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"SIMULATIONS, EXERCISES & GAMES IN THE CIVIL SERVICE"

Introduction

In an early scene in the 2009 reboot of Star Trek, the future Captain James Kirk is a cadet in the Starfleet Academy. Spock has accused him of cheating in a simulation exercise called *Kobayashi Maru*. Kirk argues that the cheating is justified because the simulation has been designed to be unbeatable. Spock counters that Kirk had failed to understand the purpose of the exercise. When Kirk asks him to explain, Spock says:

> "The purpose is to experience fear. Fear in the face of certain death. To accept that fear and maintain command of one's self and one's crew. That is a quality expected in every Starfleet captain."

Explicit and Tacit Knowledge

While we might smirk a little, we should not overlook an important insight in this slightly overwrought script. Much of what we learn is knowledge that is formalised and codified. This is explicit knowledge. It is written in books, and we can also find it in notes and databases. In school and at university, explicit knowledge is transmitted in the classroom through textbooks and lectures, and even through self-learning or online courses.

Then there is tacit knowledge, knowledge that is embedded in complex systems and situations, in which roles, technologies, emotions, and behaviours interact in dynamic and unpredictable ways that are almost impossible to codify.

Tacit knowledge has to be acquired in other ways. Such knowledge is often transmitted in the form of stories or narratives. The Iliad and the Odyssey, the Three Kingdoms, and the Ramayana and Mahabharata, whose origins go back thousands of years, are examples of how narratives transmit tacit knowledge. Fiction and novels express complex experiences and insights in ways that non-fiction cannot. This is reason enough to read widely.

Often, tacit knowledge is acquired on-the-job – through what some would call "learning by doing". In such cases, it is lived reality and experience that build tacit knowledge.

Sometimes, however, we do not have the luxury of time, either to read novels or to allow tacit knowledge to accumulate over time. In such cases, we need ways to jumpstart the process of acquiring tacit knowledge. Under these circumstances, tacit knowledge can be developed through simulations, exercises and games – the kind that today's seminar is meant to explore.

But simulations, exercises and games do more than just increase tacit knowledge. Like their richer cousin – real-life experience – they can expose us to emotions and senses that we cannot fully grasp just by sitting through a lecture. We may understand fear, but only in an intellectual way. To teach the Starfleet cadets how to manage fear, the imaginary *Kobayashi Maru* creates fear by simulating the complexities of emotion and stress that exist in combat situations.

Pattern Recognition

In a famous study, Dr Gary Klein, an American psychologist, examined how firemen make decisions in complex and stressful situations. In his seminal book "Sources of Power", he showed that firemen do not fight fires by working through a logical decision-tree from their fire-fighting manual. Instead, they apply the first pattern in their experience that most resembles their current situation to fight the fire raging in front of them. Klein's surprising conclusion was that in situations of stress or incomplete information, people do not necessarily make decisions in a logical way. Instead, they draw on a repository of heuristics and patterns, acquired through experience and training, and then embedded in memory, to make their decisions. Klein's findings led the US military to change the way it trains its officers.

This is a big reason why simulations, exercises and games are so important. Not only do they impart some of the hidden complexities that make up tacit knowledge, but they also embed patterns in the memory of participants, which can be recalled later for making decisions in real-life situations. This is pattern recognition. The value of pattern recognition is that it triggers responses to a problem – as Gary Klein discovered in firemen.

There are many other examples. During the first Apollo moon landing, astronaut Neil Armstrong noticed that, under control of its

onboard computer, the Lunar Module was heading towards a landing area covered by boulders. He then took over manual control of the Lunar Module in order to find a safer spot to land. This would take more time, and Mission Control was concerned that the Lunar Module would run low on fuel. But because of Armstrong's intense training, he had experienced several simulated moon landings with less than fifteen seconds of fuel left, and he was also confident the Lunar Module could survive a plunge from fifteen meters if it ran out of fuel. Indeed, a post-mortem after the Apollo 11 mission showed Armstrong's judgement to be sound, because it turned out that at touchdown there was about 45 to 50 seconds of propellant burn time left. This is an example of how simulations can strengthen pattern recognition, as well as the concomitant ability to respond to such patterns as they emerge in complex situations.

There is, unfortunately, no short cut to building up such a repository of patterns. Merely learning the theory of fire-fighting is of no help, just as reading a manual on how to land on the moon would not have informed Neil Armstrong's decision to override the computer control of the Lunar Module. It is only by taking part in many simulations, exercises and games – and through real-life experience – that the fireman or the astronaut grows his library of patterns. As more patterns are embedded in memory, the ability to make sound decisions when fighting real fires, landing on the moon or dealing with other complex situations is strengthened.

Exercise Red Flag

Another example is probably useful at this stage. In the early days of the Vietnam War, the US Air Force realised that it was losing too many aircraft to enemy action. A study showed that a pilot's chances of survival in combat improved dramatically after ten combat missions. So in 1975, the USAF established Exercise *Red Flag* to simulate these ten combat missions, before its aircrews were sent into real combat. The aim was to increase their chances of survival when they were eventually deployed into combat theatres. The US Pacific Air Forces created a similar programme called Exercise *Cope Thunder*, sited in Clark Air Base in the Philippines. Our RSAF pilots and crews have participated in both *Red Flag* and *Cope Thunder* for many years. All will testify to the intensity and the realistic training that these two exercises provide, and how these exercises have improved their professional confidence.

What do *Red Flag* and *Cope Thunder* do that cannot otherwise be taught in normal flying training? While they cannot really teach fear, unlike Star Trek's *Kobayashi Maru*, they do have a common purpose of

imparting tacit knowledge through the intense experience of flying in near combat conditions. Pilots and crews learn experientially to pick up cues – physical, visual, and emotional – and to acquire judgements of combat situations that cannot adequately be taught in the classroom. Equally important, like Gary Klein's firemen or like Neil Armstrong, they acquire patterns of complex situations that could prove invaluable when in actual combat, in which life-or-death decisions have to be made in a split-second, and when there is no time to reflect or analyse.

Because commanders, soldiers, sailors and airmen cannot wait to go to war to acquire tacit knowledge or to build a repository of patterns, the military have used simulations, exercises and wargames as a proven and effective substitute for the real thing. So even in the richly imagined world of Star Trek, there is place for simulation exercises like *Kobayashi Maru*.

Bounded Rationality

For a whole variety of reasons, hierarchy is crucial to the effective running of military organisations. A hierarchy is optimised for the leader at the top to receive all the information, and then to make the decisions. But under stress, such as in war or conflict, a military hierarchy can become unresponsive – even dangerously dysfunctional – because there are decision-making bottlenecks at the top. Events move too fast for the general or admiral to call all the shots. He risks having all his cognitive synapses saturated, or he lacks sufficient bandwidth to comprehend the full scope of the problem, or he lacks the tacit knowledge to cope with the complexity of the situation. Nobel economist Herbert Simon called this cognitive problem *bounded rationality*.

Bounded rationality's basic insight is that the decision-maker has a limited cognitive ability to access and process information. Combined with the finite time available to make a decision, a decision-maker cannot possibly make a rational and optimal choice. Instead he will have to choose a course of action that is somewhat acceptable, but not optimal. Knowing how to cope with bounded rationality is an important component of the tacit knowledge of military leaders.

The military has learnt through bitter – and sometimes even fatal – experience that for its commanders, soldiers, sailors and airmen to function effectively in combat, they must learn to overcome cognitive limitations such as bounded rationality, in order to cope with the chaos and complexities inherent in war and conflict. These are some of the important reasons why a large part of military training takes place outside

the classroom, through simulations, exercises and wargames that increase tacit knowledge and facilitate the learning of patterns.

Discovery and Games

The Nobel economist and strategic thinker, Thomas Schelling, once said, "One thing a person cannot do, no matter how rigorous his analysis, or heroic his imagination, is to draw up a list of things that would never occur to him."

In any complex operating environment, the connections and interactions among the myriad of agents interacting with each other are often hidden from view. These hidden interactions lead to outcomes that only become apparent when they actually occur. So when something happens, we are surprised. Simulations, exercise and games can sometimes be used to explore complex and subtle issues, in order to discover hidden concepts and buried factors, or to reveal connections and interactions that a conventional analysis would not be able to do. This can reduce surprise and improve readiness.

Dark Winter

Exercise *Dark Winter* was a famous American simulation exercise held in 2001. Many senior officials and politicians participated in *Dark Winter*. The scenario centred on the development and use of a biological weapon – smallpox – by terrorists. Three shopping malls in the USA were targeted. *Dark Winter* aimed to evaluate the adequacy of measures and responses of the US Government after a biological attack. It discovered major systemic weaknesses, such as hospitals being unable to cope with a sudden surge in demand for beds and handling of casualties. The exercise also demonstrated that the supply of smallpox vaccine in the US was grossly inadequate. Without *Dark Winter*, some of these findings would have been met with incredulity among decision-makers who would otherwise have demanded convincing analysis and hard evidence.

As a post-script, a table-top exercise on an outbreak of smallpox in Singapore conducted by the National Security Coordination Secretariat a few years after *Dark Winter* convinced the Government to spend the money to buy a full stockpile of smallpox vaccines for the whole population. The exercise helped the Government to arrive at this decision in a way that a purely analytical policy paper would not have been able to do.

Simulations, Exercises and Games in Government

I have gone through this rather long preamble not to explain why simulations, exercises and games are important to the military and the national security agencies. Instead, I wanted to establish the basis for my assertion that they are equally important for the proper functioning of government as a whole, where a lot of knowledge is actually tacit rather than explicit.

Furthermore, because governments actually operate in a complex environment, many decisions will have to be made under conditions of incomplete information and uncertain outcomes. No amount of analysis and forward planning will eliminate the uncertainty that exists in a complex world. Government decision-makers are as susceptible to the challenges of bounded rationality as are military leaders.

But in contrast to the military, governments have generally not exploited simulations, exercises and games as a pedagogical approach to train their leaders and civil servants. In fact, this approach is largely underutilised and often overlooked for its value in helping civil servants in general, and policy-planners and decision-makers in particular, to better cope with the complexities inherent in their operating environment. Perhaps it is because such simulations, exercises and games can sometimes lead to unpredictable learning outcomes, and this is anathema in bureaucratic organisations that value structure and measurable performance. But this is reason enough for governments to take simulations, exercises and games seriously, because they can help civil servants to unlearn a piece of bureaucratic theology that good analysis and thorough planning will always lead to predictable outcomes.

When I was Head, Civil Service, I argued that the Civil Service should deploy such methods systematically in order to improve the quality of planning and decision-making. To distinguish the simulations, exercises and games of the Civil Service from those of the military, I used the shorthand of calling them "policy games", instead of wargames or military games.

CSC Applied Simulation Training (CAST)

In response, the Civil Service College established a group called CAST – CSC Applied Simulation Training. In the last few years, CAST has built up some capabilities in policy gaming, and it has rolled out a few games for CSC's training and milestone programmes.

Villa La Rose Policy Game

One of CAST's early efforts was the *Villa La Rose* policy game. It is based loosely on real-life events that followed the decision to build an MRT station at the entrance to the Maplewoods condominium. In this policy game, participants play the roles of different stakeholders, each with different motivations and interests in relation to the building of a drilling shaft outside the condominium 'Villa La Rose'. This is obviously a wicked problem, with multiple stakeholders, each of whom defines the nature of the challenge and their interests differently. The game enables participants to explore the dynamics among these diverse stakeholders, how they make decisions, their assumptions and behaviours, as well as the role and use of public engagement.

Villa La Rose has now been run over 30 times in various courses, including CSC's milestone programmes, the Public Engagement Network, NEA's Middle Management Programme, and CLC's Leaders in Urban Governance Programme. Feedback on *Villa La Rose* has been uniformly positive. While the game can never fully capture all the details and nuances of real life, participants come to appreciate the complexity of the issues that surface in the course of playing the game. It helps them to recognise the importance of public engagement and the need to show empathy when faced with an increasingly demanding and outspoken citizenry. All these lessons fall clearly in the realm of tacit knowledge and pattern recognition.

Cents and Sensibilities

Cents and Sensibilities is a game centred on public sector procurement principles and practices. It is designed for participants to explore the principles of procurement, financial prudence, and public accountability. *Cents and Sensibilities* has also been run at CSC's milestone programmes, PSD's Middle Management Programme and for the Public Service Training Institutes Network. The CAST team has also done a 'Train the Trainer' for SLA. One reason why the game has done well is that it engages the participants on a dry topic, but in an engaging and fun manner.

National Security Coordination Secretariat

The National Security Coordination Secretariat's foray into policy gaming has paralleled CSC's. In 2012 and 2013, NSCS organised two games centred on wicked problems in national security. One involved Islamic militancy in the region, and the other focused on the issues and

challenges in Singapore's bilateral relations. Conducted over a three-day period, each game involved about 40 policy-makers and subject matter experts from various ministries and agencies. Participants gained fresh insights, and experienced the challenges of decision-making in a complex environment. These valuable learning outcomes would have been impossible to achieve in a conventional classroom setting.

Project Wikisense

Last year, NSCS conducted a policy game on the Internet. An online crowd-sourcing simulation game, Project *Wikisense* involved about 170 participants from government agencies, academia, and from international think tanks. Over 21 days, participants in *Wikisense* generated and analysed scenarios on the Internet on the topic of "Eurasian Resources and Economic Trajectories". *Wikisense* demonstrated that an online platform could bring together a large and diverse group of participants, scattered over continents and living in different time zones, into a systematic and directed discussion on a challenging topic. At the end of 21 days, a rich collection of 136 scenarios had been developed. The cognitive diversity that *Wikisense* achieved showed the potential of such online policy games for broadening the base of tacit knowledge.

Online Games and Cognitive Diversity

Other forms of online games have taken cognitive diversity to even higher levels. The US Army has used Massively Multiplayer Online Games – or MMOGs – involving thousands of players from all over the world to develop new tactical concepts. The US Navy's version, called MMOWGLI – or Massively Multiplayer Online War Game Leveraging the Internet – created new tactics to combat Somali pirates. In opening up MMOWGLI to the whole world – and perhaps a few Somali pirates might even have played – many more alternatives were generated, resulting in a richer outcome, leading to more robust tactical solutions. The US Navy has since used MMOWGLI to tackle wicked problems like energy.

The Future

While it clearly has tremendous value in helping civil servants cope with wicked problems and complex strategic issues, policy gaming should not be treated as an occasional but entertaining diversion. It should be established as a part of routine training. This is the way to systematically embed patterns, and reinforce tacit knowledge. The RSAF

may only take part in *Red Flag* and *Cope Thunder* once in a while, but on a daily basis its pilots, aircrew and controllers take part in simulation exercises and wargames to hone their fighting skills.

In a similar way, civil servants who routinely work in complex environments, such as media officers and diplomats in the Foreign Service, should regularly take part in policy games.

NSCS intends to develop an online policy gaming platform as part of the Risk Assessment and Horizon Scanning (RAHS) system. This is a very positive thing. It may not have the scale of MMOG or MMOWGLI, but it should enable online games to be conducted more frequently and routinely.

One reason why *Red Flag* and *Cope Thunder* are so effective is that they are both two-sided exercises that include an Opposing Force, or OPFOR. The OPFOR fly aircraft that are different from those used by exercise participants. They use the tactics and procedures of the enemy, which used to be the Soviet Union in the old days. This reinforces the learning value of the exercises, because the OPFOR teaches the participants a vital but subtle lesson that the enemy does not necessarily think and do like them.

In this regard, we should recognise that one shortcoming of the way the policy games are played is that the participants come mostly from similar Civil Service backgrounds. This can lead to groupthink, predictable reactions, and to old patterns being merely repeated. Policy gaming just among civil servants will not help them see that other people might react in completely different ways to a given situation. The learning value is diminished.

To circumvent this problem, cognitive diversity should be a factor in the design of policy games. Certain policy games should engage participants from outside the Civil Service. NSCS's games, for example, have included academics. *Wikisense* was designed for wide and international participation. People from different background and views will help to create more and different patterns that can only improve the learning value of such games.

Conclusion

With the encouraging work of CAST and NSCS over the last few years, the Civil Service should now move to systematically design and run policy games for civil servants at all levels, including in their milestone programmes. The use of policy games for planning, policy

design, futures work, public engagement, and service delivery, should be explored. Policy games must become integral to the proper running and organisation of the Civil Service in Singapore.

Thank you.

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