Strategies For Managing Force Transformation – Creating New Defining Moments For The Future

by LTC Lawrence Lim Teng Chye

"Transformation is moving an organisation to a higher plane, leading it to become qualitatively different while retaining its essence".

Peter Schwartz, *The Art of the Long View,* 1996

Introduction

Over the last 30 years, a number of significant events, or *defining moments* have left their marks in the annals of history. These events are defining because they make or break an organisation. Consequently, their effects are far reaching and can bring about fundamental changes in the outlook of an organisation. Some of these defining moments are "positive". The unprecedented SARS outbreak in Singapore was such a positive defining moment and demonstrated our ability to rise to the occasion and triumph in the face of adversity. Under trying circumstances, Singaporeans stood shoulder to shoulder and combated the spread of the virus. Our people also contributed greatly by establishing a contact-tracing centre within 48 hrs and successfully adapted imaging devices originally developed for a military purpose in less than a week to spot potential SARS carriers[1]. Through the SARS crisis, Singaporeans appreciated the need to be always vigilant. Our ability to respond against such contingencies was also tested and further fine-tuned.

In contrast, "negative" defining moments introduce discontinuities that are so profound that they fundamentally question an organisation's relevance and purpose for existence. One of such negative defining moments occurred on 9 November 1989 when the Berlin Wall fell. For many years, Western democracies have built their capabilities against an advancing Red Army. With the fall of the Berlin Wall, the enemy whom U.S. and NATO Forces have perfected their competence upon had also vanished[2]. The heavy armoured forces that have been built up over the years became irrelevant overnight. September 11 is yet another defining moment that highlighted the threat of catastrophic terrorism and the need for strong homeland defence. A new security discontinuity had emerged and

exposed the US's lack of preparedness in dealing with the threat.

These negative defining moments have a common thread – they highlight an organisation's inability to deal with discontinuities, and adapt at a rate faster than its evolving context. This essay discusses broad strategies to manage the transformation of the Singapore Army to create capacity to shape new and positive defining moments for the future. Three broad strategies will be developed as a framework to overcome the systemic and structural factors that could limit an armed force's ability to anticipate, sense, adapt and respond faster than changes in the environment. *Firstly*, there is a need to leverage experimentation to condition our hearts and minds to see and act on the future. *Secondly*, we should harness the potential of Integrated Knowledge Command and Control (IKC2) to evolve modular force structures to meet new mission demands quickly and more effectively. *Thirdly*, to leverage systems integration to shorten capability development timelines and deliver cutting-edge systematic solutions to operational users at the frontline. Relevant examples from military history, systems engineering and lessons learned from ongoing force transformation efforts of other armed forces will be used to develop the above strategies.

Systemic And Structural Limitations

Strategic relevance is the essence of existence for the military. Nevertheless, events such as the fall of the Berlin Wall and September 11 clearly showed that transforming and moving to a higher plane is not the natural order of business for all armed forces. This inaction can be attributed to systemic and structural factors that are unique to the military organisation. These factors reinforce one another and their compounded effects can seriously erode our ability to understand, focus and act on changes that really matter:

- **Focusing Too Much on Present Realities**

There is inherent bias towards meeting current mission demands and applying a more conservative yardstick in catering for the future. This is natural as current "pains" are felt, whereas future "pains" can only be talked about and will only happen downstream. Left unchecked, this has the effect of "crowding" out the future. Focussing too much on present realties will gradually desensitise our ability to feel and understand changes in the environment. Devoid of such understanding, we can be locked in effecting changes within an existing paradigm, rather than taking bold steps in shifting to new paradigms that are more consistent with the new context. Over time, this will lead to a downward spiral – the organisation becomes more inward looking and its ability to internalise gradual but subtle changes in its environment is further eroded. To remain relevant, we must constantly look outside while operating within.

- **Responding Too Slowly**

The military is a complex organisation comprising people and equipment. In the past, where threats have remained relatively stable, resources have been

optimised against anticipated threats and scenarios. Force capabilities have also been organised around stovepipes to enable rapid effective employment. This approach of organising resources and capabilities is however inherently incapable of dealing with amorphous and dynamic threats. When sudden changes occur in the environment, such as the fall of the Berlin Wall, stovepipe capabilities face mass and immediate operational obsolescence, as they cannot be readily adapted for new missions. This phenomenon is akin to structural unemployment in the labour market, and will require resources and time for personnel re-training, acquisition of new equipment and reorganisation before "redundant" forces can be redeployed. Consequently, a threat-driven paradigm will always be reactive and lag behind changes in the environment. In this new paradigm where threats have become multi-faceted and unpredictable, we need to strengthen our ability to respond faster than emerging threats. We need to break down stovepipes and reduce the friction to yield force structures that are readily configurable to meet new challenges.

- **Growing Too Slowly**

Systems should be developed such that they can be delivered quickly into the hands of operational users to facilitate the doctrine and standard operating procedures (SOPs) development. This is largely because training typically takes much longer compared to the time taken for development. It has been reported that in the U.S. Acquisition System, the time taken from system conception to fielding lasts an average of 132 months[3] (or 13 years)! Unless our acquisition system is kept lean and well oiled, our systems will run the risk of operational and technological obsolescence by the time they are rolled out. This has the effect of locking us in a vicious cycle of applying obsolete equipment against new threats and devoting scarce resources for yesterday's missions. To break free, we need to adopt new acquisition philosophies and methodologies that will shorten development timelines and permit us to grow capabilities faster.

Creating Capacity For The Future

To create new and positive defining moments in our transformation journey, capacity is required to overcome the above systemic and structural limitations. Capacity is generated if we can identify and focus on the changes that really matter, evolve structures and processes that enable us to implement changes and following them through with minimal opportunity costs. Against the inherent bias to look inwards, we must first "force" ourselves to "perceive" the future by identifying the residual uncertainties and questioning the "what-ifs". To strengthen our ability to take responsive and effective actions, the connectivity of our force elements must be enhanced to evolve force structures that can be quickly reconfigured and adapted to meet new mission demands. To shorten our capability development timelines and better optimise use of resources, it is necessary to move away from development of single large systems towards developing a range of military technologies that can be rapidly mobilised for integration and mass production. This will better lay the foundation to develop cutting-edge

systemic capabilities at short notice against unexpected threats.

To act with confidence, we must look ahead and contemplate the uncertainties, the challenges they pose and how an adversary might react to our actions. We have to part with comfortable ways of linear thinking and planning, take risks and experiment so that we can more effectively deter and defeat adversaries that have not yet emerged. Experimentation is one of the tools that can help us reperceive the future and focus on what really matters. Besides visualising future conflicts and emergent ops concepts, it also provides a platform to assess the impact of disruptive technologies and account for dynamic changes in the environment.

While the identification of a range of potential requirements for new capability developments is an important output of experimentation, its real value lies in its power to illuminate blind spots, identify residual uncertainties, opening up our minds against taking a deterministic view of future events to see the "what-ifs", and thinking through the implications of the answers. In his book *The Art of the Long View*, Peter Schwartz called this process "Scenario Planning". He described how the Royal Dutch Shell Company successfully assimilated scenario planning as part of their decision making process and helped transform Shell from the smallest of the "Seven Sisters", into one of the world's largest and most profitable oil companies.

During the 1970s, scenario planners at Shell, led by Pierre Wack were looking at the events that could affect the price of oil[4]. With dwindling oil reserves in the United States and

STRATEGY 1 : EMPLOY EXPERIMENTATION TO REPERCEIVE THE FUTURE

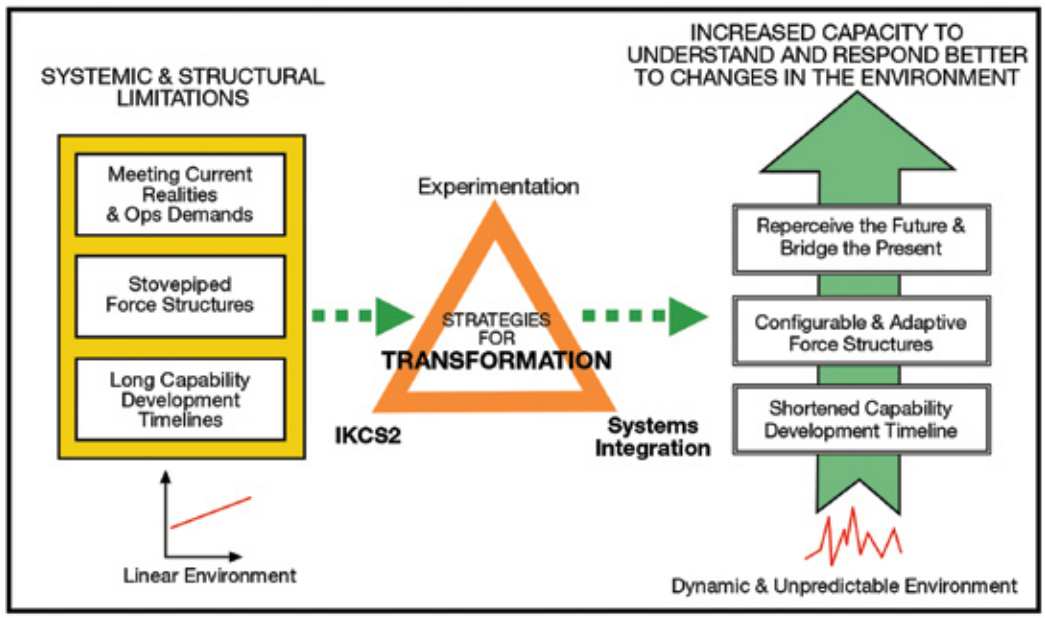

Figure 1. Framework to Generate Capacity to Create New and Positive Defining Moments for the Future.

rising world demands, Pierre correctly identified that the Arabs (under the Organisation of Petroleum Exporting Countries [OPEC]) which held the majority of the world's oil stock could demand much higher prices, but were waiting for an opportune time. Oil was a strategic commodity at that time, and powerful consuming nations such as the U.S. would do whatever possible to keep prices low. Pierre helped Shell's top management "reperceive the future" by presenting possible oil price shock scenarios, made them feel the full ramifications, questioned the underlying assumptions for each scenario and helped managers imagine the decisions they might have to make as a result.

When the energy crisis struck in 1973, triggered by the Yom Kippur War, Shell's management was mentally prepared for change and responded quickly. Shell managed to turn adversity into opportunity and their fortunes rose steadily ever since. By questioning the assumptions about the way the world works, Shell was able to see the world more clearly and make better decisions about the future. This is the true value of experimentation, that is to gear our minds to be aware of subtle indicators of change so that we can actively look out for them, help us focus on the changes that really matter and prepare us to take actions responsively and confidently.

Without questioning the what-ifs and their implications, we could be pursuing transformation "blindly" and would be ill prepared to sail in a different course when the wind direction changes. Take for example the Future Combat System (FCS), the cornerstone of the U.S. Army's transformation effort to become a lighter and more mobile force. Instead of deploying forces all over the world, the FCS is envisioned to transform the U.S. Army into a global, consolidated power projection force that is stationed primarily in the U.S.. It will be built around the lightly armoured Stryker wheeled combat vehicle in the interim (up to 2008), with the ultimate goal of creating a group of more technologically advanced mobile combat units for the Objective Force by 2020.

The experience from Ops Iraqi Freedom however underscored the value of heavy armoured ground forces. While frequently referred to as legacy, heavy armoured forces proved pivotal in breaking through Iraqi defences in the South, and in urban combat operations within Baghdad and other cities. The more lightly armoured forces such as those being developed by the FCS will have been more vulnerable to Iraqi rocket propelled grenades and other light arms. There is also evidence to suggest that sufficient time would be available to permit the build-up of heavy conventional forces. This is in cognisance that current geo-political realities will not allow unilateral action to be taken without exhausting all possible means for political mediation. In Ops Iraqi Freedom, a period of four months was available for force build-up as the U.S. and Allies painstakingly garnered political support through the UN and quelled domestic political opponents. This allowed Coalition Forces to assemble more than 250,000 troops, 500 tanks and 650 aircraft[5].

The above observations however indicate that a balanced capability

portfolio will best meet the disparate demands of a wide spectrum of operations. They also highlight the potential pitfalls in force transformation – that without questioning the what-ifs and the whys, we could be pursuing technologies for the sake of it, instead of harnessing high payoff technologies and applying them to bring new operational concepts into fruition. We need not wait to fight a war to extract meaningful lessons learned. Like Shell, we can also turn adversity into opportunity. Experimentation will provide the platform for us to do so.

STRATEGY 2 : USE IKC2 TO CREATE NEW VALUE CHAINS

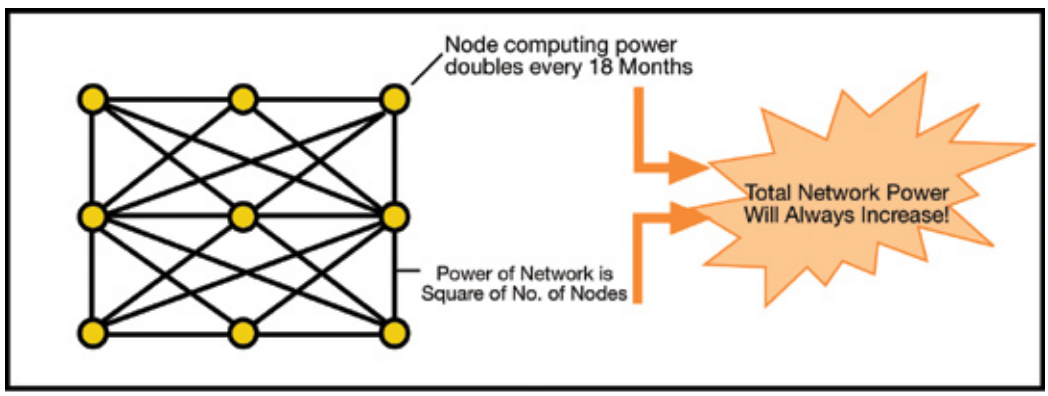

Figure 2. Moore's Law and Metcalfe's Law Illustrated.

By now, most of us would have been well accustomed with the following laws:

Moore's Law: Computing power will double every 18 months.

Metcalfe's Law: Power of Network = (Number of Nodes)^2.

The confluence of the 2 laws implies that with the application of IKC2, forces can be networked to enhance their reach, and their ability to leverage the collective strength of the entire system. Networking will also increase the richness in interactions between nodes, empower forces to respond better and faster through integrated knowledge, and allow new micro-network structures to be created dynamically. Peter Evans, the author of *Blown to Bits* referred to this phenomenon as the "deconstruction" of value and organisational chains[6].

The advent of smart, software intensive systems is producing the capacity to build force capabilities that are scalable and can adapt quickly to new challenges and unexpected circumstances. With IKC2, there will also be increased scope to organise force elements in an object-oriented manner[7], or as "Lego blocks" with a set of predefined interfaces to "plug and play" with the larger system. In such a system, efficiency is gained through the interaction between blocks, and the dynamic adaptation of the blocks as a whole to form new shapes to fit with its environment. Besides the property of being self-adaptive, this also allows operations to be decentralised yet combined in effect.

For example, in a classical meeting engagement between tanks, the side

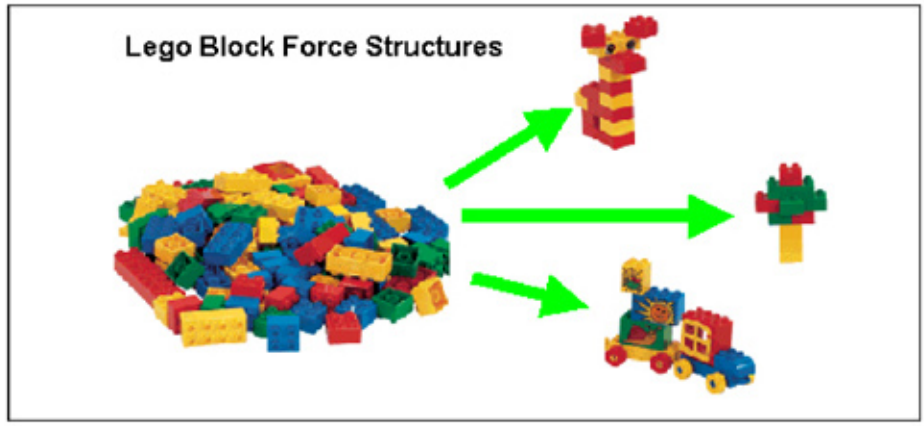

Figure 3. The Lego Block Principle: Rapid Reconfiguration through Standard Interfaces.

who shoots first usually gains the tactical advantage. Consequently, each platform is designed to detect and shoot targets at long stand-off distances. Combined effects (target acquisition and engagement) are achieved at the local platform level. However, against a network of sensors and shooters, an enemy who shoots first risks being detected and engaged first. If his forces were not dispersed, the positions of other nearby friendly forces would be compromised as well, thus leading to higher combat attrition. Although the functions of sensing and shooting are now decentralised to individual force elements, combined effects are achieved at the global level, enabled by interactions between nodes.

A decentralised concept of operations has also been found to play a larger role in stimulating innovation during operations. This is not surprising, as IKC2 will empower force elements to deconstruct and recreate new value chains on the fly. For example, during the war in Afghanistan, coalition forces took existing capabilities from the most advanced laser-guided weapons to 40-year-old B-52s updated with modern electronics and used them together in new and unprecedented ways, with devastating effect on Taliban and al-Qaeda forces[8]. This was not achieved by the application of new revolutionary technologies per se, but by new operational concepts enabled by IKC2.

For all the promises that Moore and Metcalfe Laws hold for us, we have to be mindful of the potential pitfalls as well. Firstly, the rapid pace at which IT advances is an opportunity as well as a risk. Sensible IT acquisition strategies must be formulated such that our systems are always on par, if not better than what the commercial market can offer. In this regard, a phased acquisition approach would better mitigate the risk of block obsolescence while providing the flexibility for forces to experiment and evolve new techniques, tactics and procedures.

In order not to offset the yields from networking, complexities due to an increased number of nodes and interactions must also be adequately addressed[9]. In network mathematics, such complexities can grow at a factorial

rate and potentially outstrip the gains from Metcalfe[10].

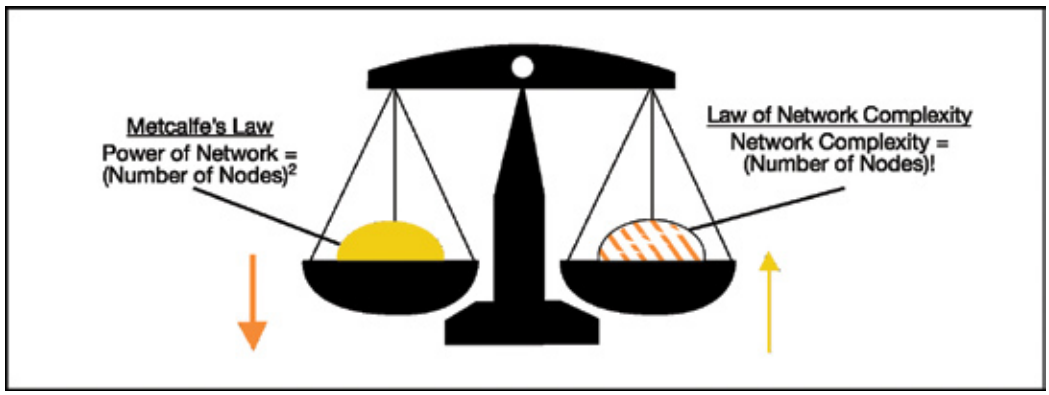

Figure 4. Managing Network Complexities in Order Not to Offset Gains from Metcalfe.

To manage complexities, interface and quality of service standards must be established as the principal means to regulate, control future growth, as well as to achieve interoperability. Instead of prescribing detailed and complex solutions, the proliferation of interface and quality of service standards is also a better strategy to promote network growth. It will establish the global architecture to assure interoperability in the long run while allowing networks to grow in a relatively distributed manner, from the ground up.

STRATEGY 3: SYSTEMS INTEGRATION TO SHORTEN CAPABILITY DEVELOPMENT TIMELINES

The divergence in the timelines between acquisition cycles and discontinuities suggest that one should move away from the development and procurement of single large systems, which consume significant resources and time, towards research and development of a range of military technologies that can be rapidly mobilised for integration and mass production. This is premised on the idea that the possession of scientific knowledge and engineering techniques will prove more valuable in meeting unexpected exigencies than a large stockpile of obsolete equipment. Large-scale procurement is deferred to allow residual uncertainties to evolve and become clearer. When long-term uncertainties become short-term requirements, decision makers can then choose from an array of prototypes the system is best suited to meet the needs of the day, quickly and effectively. Peter Rosen referred to this approach as developing capabilities along "the technological dimensions of the security environment[11]".

There is anecdotal evidence to suggest that such a capability development philosophy can bring about a Revolution in Military Affairs (RMA). These revolutions occur not as a result of a single new technology or weapon, but when groups of technologies emerge collectively and together transform the nature of warfare. Soviet military writers have identified three such revolutions, two that are historical and one that is occurring now[12]. The first revolution took place in the 1920s when the internal combustion engine,

mobile radios and military aviation combined to increase both the speed with which armies could advance, and the depth to which they could penetrate. Recognising the operational potential of the underlying technological trends, the Germans built their forces around small, high quality, mobile shock forces supported by air power and gave birth to Blitzkrieg.

According to the Soviets, the second revolution took place in the 1950s when ballistic missiles and nuclear weapons made it possible for nations to deliver overwhelming firepower rapidly and across continents. This ushered in the age of the Cold War and the strategic paradigm of Mutually Assured Destruction (MAD) which fuelled the development of strategic nuclear forces such as the Nuclear Submarines and Inter-Continental Ballistics Missiles (ICBMs).

The revolution occurring now has its origins back in the 80s when the development of micro-electronics, computers, sensors and communications fuelled a qualitative change in the effectiveness of tactical forces, allowing them to operate in smaller, leaner and more powerful discrete packages by leveraging light but highly effective tactical weapons and networking. The current RMA is significant as it has also opened up new realms of warfare in the information and knowledge domains and offered more viable military options as nuclear weapons have long been recognised as blunt policy instruments.

To build up a qualitative edge in the current RMA, we must begin to level up our systems integration knowledge, especially in the areas of sensors, computers and communications, and embark on broad based R&D in an array of high payoff technologies. This will shorten development timelines and establish the knowledge foundation to deliver cutting-edge systemic capabilities at short notice against unexpected exigencies.

Conclusion

Transformation is not a destination. It is a journey as we renew our missions and roles with the strategic context to become something better and more relevant. We can therefore, by definition never arrive. While we cannot predict the future, we can put in place the structures and processes that will enable us to understand and respond better to changes in the environment.

This essay has highlighted three key broad strategies as a framework for action. *Firstly*, to employ experimentation to see the future with greater clarity and to condition our minds and hearts to take responsive decisive actions where it matters most. *Secondly*, to enhance our ability to adapt and respond by leveraging IKC2 to evolve re-configurable force structures. *Thirdly*, to shorten capability timelines by building up a qualitative edge in systems integration and broad based R&D in high payoff RMA technologies. It is hoped that this framework will provide the capacity for us to create new and positive defining moments in our transformation journey ahead.

(Ed note: This essay was an Award winner of the 2004 CDF Essay Competition)

Endnotes

1. For a full account of this story, see *The New York Times*, Technology Section, "Military Hardware is Adapted to Fight SARS" (12 May 03).

2. Gordon R Sullivan and Michael V. Harper, *Hope is Not a Method* (Broadway Books, 1997). See pp 148-150 on the impact the fall of the Berlin Wall had on the U.S. Army's Transformation effort.

3. William Cohen, Annual Report to the President and the Congress 1998, Chapter 18, p3.

4. Pierre Wack, "The Gentle Art of Reperceiving", *Harvard Business* Review Sept 1985, p9.

5. News reports indicate that Coalition Forces began building up forces after UN Security Council Resolution 1441 was passed in November 2002. The actual ground offensive started only on 20 March 04, that gave Coalition Forces about 4 months to build up and deploy forces.

6. See Philip Evans and Thomas S. Wurster, *Blown to Bits* (Harvard Business Scholl Press, 2000), pp69-71.

7. An object refers to an entity that contains all the data, behaviour and functions that pertain to the entity. Objects have interfaces through which they send and receive messages to and from other objects. For a thorough discussion on Object Orientated design, see Derek Hatley, Peter Hruschka and Imitiaz Pirbhai, *Process for Systems Architecting and Requirements Engineering* (Dorset House Publishing), pp255-257.

8. Remarks as delivered by U.S. Secretary of Defense Donald Rumsfeld, National Defense University, Fort McNair, Washington, D.C., Thursday, 31 January, 2002.

9. See Mark W. Maier and Eberhardt Rechtin, *The Art of Systems Architecting*, (2nd Edition, CRC Press, 2000) on the impact of complexity associated with the number interrelationship among elements could increase faster than the number of elements and affect system performance.

10. Jeffrey R Cares SSG XVIII Technical Report "Network Fundamentals", 21 July 1999.

11. See Stephen Peter Rosen, *Winning the Next War* (Cornell University Press, 1991) Chap 8, p221, where the author drew examples from guided missile development and showed how the US Air Force and Navy employed this strategy successfully to manage uncertainties and mitigated the threat of block obsolescence.

12. Notra Trulock III, Kerry Hines, Anne Herr, "Soviet Military Thought in Transition: Implications for the long Term Military Competition",(Arlington VA Pacific-Sierra Research Corporation, May 1988), p28.

LTC Lawrence Lim recently assumed the command of an Artillery unit upon his return from the Canadian Forces Command and Staff College. He has previously held the appointments of a Staff Officer at Army HQ and as a Battery Commander. LTC Lim holds a MEngg (Mech) (Hons 1st Class) from the Imperial College, London and a MSc (Systems Engg) from the U.S. Naval Postgraduate School.