanding of SOD and the underlying theoretical basis for this alternative approach to operational design and planning, an elective was developed and delivered to a group of 14 students during the academic year.

Armed with a greater depth of understanding of SOD and theoretical concepts, the JOPG was composed of the SOD elective students who volunteered, and four others who were interested in participating in an alternative approach. A student commander was appointed, and there were student leads for design and plans. And while the entire group participated in all discourses, the plans lead and a couple of other members of the larger team considered the implications of the discourses on understanding the problem (systems frame) to the transition to planning (operations frame) during system framing. The draft document that was considered as a framework for the conduct of the JCSP 33 group had been superseded by a more philosophical approach articulated by the US Army.³⁰ Thus, while the group retained the systems and operational frame discourses, they expanded the process, commencing with a discussion of what they referred to as the mess of conditions that existed prompting a military response. From that, they were better able to describe the system. In addition to the relationship diagrams, the group created other products that better illustrated their understanding of the problem. This was considered a major accomplishment in conveying the work of the group to anyone who had not been present during the group's discourses.

The initial presentation depicted the elements of the system on a graph of capability-versus-intent as it related to the desired state of a more stable region. To this graph they added the relative trends, should there be no intervention to ameliorate the current state. From this, they were able to discern where

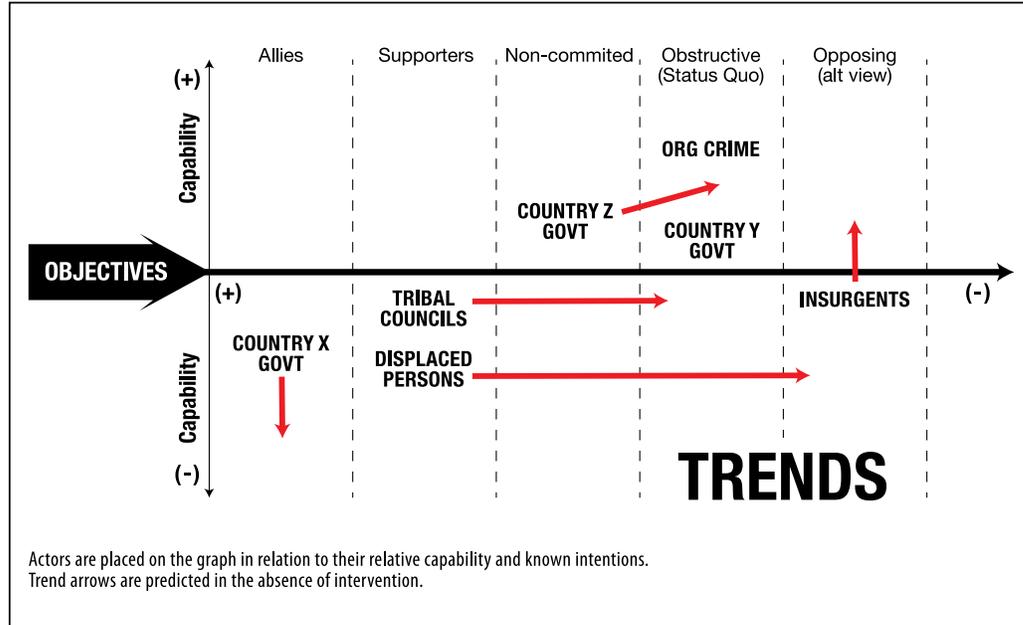


Figure 4: An Excerpt of the Trends Diagram

actions needed to be applied to reinforce positive trends, and to stop, or reverse, negative trends. From this and their determination of the system and the rival, they were able to identify what was lacking in the current environment that prompted the need to intervene. Figure 4 is an excerpt of the trends for illustrative purposes.

The group considered how best to illustrate the campaign design, and rejected the linear approach supported in the OPP that was illustrated in Figure 1. The group's campaign design, illustrated in part at Figure 5, is an overlay on the system and rival frame relationship diagram.

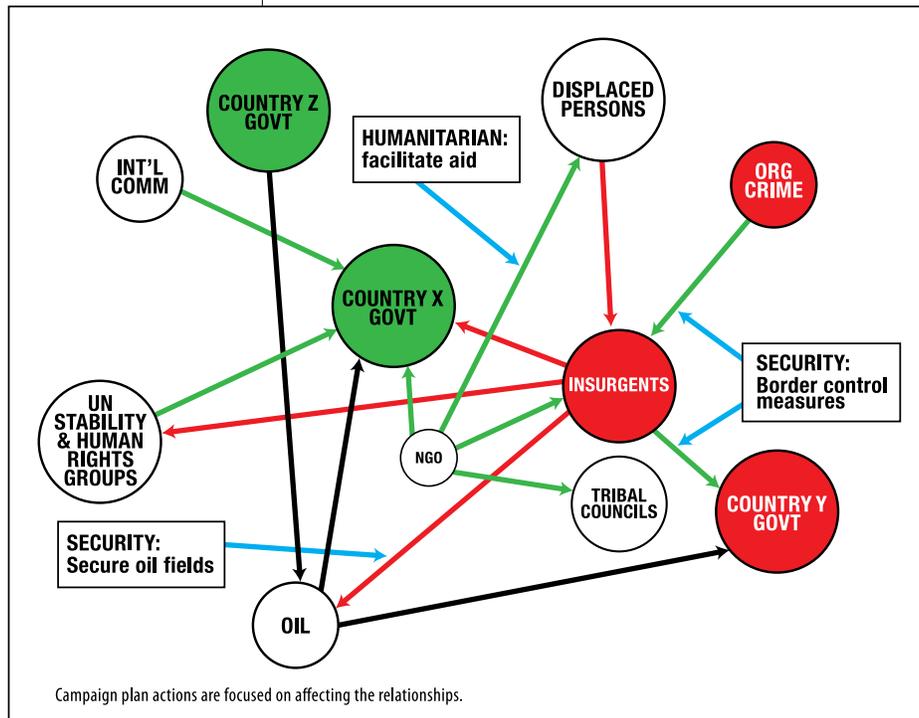


Figure 5: Campaign Plan Overlay

For complex or wicked problems, it is suggested that since each attempt to solve a wicked problem changes the problem itself, working backwards from an end-state to establish pre-conceived decisive points would be untenable. In other words, if effects cannot be attributed to specific causes or actions, pre-determined decisive points cannot be identified. For this reason, the group used a circular diagram with the centre being the strength that required bolstering to permit the region to effectively deal with the problem unaided as it persists and changes, as do wicked problems (Figure 6). It was considered that this centre would expand and contract as the actions taken positively or negatively affected this source of strength. Surrounding this were those elements of the system that had an impact upon the centre, and surrounding that were the types of actions intended to achieve a positive effect on the relative strength of the centre. The ultimate decision being recognition of when the current state becomes good enough.

cally, it was decided to use a systemic approach to operational design and planning that emphasized the contributing theories (complexity, chaos, and systems theory), rather than adhering to the SOD methodology, *per se*.³² This permitted greater latitude for each group to establish how they would define the system, and the means they would derive to communicate their understanding. They were free to use whatever means they decided were appropriate for the operational problem and themselves as a group.

Each group approached the problem using ways and means that suited their own group. The first group spent time developing a team building approach to the work of the group. They used simple means in capturing their findings, making notes and sketches on whiteboards and butcher paper. They spent a lot of time talking to ensure each member had a comprehensive collective understanding of the problem, and how they intended to deal with it. As they worked through the process they established and developed their COA applying new found knowledge and understanding to their appreciation of the problem, and how, as a wicked problem, their intended actions might alter the problem itself. Concurrent work on both the COA and the design ensured harmony between the two. Their final outcome, a briefing to their exercise senior commander, was delivered informally as a round table discussion, with the student commander leading the process and his design and plan leads explaining the group's understanding of the problem, and what they recommended be done about it.

The second group elected to make use of the technology available, and focused upon translating their whiteboard and butcher paper preliminary work into a variety of electronic products. While it was considered by the exercise senior commander that each group had a comparable understanding of the problem and had developed a sound COA, the advantage the second group's selected means offered was greater portability and easier archiving of their work. As well, the second group established a blog as a means of capturing the narrative. They found this provided a better means of sharing their evolving understanding of the problem and their COA. The more tangible and portable medium used by the second group would offer the means to communicate up and down the chain of command as necessary to link the strategic direction and the tactical actions. However, while the selection of an electronic record was consistent with the JCSP 34 approach, the actual products or means used to illustrate JCSP 35's work was unique to their group.

An interesting difference between the second JCSP 35 group and the JCSP 34 group was their understanding of the nature of the problem. For JCSP 34, the collective understanding that emerged was that the ability of the region to govern itself was the focus of their intervention actions. That is, in

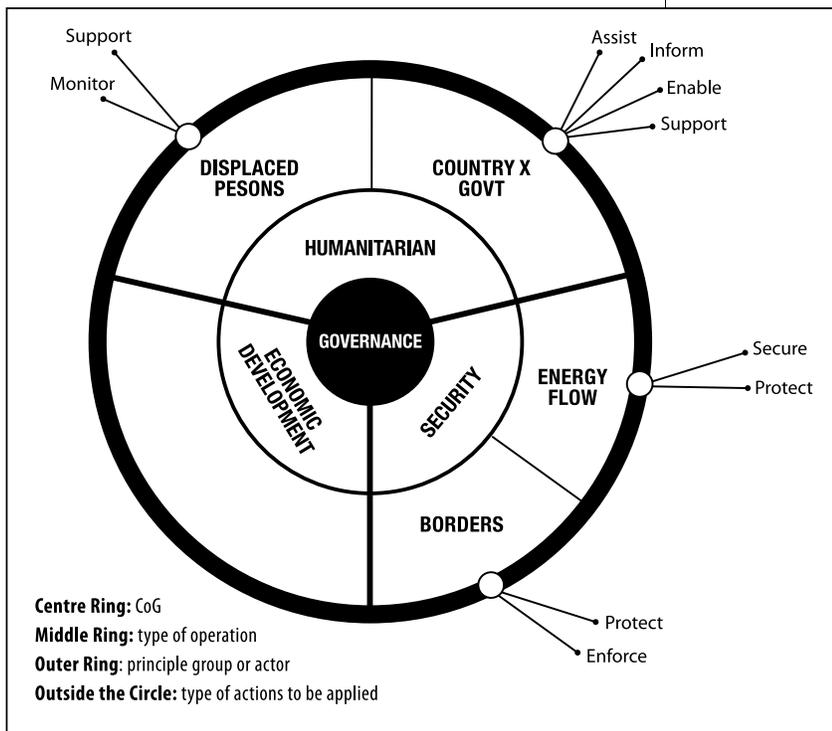


Figure 6: Circular Campaign Plan – Partial View

The group struggled with the idea of the narrative and elected to use it as an aide memoire for the commander to recapitulate and reset the discourses when they got side tracked or focused upon unproductive material. Rather than continue to consider merging SOD and OPP, the former was better considered as an alternative approach when dealing with complex problems.³¹

Third Year

For JCSP 35, the JOPG was divided into two groups with seven of the fourteen elective students in each. The other four members of each team were given the introduction to SOD to read, and all were given a briefing on the approach taken by

JCSP 34. As a result of difficulties encountered during JCSP 33 and 34 experiments, in trying to use SOD specifi-

portability and easier archiving of their work. As well, the second group established a blog as a means of capturing the narrative. They found this provided a better means of sharing their evolving understanding of the problem and their COA. The more tangible and portable medium used by the second group would offer the means to communicate up and down the chain of command as necessary to link the strategic direction and the tactical actions. However, while the selection of an electronic record was consistent with the JCSP 34 approach, the actual products or means used to illustrate JCSP 35's work was unique to their group.

An interesting difference between the second JCSP 35 group and the JCSP 34 group was their understanding of the nature of the problem. For JCSP 34, the collective understanding that emerged was that the ability of the region to govern itself was the focus of their intervention actions. That is, in

applying actions that increased or supported self-governance, or conversely, decreased or weakened those tensions that undermined self-governance, the current state would be ameliorated and the region would be more stable. For JCSP 35, the crux of the problem was the different perceptions of what constituted regional political stability. They saw the tensions being those things that perpetuated the different views of stability seen by the coalition and the rival.

Centre Ring = desired outcomes. Outer ring = focus of actions. Arrows indicate type of Whole of Government action. Central box the attractor.

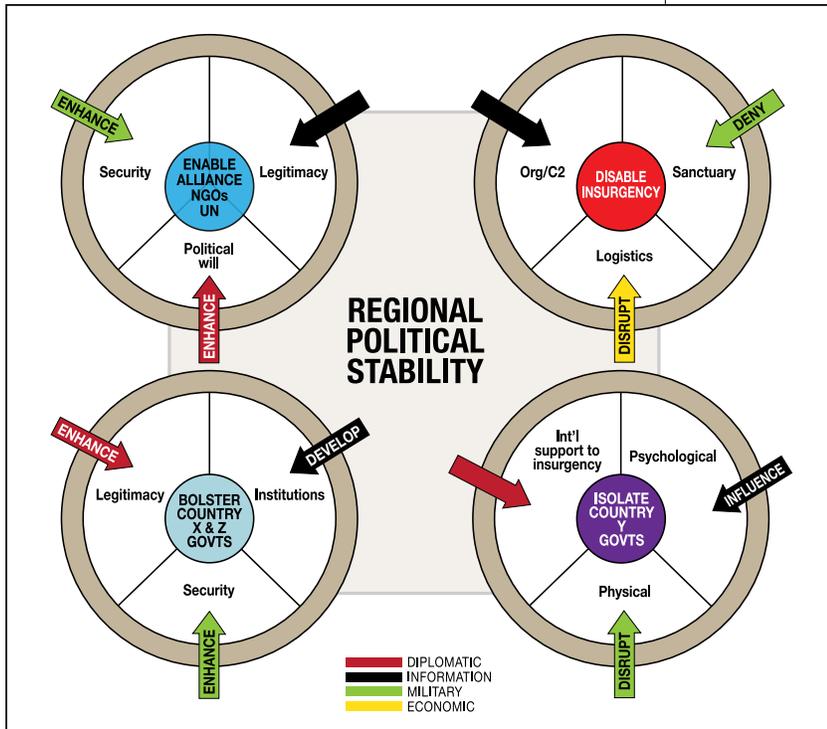


Figure 7: Whole of Government Campaign Plan

Consequently, their intended actions were designed to bring both sides to a new, mutually acceptable attractor,³³ a desired state that would result in a more stable region. While an effective outcome for JCSP 34 would have allowed the region to deal with its own problems, it would have fallen short of addressing the real problem: different views of regional stability or the ideal state. The JCSP 35 group placed significant focus upon what would be required across all aspects of national power in a comprehensive approach to influence the acceptance by both sides of the conflict of a new, mutually acceptable ideal state. Had they had the benefit of subject matter expertise from other government and non-government organizations within the JOPG, their COA would likely have been richer. This comprehensive approach would have been more appropriate, given that the fundamental consideration in wicked problems is that "... the information needed to define the problem depends upon one's idea for solving it,"³⁴ and problem solution is dependent upon one's perspective. Each element of any coalition would have its own thoughts on the problem solution / definition, and therefore, a collective effort to achieving a mutual understanding would likely lead to a better solution. Moreover, by focusing solu-

tions upon affecting the perceptions of political stability towards a mutually satisfactory attractor, there would emerge greater potential for long-term stability. The foregoing is not meant to assess the outcome of JCSP 35 as superior to that of JCSP 34. Rather, it is to illustrate the evolving understanding of how to deal with complex problems from an operational design and planning context.

Conclusions and Recommendations for Further Research

The OPP challenges Canada to explore new approaches that will offer more complex responses to deal with the increased complexity anticipated in future conflicts. A systemic approach to operational planning based upon an understanding of the underpinning theories of systemic operational design has offered one such approach.

The iterative evolution of the CFC experiment lead from attempts to use an intuitive approach in a sequential manner; first design, then plan, to a systemic approach that is more consistent with the theory of wicked problems; solve to define and understand the problem, then design and plan concurrently. This occurred as the experiment moved from an investigation of SOD as an addendum or alternative, to the OPP or elements therein, to the adoption of a systemic approach informed, but not constrained, by the underpinning theories upon which SOD was developed. It was evident that the depth of understanding and appreciation for the implications of wicked problems to military planning staffs increased progressively. The means of illustrating each group's work became consistently

more comprehensive. Illustrative tools and media were selected and developed by each group to suit their understanding of the problem, and how to describe it. Successive iterations of the experiment lead to an increasingly fuller understanding and appreciation of the nature of the operational problem, and how to convey that understanding, most notably, when problem solution was done concurrently with problem definition or understanding.

A significant area that would offer an opportunity for further research is the narrative aspect of the process. If a picture paints a thousand words, which words does it paint? If the thousand words are those of the observer of the picture, would they be consistent with the artist's thousand words?

Dr. Michael Collender, a philosopher who has lectured at the National Defense University's Joint Forces Staff College, and USAF Lieutenant Colonel Matthew J. Deller, offer an interesting discussion of the role of language in representing understanding. The context of their work is the interpretation of mental relationships to objects, with language among other things as a significant aspect - as a consideration in opera-



NOTES

1. Leo Tolstoy, *War and Peace, Book X, Cp. VII* (Hertfordshire, UK: Wordsworth Editions Limited, 1993), pp. 399-400.
2. J. Anderson, *Advanced Directed Study: Approaches to Operational Design Literature Review*, 2009.
3. Paul Mitchell, *Network Centric Warfare and Coalition Operations: The New Military Operating System* (London and New York: Routledge, 2009), p. 2.
4. Andrew Godefroy (Ed.), *Projecting Power: Canada's Air Force 2035*, Canadian Forces Aerospace Warfare Centre, 2009, p. 26.
5. Canadian Forces Joint Publication 5.0 (CFJP5.0): The Canadian Forces Operational Planning Process (OPP), Change 2, April 2008, preface.
6. *Ibid*, pp. 1-3, 1-4.
7. *Ibid*, p. 3-1.
8. For a discussion of complicated and complex problems, see Edward Smith, *Complexity, Networking, & Effects-Based Approaches to Operations*, DOD Command and Control Research Program publication series, The Future of Command and Control, July 2006, Cp. 2.
9. For a detailed description of wicked problems, see Horst Rittel and M. Webber, "Dilemma in a General Theory of Planning," in *Policy Sciences* Vol. 4. (Amsterdam: Elsevier Scientific Publishing Company, 1973), pp. 155-169.
10. See the companion pieces by Colonel Stefan Branach, "Educating by Design: Preparing Leaders for a Complex World," and "The Art of Design: A Design Methodology," in *Military Review*, March-April 2009.
11. This analogy was used by Lieutenant-Colonel Dundon during the SOD Elective discussion on emergence as a property of wicked problems, JCSP 35, 2009.
12. John Arquilla and David Ronfeldt, "A New Epoch – and Spectrum – of Conflict," in Arquilla and Ronfeldt (Eds.), *Athena's Camp: Preparing for War in the Information Age*, (Santa Monica, CA: Rand, 1997), p. 11.
13. Canadian Forces Joint Publication 5.0 (CFJP5.0): The Canadian Forces Operational Planning Process (OPP), Change 2, April 2008, pp. 3-11, 4-5.
14. *Ibid*, p. 2-1.
15. *Ibid*, p. 3-10.
16. For a brief, concise explanation of the SOD process, see Matthew Lauder, "Systemic Operational Design: Freeing Operational Planning from the Shackles of Linearity," in *Canadian Military Journal*, Vol 9, No. 4.
17. A more detailed discussion of the SOD process can be found at Lieutenant Colonel William Sorrells, Major P. Blakesley, Lieutenant Colonel G. Downing, Major D. Pendall, Major J. Walk, Major R. Wallworth., *Systemic Operational Design: An Introduction* (Fort Leavenworth, KA: School of Advanced Military Studies, United States Army Command and General Staff College, 2004-2005).
18. *Ibid*.
19. It should be noted that this draft document was never intended, nor sanctioned, for use as a planning method. It was not put to the test during the CFC experiment as such, rather the framework of adapting an essentially intuitive approach into a step-by-step process was being explored. US Training and Doctrine Command. Concept Development & Experimentation Directorate, Futures Center. *Systemic Operational Design: Designing Campaigns and Operations to Disrupt Rival Systems, Version 3.0 4 April 2005 (draft)*. Fort Monroe, VA: Future Warfare Studies Division, 2005.
20. Edward A. Smith, *Effects Based Operations: applying network centric warfare in times of peace crisis and war*, Washington, DC: DOD-CCRP, 2002.
21. General James N. Mattis, *Memo for USJFCOM, Assessment of Effects Based Operations*, 14 August 2008. The implications of complexity to an effects-based approach to operations has matured over time as can be seen at Edward A. Smith, *Complexity, Networking, & Effects-Based Approaches to Operations*, July 2006.
22. Michael Collender and Matthew Deller, "Scoping Complex Systems for the Joint Task Force Commander," in *Campaigning: Journal of the Joint and Combined Warfighting School*, Fall 2008, p. 39.
23. Lieutenant Colonel William T. Sorrells, US Army, Lieutenant Colonel Glen R. Downing, USAF, Major Paul J. Blakesley, British Army, Major David W. Pendall, US Army, Major Jason K. Walk, Australian Army, Major Richard D. Wallwork, British Army, "Systemic Operational Design: An Introduction." A Monograph, School of Advanced Military Studies, United States Army Command and General Staff College, Fort Leavenworth, KS. Academic Year 2004-2005.
24. Lieutenant-Colonel John Anderson, *Report on the Suitability of SOD*, CFC 2007.
25. For a detailed discussion of mental models, establishing a collective understanding, see: Montgomery, Henry, Lipshitz, Raanan, Brehmer, and Berndt (Eds.), *How Professionals Make Decisions*, (Mahwah, NJ: Lawrence Erlbaum Associates, N/D).
26. Lieutenant-Colonel John Anderson, *OPP and SOD*, December 2008, p. 15.
27. Lieutenant-Colonel John Anderson, *Report on the Suitability of SOD*, CFC 2007.
28. *Ibid*, p. 5.
29. *Ibid*, pp. 4, 5.
30. TRADOC Pamphlet 525-5-500, The United States Army Commander's Appreciation and Campaign Design, Version 1.0, 28 January 2008.
31. Lieutenant-Colonel John Anderson, *Report on SOD as a Design and Planning Methodology for the JCSP*, 4 June 2008, p. 5.
32. Lieutenant-Colonel John Anderson, *Report on a Systemic Approach to Operational Design and Planning for the JCSP*, 19 June 2009, p. 2.
33. In short, an attractor is a trajectory to which motion gravitates. The difference between an attractor and a strange attractor is that for the former the trajectory itself is predictable, for the latter, since it is non-repetitive, it is not predictable. The concept of a strange attractor is more consistent with the nature of complexity and its inherent unpredictability. But the end is the same, the attractor will attract the "object," or the object will always be drawn to the attractor. If the attractor is its understanding of political regional stability, it will always be drawn, regardless of its trajectory, to that attractor. For a discussion of attractors and strange attractors see Marion Russ, *The Edge of Organization*, (Thousand Oakes, CA: Sage Publications, 1999), pp. 15-22.
34. Rittel and Webber, p. 161.
35. Collender and Deller, pp. 37-81.

tional planning. Their construct applies to the analysis of both one's own and the adversary's resources, which is possible because of the notion of different models of victory for each, or the purpose of each force in the operational environment. They argue that this permits the interpretation of causes in a complex system.³⁵

It is recommended that further study be done in the area of the narrative as a means of communicating operational design and planning.

