Revolution in Military Affairs : An Intuitive Informatics Model for Evaluating a Commander's Proficiency

Abstract

No consequences are as damaging or irrevocable as those pertaining to the appointment of incompetent or ill-prepared persons, to command positions in military and security forces. Taylor (2007) describes Intelligence, its analysis and use as the cybernetics of statecraft. Selection of personnel for administrative and command positions as practice of statecraft, uses readily weighted parameters in evaluation and determination of candidate suitability. In future Artificial Intelligence applications such as fuzzy logic, neural networks or other intelligent systems shall be used to evaluate personnel.

This paper argues that different qualifications, fit for different candidates, in different situations. No attempt is made to weigh the parameters identified, reviewed and qualified herein, but they are evaluated qualitatively, to assist other researchers who are codifying systems or undertaking other research in this area. It is a study-cum-'toolkit' where the necessary can be extracted on-demand and utilized in system specification/design.

Introduction

Broadly speaking commander evaluation systems and processes for military and security forces includes a wide range of issues such as:

- efficacy, discipline and timeliness in military / security operations
- choice and profiles of field and command level operatives
- psychological impact assessment of past and anticipated attacks
- ability to identify and eradicate malignant enemy knowledge bases
- choice of systems for training and operations
- appropriate knowledge based financial budgeting for operations and organizations
- gathering and processing of evidence and information for purpose of determining operational objectives, strategic missions and post-event outcomes as pertains to a rival, especially in asymmetric warfare

It is the qualified opinion of this analyst that the right persons, at the right time and the right place makes a very big difference by way of a sequence of cumulative actions, that in turn determines the outcome of a conflict especially of the asymmetric type. Today systems for assessing commanders should cover various aspects of security, military operations and law enforcement. The basis of this approach is that terrorism and organized crime today has military capabilities, a trend witnessed in countries such as Pakistan, Afghanistan, Colombia, Yemen, Nigeria amongst a host of other states.

For the hyperbole world of information systems engineering, to realize its physical manifestations in populations/reservoir areas from which the most extreme forms of terrorism and political violence are manifested today – research would have to be effected and validated by Military / Security Commanders during actual operations. A prudent military commander must ensure continuity of effective command processes, by selecting the best as his/her successors.

An illustration of benefits of selection insights can be deduced from Hartley (2003) that delves into the characters of Premier Meles Zenawi(deceased) of Ethiopia and President Isaias Aferwoki of Eritrea. These details includes the genesis of their struggles, their *modus operandi*, behaviour, and ambitions – while still at nascent command position in informal militia. Many of these insights can be extrapolated into the ongoing conflict against terrorist organizations in the Horn of Africa. Hartley's narrative has been validated by events that have relevance to projections of future trends in the Horn of Africa.

Wirtz(2007: 204) further underscores the validity of the question of cost-effective nature of security operations, which is to a large extent determined by commanders. An observation made is that security officers may soon have to operate more like enterprises, where they must account for the cost benefits and disadvantages derived from each and every expenditure item. The Former United States Secretary of Defense Rumsfled called for metrics on cost-benefit basis for the Global War on Terror , eg. For every dollar that Al Qaida spends, how much more does the U.S. Government and its allies spend on global counter-terrorism operations. Which of the two establishments has got commanders who are more effective in meeting their tactical and strategic objectives.

These factors can be ascertained in an administrative environment that implements a broad spectrum Intelligent Knowledge Management System. This kind of knowledge management system is further elaborated upon in Wirtz(2007:240) under the context of Revolution in Military Affairs (R.M.A.) which embraces the execution of operational maneuvers based upon refined knowledge of ones fielded forces and those of a security adversary - by way of C4ISR(computers, command, control, communications, intelligence, surveillance and reconnaissance) with a view of fielding the ultimate intelligent network-centric fighting force.

In the context of Information Systems Development Cycle this paper offers some directions for Requirements Collection and Analysis. These essential specifications are to be used in intelligent information systems, that select and evaluate military commanders on real-time or on-demand basis, by way of inferences.

The human mind is a vast super-computing system which is based on massively parallel neural networks of neurons. This analysis should aid the reasoning and train the intuition of determined persons in reaching commander selection / evaluation decisions with(out) computers. Canada(1997) registers a felt need in formalizing requirements for military personnel selection and screening, with a view to ensuring that force composition does not in itself undermine operations.

Systems can evaluate candidates but the final selection decisions are made by human beings – their judgment must also be trained for the better. Both computers and man must operate in tandem, when it comes to evaluations for determination of suitability of persons for command responsibility.

Training / Evaluation of Commanders is a complex undertaking. A lot of man hours are utilized in the development of a soldier → to officer → to commander. Trainers, instructors, lecturers and academics are never sure of the challenges that a commander shall be exposed to in the long run, and a lot of their efforts are geared towards producing a highly skilled and adaptive individual. In this paper, a concept of a simulator for training middle-level and high ranking military commanders is explored. How can such a system work? What are the inputs and outputs? What skill-sets should it enhance in the trainee?

What would a simulator for training/evaluating a senior military commander encompass? Would it have a command line interface or a graphic user interface? Would it offer feedback in form of actual data (complete with video, audio and text) or simply present the facts and figures and prompt the trainee for input?

If we may commence with a command line interface for a command simulator, text inputs and outputs – a hypothetical system may be implemented in the following fashion. First and foremost the commander must be challenged to select, equip and train his/her forces, after which these forces('who' are actually system parameters) would be managed by the commander. This would allow for examiners to ascertain the defense administration skills of a commander. Once such a sequence of defense administration challenges is established, the combat skills of the commander can be put to test against those of other commanders who have logged into the system. This hypothetical system could provision for hypothetical nations and their forces(land, air, naval, cyber space, etc).

If we may log into the system and be granted the credentials of Nation A, we can proceed to selecting different military commands, and different assignments. In the course of the exercise – the system should give some feedback in the form of synergy and economies between commanders on the same side, who are carrying out different roles. Human computer interaction is the key to such a system, with massive processing power and artificial intelligence applications working in the background to give the evaluators feedback and the trainees provision for more complex challenges. But a norm in such type of simulation would be time compression – e.g. a sequence of events that could last six months may be undertaken in one hour.

After the first group of trainees use the system it should remember its past inputs and scenarios. It must have a case based and/or neural reasoning capacity. This would make it easier for the trainers and more challenging for future trainees, as past successes and schemes of work, may not be replicated with success in future sessions. Military training in any instance is geared towards preparing individuals for near impossible undertakings. A command line interface could offer input on the prompt, into tables or a wide range of other formats. These inputs should undergo evaluation by way of natural language processing, after which the system would offer appropriate feedback. Hypothetical cases may also be fed into the system, to train it to pose evermore difficult challenges to its trainee users.

This type of system would offer no battle graphics, no attacks, no maps, no imagery, just the questions and prompts for answers. In the first instance what would one like to know about a military commander? Ability to select, train and retain staff. Like in the real world, the systems demands and requests for decisions must come with deadlines and caveats. Given the command line type interface a key test parameter of this system is whether the trainees can visualize mentally (in addition to using paper maps and charts that are provided) and build a workable situational awareness picture, without it being provisioned for by the system. This type of simulation is geared towards testing the ability of the commander to work with a badly damaged or inadequate informatics infrastructure.

What would be the system inputs? They could include answer to system questions by the trainee, pneumographic, cardio-activity, electromyography, electroencephalography and skin galvanic responses, such as those that are utilized in polygraph type credibility assessment tests. A complete automated feedback loop would allow for more complex and pressing scenarios to be rendered to the candidates, when the system determines that they are becoming comfortable with the current work scenarios. The sensors should be small, light weight and not offer negative feedback by way of burdening the wearer. Only this kind of provisioning would challenge the knowledge and system engineers to develop, a system that is tasked to challenge individuals.

Command line interfaces need not be restrictive, they should be capable of generating a wide range of reports that can be printed. With provisioning of text to speech applications, these reports can be read out to the user, though not an explicit function of the system. A user should also be capable of fashioning an essential parameters display that always remains on the screen, as a decision support facilitation mechanism – that is updated on a regular basis. Command line interfaces can allow for some inputs and answers to be delivered in form of files and scripts, the only challenge would be to ensure that they do not form any negative, unrealistic or system specific training.

Though both trainee and trainer may not be capable of viewing the actual bombing raids, artillery duels, naval battles, and infantry operations – it is anticipated that these types of systems should simulate them sufficiently and printout/display outcomes. There are a wide range of concepts such as fuzzy logic and game theory, that can capture the chaotic nature of armed conflict. But the final outcomes must be relayed to the user in text. A proper high-end simulation engine, would be capable of rendering graphic format output of the battles. It is safe to assume that an enhanced system shall have a graphic input side, capable of training its users via graphical user interface and schematically representing outcomes of battles and in some or all of the cases offering some form of video output.

There are simple reasons for this dual format approach. Not all organizations may be in a position to afford the computing power to render 100% video/audio output from a complex simulator. A conceivable feedback is the type converging data streams from each and every soldier, jet, drone, ship, radar, scope, etc. But does a top-level military commander require such a drill down capability? Only in very special high stakes and high profile situations. Selection must incorporate some instances to test a commander's handling abilities for 'microscopic' but highly intense combat situations.

Elements in the field in this type of system should be capable of taking in voice commands as in real world military units. This would only be possible if it is a multi-user simulator, with actors fitting into each and every role in the virtual world. But can the best simulator adequately score a military commander's proficiency in relation to a wide range of situations? The following are some of the factors that should be considered when developing a system for scoring commander proficiency.

Analysis and Propositions

Proficiency of a military/security commander is determined by the scoring values in relation to his/her comprehension and handling of tactical/strategic narratives, that (s)he responds to in real operational situations or empirically valid hypothetical simulated scenarios.

Components of a tactical/strategic narrative include but are not limited:

- The Commander(s) in question (parameters e.g. their intelligence and emotional quotients)
- Personnel Systems of the Military/Security Organization(parameters e.g. training/selection)
- The Battle-space/Theater(Land, Air, Sea, Cyberspace, 'Hearts and Minds', Space, etc.)
- Knowledge bases of the parties in the conflict(e.g. Depth/complexity of intellectual capital)
- Ways and means available to parties in conflict(e.g. Systems, equipment, funding, etc.)
- Restraining factors that are self-exercised or imposed by third parties
- Operations conducted in actualization of the conflict

A real-world tactical/strategic narrative is always complete but a hypothetical empirically valid tactical/strategic narrative used in training is always incomplete, due to the unique nature of any real world situation that an operative or commander must respond to.

The question of sufficiency of a narrative arises when attempting to determine the level of preparedness that it induces or verifies, in a training or evaluation subject respectively. A tactical/strategic narrative can only be sufficient to the extent of it being appropriate to a specific context of perception that is usually multifaceted.

Revolution in Military Affairs : An Intuitive Informatics Model for Evaluating a Commander's Proficiency

An example of a highly complex multifaceted tactical/strategic narrative, is a wholesome video rendering of a situation with appropriate schematics and running commentary. While the simple end of this analytic spectrum is a literary narrative, that explains a situation in detail but leaves it upon the reader to comprehend and internalize the situation described without any audio-visual aids.

Efficacy of a commander is also an issue of trained intuition. This training may come in form of :

- An individual's effort to comprehend and internalize past and hypothetical cases and scenarios respectively. A human memory powered type of Case Based Reasoning Approach,
- or Learning the 'hard way' during an event, ie. Learning by way of real world exposure, injury and real-time responses.

The very mention of trained intuition raises the question, as to whether a computer based artificial intelligence system can accept narratives in form of video, audio, text or graphics input and offer decisive resolution? If such complex systems come into operation, their reverse applications would include the analysis of proficiency of commanders and other personnel.

This paper offers some insights into the genesis of such kind of thinking. It formalizes the structuring and input of real-time and/or hypothetical tactical/strategic narratives into an artificially intelligent computer based system. Upon the computer based informatization of these narratives, appropriate Artificial Intelligence systems extract critical parameters. These are utilized to make tactical/strategic evaluations and to offer advice and scoring, as to how the situations at hand are being handled. When applied in reverse the advice/orders of a commander could be fed into the requisite system in real-time or training, and scoring given as to his/her proficiency in handling situations, as well as scoring on his/her overall comprehension and awareness of the situation.

Operational performance is not purely an issue of obtaining objectives by way of combat. It also entails adherence to International Humanitarian Law and subtle/friendly ways of drawing in and retaining the support of non-combatants, especially civilians in the theater.

Artificial Intelligence also offers the option of making extrapolations, adjustments and/or modifications to narratives and additional advice for (re)actions. Intelligent Proficiency Metrics extends the functionality of common practices such as use of simulators, for training and accumulation of personnel records(during service).

Informatization of Human Thought and Understanding

Given that human understanding and the human brain are still a matter of much research and mapping, we nevertheless have to create a basic mathematical informatization of human understanding processes if we are to proceed to the level of developing software that can evaluate human proficiency in any measure. My propositions are therefore as follows:

Basis of the Human Understanding Algorithm

To understand something it must exist in your brain as a set of impulses or other chemical compositions. Label the set of impulse generators that you induce by way of deliberate learning as Set(A). For Set(A) to be understood it must first be discovered. Discovery is done by finding members of the set by way of inspecting them exhaustively and concluding that they belong to the Set(A).

If all the members of the Set are discovered then our understanding is complete, otherwise if a Set is partially discovered or its component members are not exhaustively inspected then our understanding is incomplete. Many a time, when we believe that our understanding of a situation is complete it is actually incomplete. Subsequent discoveries compel us to draw the conclusion that our understanding is incomplete.

Because our understanding is usually incomplete, the ideal Set denoting any form of learning would be structured as follows, in set theory notation:

$$\text{Ideal Set (A)} = \bigcup_{n=0}^{\infty} (a) = \{a0 \cup a1 \cup a2 \cup a3 \cup a4 \cup \ldots \cup an\}$$

Learning can be deliberate (based upon the construction of a Set (A) which comprises well chosen elements) or learning can also be by chance (based upon the construction of a Set (B) which comprises of random elements). Naturally learning incorporates both deliberate effort and some occasions of chance(this can be illustrated as [(Set(A))∪(Set(B))] – this would be a representation of knowledge).

The Human Understanding Algorithm

Algorithm Inspection (Understand){

unverified variables(the narrative) : [(∃(complement(Set(A))))∪(∃(complement(Set(B))))]

Begin

Inspection of members from (complement(Set(A)));

Repeat Inspection;

Until Inspection creates Set(A);

End Repeat;

Inspection of members from (complement(Set(B)));

Repeat Inspection;

Until Inspection creates Set(B);

End Repeat;

Inspection creates a representation of knowledge [(Set(A))∪(Set(B))];

Compare members of [(∃(complement(Set(A))))∪(∃(complement(Set(B))))] to [(Set(A))∪(Set(B))];

If [(∃(complement(Set(A))))∪(∃(complement(Set(B))))]∩[(Set(A))∪(Set(B))] occurs;

Flag the inspection that produces errant intersection member(s) as in-exhaustive;

Repeat the inspection of In-exhaustive inspection flagged member(s) **until** [(∃(complement(Set(A))))∪(∃(complement(Set(B))))]∪[(Set(A))∪(Set(B))]occurs;

End Repeat

Knowledge of [(Set(A))∪(Set(B))] contains elements[an and/or bn] of the solution to a problem;

End.

}//End of Algorithm.

Implications of Human Understanding Algorithm

Were such an algorithm to be actualized by way of Informatization, we would be able to numerically calculate the following parameters in relation to human understanding:

- Rate and extent of human understanding
- Rate and extent of storage in human memory
- Extent of recall from human memory
- Acquisition and synthesis of knowledge

Upon effecting of the Algorithm and production of Set(A) and Set(B):

- a tactical/strategic narrative with wholly static parameters would be described as predictable
- while a tactical/strategic narrative with any dynamic parameter would be unpredictable

The expression [(Ǝ(complement(Set(A))))∪(Ǝ(complement(Set(B))))]∪[(Set(A))∪(Set(B))], is the entire mapping of one's mind at any instance. While Function Inspection is a limited scope of neuron activity. Any error by way of intersection of [complement sets] and [normal sets], implies that there is always room for learning. This is because according to De Morgan's Law: $A \wedge A^{c} = \emptyset$

Representation of Static and Dynamic Narratives with Decision Tables

If an unpredictable narrative is represented by way of a decision table, there would be an ever changing number of Conditions, Rule Sets and Actions, while a predictable narrative would have a fixed number of Conditions, Rule Sets and Actions. Geissman *et al*(1988) formalizes verification of critical application experts systems, but validation of proficiency evaluation systems would depend entirely on results from actual system supported decision(s). The following is a generic decision table as described in Kendall(2011). It is fully capable of capturing both predictable and unpredictable situations:

CONDITIONS	**Rule Set (1)**	**Rule Set (2)**	**...**	**Rule Set (n)**
C1: deals appropriately with (a1)	Yes	Yes	**...**	No
C2: deals appropriately with (b1)	Yes	Yes	**...**	No
C3: deals appropriately with (a2)	Yes	Yes		No
C4: deals appropriately with (b2)	Yes	No		No
. . .	. . .	. . .	**...**	. . .
Cn: deals appropriately with (bn)	Yes	No	**...**	No
ACTIONS			**...**	
Ac1: Commander proficient	Yes	Yes	**...**	~
Ac2: Commander not proficient	~	~	**...**	Yes
Ac3: Commander needs training	~	Yes	**...**	Yes
Ac4: Commander needs exposure	~	Yes	**...**	~
. .	. .	. .	**...**	. .
Acn: Use Other Test (X)	~	~	**...**	No

In Konrat(1977) there was a method to the 'madness' in harsh German cadet training in the period preceding the Second World War and selected cadets(those promoted to First Lieutenant), performed as per the expectation of their appointing authorities. The details that are rendered in this narrative, would be sufficient for developing limited systems for commander selection right down to the appropriate decision tables. As the Konrat story unfolds further during the war, it becomes clear that there are many more factors, that could be incorporated into such a system.

One may include a wide range of military narratives when developing such systems, but there are a wide range of non-security related materials/narrative that may be incorporated. An example is Womack, *et al*(2003) offers a wide range of business issues that can be incorporated into practice when managing military/security logistics.

Note – each and every rule Rule Set represents the idiosyncratic scoring traits of a Commander, under certain circumstances. It would take repetitive routines of scoring under empirically controlled conditions, to come up with a valid final resolution/action. Validation is only performance based.

The Individual scoring Elements of the Rule Set(1), Rule Set(2),......, Rule Set(n), could be dynamically or statically weighted – this would in turn allow for determination of the Actions in the Decision Table, by way of an automatic or manual proficiency grading program.

The Elements of the Rule Sets could be scored as functions of the entire Rule Set or on their own. The scoring values can be positive or negative, allowing for a Rule Set aggregate to be deduced. The Proficiency/Grading determination of Actions can be automated, by automating Result Set input system. All the programs that are described in this paper could be altered dynamically and simultaneously from time to time utilizing techniques such as genetic algorithms, but that is beyond the immediate scope of this paper. A Decision Table can be computerized via Programming Language e.g. C/C++ or rendered via a Spreadsheet Application.

Realizing the Promise and Exploring the Possibilities

Efficacy of evaluations of military/security commanders is an ongoing challenge in many respects. Key to the success of these endeavors, would be the ability of a military to identify and weed out Toxic Leaders from within its ranks(Reed, 2004). These are persons in positions of responsibility who lack concern and have no empathy towards the plight of their subordinates. A Toxic Leader is driven by self-interest.

Artificially intelligent personnel evaluation systems could scan through the service records of officers at various levels, giving scores that may make it possible to identify this negative trait. Evaluating operations/training narratives given by soldiers, also provides an extra channel for development of Automated Officer Evaluation techniques. Reed(2004) was followed a few years later by the Center for Army Leadership Annual Survey of Army Leadership(CASAL) that was documented by Steele(2011).

With an ever growing number of military/security personnel engaged in full-time in professional credibility assessment of their colleagues, it must be clear that operational performance it not only dependent upon professional abilities. There is an aspect of the Officer charged with an operation being willing to undertake it. One may be willing and not proficient or one may be unwilling but highly proficient in relation to a particular task. Ngari(1987) goes into greater detail to elaborate on Officer Training in the Gabonese Armed Forces.

He cites General de Gaulle at the beginning of the article as having spoken of, '...the joy of serving, a pride in arms and the hope of accomplishing great actions...'. He goes on to describe the quality of personnel. In this text however, Ngari assumes that good personnel are trained and equipped. He does not divulge much about evaluation procedures and processes for Officer selection. In Africa many military forces are staffed first by way of ethnic and political loyalty, after which training is next. Selection is not necessary the first criteria but it is hoped, that those chosen to serve could be trained to the appropriate levels in order to protect the wealth and political interests of the ruling class.

An issue that comes out clearly in the narrative of Wright(1987) is that the proficiency and/or efficacy of persons in military/security organizations cannot be determined, unless their underlying credibility as pertains to issues of loyalty are established. In all cases a credibility assessment should precede a proficiency assessment, because some of the issues in the latter may be of a classified nature and should not be revealed to persons with doubted loyalty. This concept is further enhanced in the narrative of Pincher(1986), we learn those that have fallen to deception of persons with questionable credibility, seek to implement credibility assessments that have validated biomedical empirical basis.

Conclusion

It is technically feasible today to create empirically valid abstractions of Officer evaluation processes, with the hardware platforms and software environments available off -the-shelf. But even with the best artificial intelligence computing solutions, the best we can hope for is the selection of commanding and executive officers, on a task by task basis. This predicament is created by the vast knowledge and case bases that would be required, for a comprehensive system to be developed. A perception expressed in Bramer(1990: 50) when he predicts that 'generalist' knowledge engineers shall be superseded by the 'specialist' knowledge engineers who are more attuned to certain tasks. But that does not rule out the possibility of collaboration amongst the specialists, for ever more greater synergies.

Bramer(1990: 46) raises technical and/or ethical concerns as to the informatization and use of human judgment in decision systems. In Geraghty(1992) we are introduced into one of the world's most complex and successful proficiency based officer selection mechanism and a selection of some of its renowned works. With no better testimonial that a Commendation Letter for the 22nd Special Air Service (SAS) Regiment from Commander-in-Chief of 'Operation Desert Storm' General H. Norman Schwarzkopf (pp. 533-534). A reader cannot but help to imagine if the technical 'infusion' of Informatics into this mix could provide a new and better breed of 'Super-Human' Officers, Staff and related works.

About the Author:

Nyagudi Musandu is a Security Analyst and Forensic Criminologist based in Nairobi, Kenya – East Africa.

Bibliography:

Bramer, M. 1990. 'Expert systems: where are we and where are we going?'. *'Expert Systems: Principles and Case Studies'. Richard Forsyth(ed.).* London: Chapman and Hall.

Canada, Government. 1997 July. 'RECOMMENDATIONS : Chapter 20 - PERSONNEL SELECTION AND SCREENING'. *'Executive Summary : Report of Somalia Commission of Inquiry*'. Minister of Public Works and Government Services, Canada.

Geissman, J.R. & Schultz, R.D. 1988. 'VERIFICATION & VALIDATION OF EXPERT SYSTEMS'. *'Knowledge-Based Systems: Fundamentals and Tools'. Garcia, O.N. & Chien, Y. (eds.). 1992.* Los Alamitos, California: IEEE Computer Society Press. pp. 410 - 417

Geraghty, Tony. 1992. *'WHO DARES WINS – The Story of the SAS 1950-1992'.* London: Warner Books.

Hartley, Aidan. 2003. *'The Zanzibar Chest – A Story of Life, Love and Death in Foreign Lands.'* New York: Atlantic Monthly Press.

Kendall, K.E. & Kendall, J.E. 2011. *'SYSTEMS ANALYSIS AND DESIGN', Eighth Edition.* Upper Saddle River, New Jersey: Prentice Hall. pp. 267 – 271

Konrat, Georg von. 1977. *'Assault from Within.'* Nairobi: East Africa Literature Bereau. pp. 5 – 40

Ngari, Idriss. 1987 November. 'Officer training in the Gabonese Armed Forces'. *'AFRICAN DEFENCE JOURNAL – MILITARY INFORMATION MONTHLY, No. 87, ISSN 0244 0342'.* Paris: Societe Africaine de Publicite et d'Editions Fusionnees. pp. 64 – 65

Pincher, Chapman. 1986. *'THEIR TRADE IS TREACHERY'.* London: Sidgwick and Jackson Limited.

Reed, George, E. 2004 July – August. 'Toxic Leadership'. *'MILITARY REVIEW' – The Professional Journal of the U.S. Army.* Fortleavenworth, Kansas: United States Army Combined Arms Center. pp. 67-71(was accessed via the Internet when initially published).

Steele, John, P. 2011. 'Antecedents and consequences of toxic leadership in the U.S. Army: a two year review and recommended solutions'. *'Center for Army Leadership: Technical Report 2011-3'.* Fortleavenworth, Kansas: The Center for Army Leadership at the United States Army Combined Arms Center (was accessed via the Internet when initially published).

Taylor, S.A. 2007. 'The Role of Intelligence in National Security'. *'Contemporary Security Studies' Collins, A.(ed.). 2007.* Oxford: Oxford University Press. p. 250

Wirtz, James, J. *et al*. 2007.*'Strategy in the Contemporary World – An Introduction to Strategic Studies, 2nd Edition.'* Oxford: Oxford University Press

Womack, James, P. & Jones, Daniel T. 2003. *'Lean Thinking – Banish Waste and Create Wealth in Your Corporation.'* New York: Free Press

Wright, Peter. 1987. *'SPY CATCHER – The Candid Autobiography of a Senior Intelligence Officer'.* Toronto: Stoddart Publishing Co. Limited