



POINTER

Beyond the Horizon: Forging the Future RSAF



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EDITORIAL

We are pleased to kick off our Pointer Supplement for 2016 with an Air Force-themed issue. The theme is 'Beyond the Horizon: Forging the Future Republic of Singapore Air Force (RSAF)'. The essays in this supplement explore issues related to the RSAF in the future, the possible changes in the operating context and the strategic challenges faced. These essays will also discuss the preparation required to exploit opportunities and create capacity within the organisation. Overall, the supplement aims to engender a sense of aspiration and excitement about the possibilities of the future and a sense of ownership of the challenges that will need to be dealt with collectively.

The first essay, 'Future Trends and the Strategic Imperatives for Change in the RSAF' is by LTC Wong Khiong Seng and CPT Nichola Goh. According to the authors, to remain at the forefront, the RSAF has to anticipate and address the many external and domestic challenges that it can expect to face in the future. In this essay, the authors outline various developments that are of interest to Singapore and the RSAF, including developments in our neighbouring countries, the expanded spectrum of threats the RSAF can expect to deal with in the future and the domestic resource challenges that the RSAF would have to overcome. The essay then concludes by outlining the holistic strategy that the RSAF will adopt to ensure it remains relevant and effective in the face of these challenges.

The second essay, 'Sustaining a Strong and Capable RSAF for the Future' by ME6 Sreekanth Shankar, LTC James Phang, MAJ Ng Guo Feng and CPT Tan Peng Yu, discusses the key shifts required to sustain the RSAF as a credible deterrent force for the future. The essay argues for the RSAF to continue its emphasis on employing advanced fighting concepts enabled by an innovative force structure and exploring cross domain capabilities, to maximise its resource pool by enhancing flexibility in capabilities and skillsets and to strengthen our internal and public engagement efforts with a more deliberate and targeted communication strategy.

LTC Tan Hwee, Roy, MAJ Oh Wai Mun, Lance and CPT Tan Xi Jie present their perspective on 'Moving Beyond the 1-0 Paradigm: Enhancing the RSAF's Value in Peace'. Their essay explores the RSAF's roles in peace and the potential areas that the RSAF could further contribute in, as the RSAF's operating context evolves. According to the authors, the RSAF, in maintaining a high state of operational readiness and sharpening its combat edge, contributes significantly to the defence of the country. This in turn underpins the peace and stability that Singaporeans enjoy, the foundation of which our national success, both economic and social, is built upon. However, the

RSAF is not just a critical tool for war, but also a vital instrument in peace. While the RSAF must continue to anchor the deterrence mission, there is scope and need to contribute beyond the defence area. The authors conclude that in moving beyond the RSAF's 1-0 paradigm, we can strengthen the RSAF, strengthen the SAF and strengthen Singapore. This will in turn enhance Singapore's peace and security, the springboard on which we can build Singapore's future success story.

The fourth essay, 'Human Capital Challenges for the RSAF' by LTC Tee Pei Ling, MAJ Tjong Wei Chee and ME5 Wong Chong Wai provide insights on the opportunities and challenges for the RSAF in dealing with future human resource trends. The authors highlight that the national manpower challenges that arise as a result of a low birth rate will be one of the many constraints that the RSAF will have to work with, moving forward. The rising national educational standards and individual aspirations among our Operationally-Ready National Servicemen (NSmen) and Regulars will enable the RSAF to leverage on technology as they can be trained more effectively and operate more sophisticated weapon systems. This essay seeks to provide clarity on the manpower challenges that the RSAF will face within the next 15 years. It will explore and seed new ideas in maximising the potential of the well-educated workforce to a thinking and technologically savvy fighting force capable of a full spectrum of operations.

LTC Tan Cheng Wee, Mark, MAJ Cumarran K. and ME4 Ng Wei Rong in their essay, 'RSAF 2030: Evolving Our Culture for Future Challenges' examine the importance of culture to the RSAF's success and the key organisational attributes required to sustain success. The essay focuses on the determinants of culture, its intrinsic importance in driving organisational behaviour and the pitfalls if culture does not evolve with an organisation's changing strategy, objectives or operating environment. It scrutinises the current RSAF culture to identify what has enabled mission success thus far and discusses how a culture shift must be evoked to support future warfighting concepts while engendering key organisational attributes and strengths for the future.

The final essay is entitled, 'Black Swans need not be Black: Preparing the RSAF to Succeed in Spite of Future Uncertainties'. Written by LTC Goh Sim Aik, ME4 Soon Yi Xiang, Andrew and CPT Lim Peixian, Vanessa, the essay delves into how the RSAF can prepare for 'Black Swan' events and put in measures to handle them. 'Black Swan' events are game changing events that cannot be reliably foreseen. While the RSAF has robust plans in place to guard against uncertainties, the key to guard against 'Black Swan' events lies in the adaptability and nimbleness of the RSAF, to not only absorb the impact of 'Black Swan' events, but also to triumph over them. This essay explores what the RSAF must do to prepare itself to deal with 'Black Swan' events effectively. It also suggests measures that the RSAF could adopt, especially in the areas of personnel development and organisational culture.

Future Trends and the Strategic Imperatives for Change in the RSAF

By LTC Wong Khiong Seng & CPT Nichola Goh

INTRODUCTION

The Republic of Singapore Air Force (RSAF) has come a long way since it was founded as the Singapore Air Defence Command in 1968. From a young Air Force tasked with providing basic air defence for Singapore, the RSAF has grown into one of the most advanced and respected Air Forces in the region. To remain at the forefront, the RSAF has to anticipate and address the many external and domestic challenges that it can expect to face in the future.

This essay aims to outline various developments that are of interest to Singapore and the RSAF, including developments in our neighbouring countries, the expanded spectrum of threats the RSAF can expect to deal with in the future and the domestic resource challenges that the RSAF would have to overcome. The essay will conclude by outlining the holistic strategy that the RSAF will adopt to ensure it remains relevant and effective in the face of these challenges.

REGIONAL DEVELOPMENTS – FORCE MODERNISATION

The essay will begin by examining developments in the immediate neighbourhood of Singapore. The region is characterised by rapidly modernising Armed Forces backed by growing defence budgets and fuelled by increasingly vocal domestic voices. The Southeast Asian region has also seen a recent spate of territorial tensions. In short, the external environment is becoming more contested, complex and volatile and the RSAF needs to be well-prepared to face any attendant challenges.

Increasing Nationalism

Increasing nationalistic sentiments amongst Southeast Asian countries is an undeniable observation. Nationalism first dominated the Southeast Asian narrative in the 1940s to 1960s, when many battles for independence were fought by fledgling young states after World War Two (WWII). However, nationalism has also made a comeback in the region in recent years, albeit in a very different form from the post-WWII nationalistic struggles.¹ Modern Southeast Asian countries are more willing and

capable of voicing their nationalistic sentiments and protecting what they view as their territorial boundaries. Rising nationalism in many countries has also increased the pressures on governments to respond decisively to any perceived challenges to their national interests. The mix of more confident, well equipped militaries and rising nationalism cannot be taken lightly.

But, perhaps the most pressing issue Southeast Asia now faces is the disagreement amongst multiple countries over the Spratly and Paracel islands. The Philippines, Vietnam, Malaysia and Brunei all lay claim to the territory in the disputed region of the South China Sea. Notably, China also lays claim to a large portion of the two chains of islands. In September 2015, satellite images revealed that China had begun the construction of a runway on Fiery Cross Reef in the Spratlys.² While the disagreements have not translated into full-blown military clashes between the countries and China, this is definitely a worrying issue that is likely to dominate Southeast Asian politics and dynamics within the region. In short, strong nationalistic sentiments, which often manifest into territorial disputes, is not an uncommon phenomenon in the region. In turn, this means the region is more volatile and the RSAF will do well to prepare itself for the uncertainty should it spill onto Singapore's doorstep, and continue to safeguard Singapore's sovereignty.

Modernising Militaries

According to the Stockholm Peace Research Institute, collective military expenditures in Southeast Asia have risen steadily from US\$14.4 billion in 2004 to US\$35.5 billion in 2013 (with the exception of Myanmar and Brunei).⁴ (See Figure 1) This figure is expected to increase even further. The motivations behind an overall increase in defence spending are multi-fold. Following their economic expansion, many Southeast Asian countries can now afford to spend more money on defence. While a large portion of defence spending necessarily goes into recurrent costs for militaries, increased defence spending also translates into more modern and high-technology procurements for many militaries.

As the region has experienced economic growth in recent years, many countries in the region are expanding and modernising their militaries. For example, when asked what the Philippines could do to counter China's action in the South China Sea, Chief of the Armed Forces of the Philippines, General Gregorio Catapang Jr. responded with a proposal that at least 1% of the approved national budget should go into the improvement of the capabilities of the Armed Forces.⁵ The Philippines'

defence budget now accounts for 0.8% of GDP, but a large majority is allocated for annual government expenditure, leaving a smaller amount for procurement under the modernisation programme.

Besides the Philippines, Vietnam also hotly contests China’s claims to the South China Sea and this has manifested into exchange of blows between the two countries over the years. Against this backdrop of tension, Vietnam has increased its military spending by 113% between 2004 and 2013, the largest increase among Southeast Asian countries.⁶ The Vietnam People’s Air Force has also constantly upgraded its fleet of fighter aircraft, recently procuring an additional 12 Su-30MK2 jets in 2014.⁷ Vietnam has also been modernising its Navy, purchasing a fleet of 6 Kilo-class submarines.

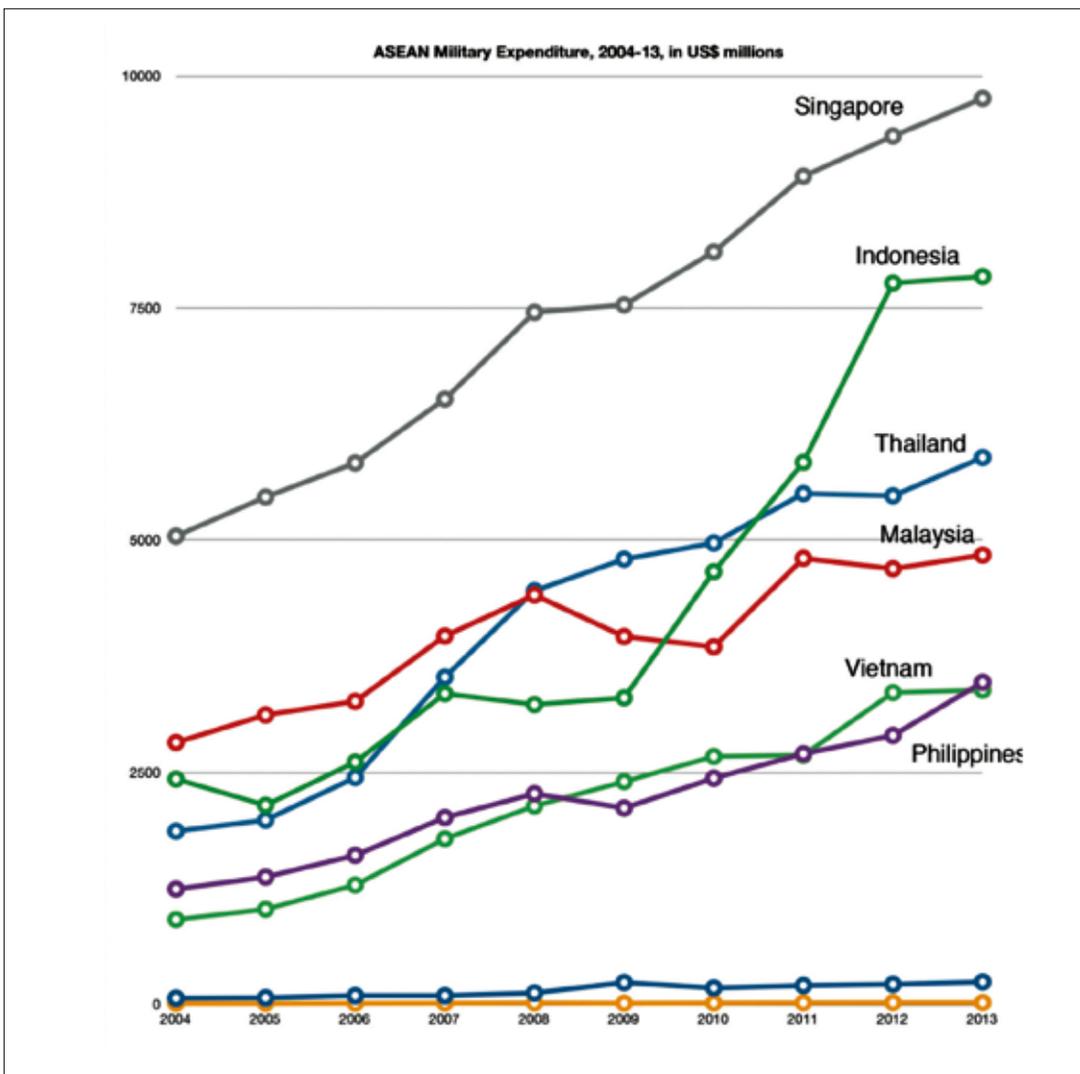


Figure 1: ASEAN Military Expenditure from 2004 to 2013.³

It also received 2 Gepard-class guided missile stealth frigates from Russia in 2011 and has stepped up the indigenous production of naval vessels and ballistic missiles.⁸

The effects of a growing defence budget and increasing government emphasis on defence are also evident in Indonesia. In 2015, the Indonesian defence budget increased by 14% from 2014 to 95 trillion rupiah.⁹ While defence still accounts only for 0.8% of government spending, the Indonesian government has pledged to increase military spending to 1.5% of the GDP by 2020, which would translate into a three time increase in the defence budget.¹⁰ (See Figure 2) An expanded defence budget will allow the Indonesian Air Force (TNI-AU) to significantly improve its capabilities, including jointly developing the 4.5 generation KF-X/ IF-X fighter with the Republic of Korea Air Force and replacing its ageing F-5 fleet.¹¹ Malaysia is also looking to modernising its Air Force by replacing its ageing fighters.¹² These are just some examples of how regional militaries are modernising.

DEALING WITH AN EXPANDED SPECTRUM OF THREATS

The character of warfare continues to evolve due to changing threat trajectories as well as increased importance of the information and non-kinetic realms. Aside from traditional force build-up, the RSAF has to continually improve its capabilities in these domains in order to remain relevant.

Non-Conventional Threats

The requirement to deal with non-conventional threats is not new to the Singapore Armed Forces (SAF). The SAF has recognised for a long time that transnational terrorism threats is something that most modern militaries have to deal with. However, transnational terrorism is becoming a more serious threat to the Southeast Asian region than ever before. Islamic State of Iraq and Syria (ISIS) has experienced more success, both militarily and in terms of recruitment, than arguably any other non-state actor, and threatens to extend its reach to Southeast Asia. The group is already recruiting new members from regional countries such as Malaysia and Indonesia, who could be trained to conduct attacks on their home countries. The recent bombing in Jakarta in January 2016 is also a sombre reminder that the threat of terrorism is coming closer to our backyard than ever before. Besides organised attacks, the recent spate of lone-wolf attacks is also a worrying trend—worrying because of the increase in frequency but also because of the difficulty in predicting and preventing such attacks. In addition, the evolution of such non-state actors from spreading terror to establishing caliphates

blurs the line between conventional and non-conventional warfare, with the best case study being ISIS. ISIS has evolved from a group that pledged allegiance to Al-Qaeda, to a pseudo-state controlling territory in Iraq and Syria, capable of posing serious opposition to traditional militaries. The RSAF has contributed assets and personnel, including a KC-135R tanker and an Imagery Analysis Team, to the international coalition efforts against ISIS. Deputy Prime Minister and Co-ordinating Minister for National Security, Mr Teo Chee Hean reminded that by joining the international fight against ISIS, the SAF and RSAF are “contributing directly to Singapore’s own security.”¹⁴ The RSAF may also consider leaning forward more to support our homeland security agencies in combating terrorism on our home soil.

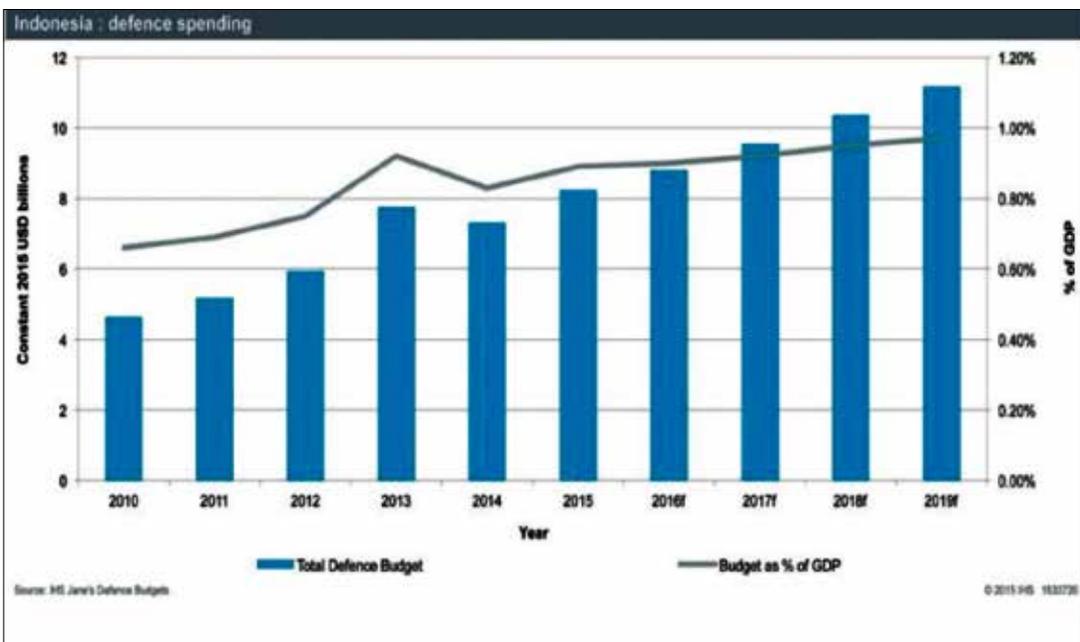


Figure 2: Indonesia’s defence budget as a proportion of GDP.¹³

Non-Kinetic Domain

Another area that the RSAF would have to grow its capabilities is in the non-kinetic domain, including realms such as information warfare and cyber warfare. The cyber domain is getting increasingly important and this challenge is not unique to the RSAF. The cyber domain is a vulnerability faced by all advanced militaries and Air Forces that rely heavily on networks and computers. In 2011, the United States Air Force’s (USAF) Predator and Reaper drones were infected with a computer virus. While there were no confirmed incidents of classified information being lost, the virus was extremely

difficult to eradicate from the Unmanned Aerial Vehicle (UAV) systems and military network security specialists were not able to determine the source of the virus. There were fears that classified information was leaked onto the internet and unauthorised external systems through the virus.¹⁵ This is just one example of how the cyber domain presents risks even for the most advanced Air Forces. In fact, it is increasingly agreed by advanced militaries around the world that the cyber domain is where the next war will be won or lost. The US's cyber command is recruiting an additional 6,000 cyber experts, the British military has set up a cyber reserve unit and the North Atlantic Treaty Organisation (NATO) has declared cyber to be one of its core tasks.¹⁶ While the RSAF has to set itself on a similar trajectory to ensure it is able to shield itself against non-kinetic attacks on the cyber domain, the RSAF must work with the other services to tackle this emergent threat domain.

DOMESTIC CHALLENGES

Besides external challenges, domestic challenges and internal resource constraints would also affect the RSAF of the future. This part of the essay will outline resource constraints in manpower and the challenges the SAF/ RSAF might face in retaining public and government support in the future, in the face of competing demands for national resources.

Government Support and Public Mindshare

Since its inception, the SAF has enjoyed strong government support. Singapore has enjoyed continual economic growth and defence still takes up the largest proportion of government spending. However, public pressure for more social spending on items perceived to directly benefit a larger proportion of the public (such as healthcare, education and housing) is increasing, especially given Singapore's ageing population. This, coupled with a weakened threat perception by the public, will put pressure on the government in terms of defence spending. We cannot take our defence spending for granted and the RSAF needs to be prepared to learn to do more with less to ensure it remains operationally ready. In addition, the RSAF has to continue to articulate and demonstrate its value in peace to a more vocal public audience for it to continue to secure public mindshare so that there is a shared understanding about the important role the RSAF plays both in peace and war. More importantly, securing public mindshare also means securing the societal support and continued investments necessary for the RSAF to remain a credible Air Force.

Shrinking Manpower Pool

People are the heart of the RSAF, and our most important resource. Trends affecting the larger Singapore workforce are also expected to affect the RSAF. Firstly, the low birth rate in Singapore means that a smaller pool of Singaporeans is entering the workforce every year, and this number is expected to continue to shrink. This translates to a smaller number of both regulars and full-time National Servicemen (NSFs) for the RSAF. Unlike other organisations which can hire foreigners, the SAF can only recruit Singaporeans for obvious security reasons. This further exacerbates the challenges of recruitment in a country where labour is already in short supply. In addition, youths entering the workforce possess higher academic qualifications, leading to greater job mobility. The RSAF has to do more to attract and retain talents to remain an effective workforce. Of particular interest is our pool of Air Force engineers. As the RSAF is heavily dependent on technology, the ability of the RSAF to attract and retain engineering talent will have direct impact on our ability to execute our mission successfully.

STRATEGIES FOR THE FUTURE

The RSAF of the future has to employ a holistic strategy to meet all the future challenges articulated thus far. This includes leveraging advanced technology and Concepts of Operations (CONOPS), finding innovative solutions to address its manpower challenges, improving its culture to build a more effective and efficient workforce, and strengthening its Value in Peace to ensure it continues enjoying public support.

A Strong and Capable RSAF for the Future

To remain relevant in an increasingly complex and contested environment characterised by modernising Armed Forces and more dangerous non-conventional threats, the RSAF has to constantly review its existing CONOPS and exploit opportunities presented by technology. The RSAF of the future has to be more potent, more integrated and more resilient, yet leaner in the face of manpower challenges. The RSAF has to exploit new capability domains as force multipliers. These domains include cyber and electronic warfare, which are likely to define the nature of air warfare in the future. Technology will continue to be a critical force multiplier for a small armed force like the SAF which does not have the advantage of numbers. The RSAF must also constantly innovate to improve its structures and CONOPS and maximise available manpower.

Addressing Manpower Challenges

A multi-prong strategy is required to address the RSAF's manpower challenges. This multi-prong strategy involves maximising the supply of personnel available to the RSAF, managing demand and creating a high performance culture.

First, the RSAF can maximise its supply of manpower by strengthening career branding, expanding its recruitment pool to include females and mid-careerists and enhancing its career schemes. The RSAF also has to improve the management, training and employment of its Operationally-Ready National Servicemen (NSmen) and NSFs to augment its regular pool. While the RSAF continues to find ways to better recruit and retain, it also needs to ensure its manpower demands are sustainable for the future. The RSAF should do so by harnessing technology and innovative concepts and enhancing the productivity of its workforce to ensure it can continue to do more with less. Examples of how technology can replace humans in manpower-intensive or dangerous jobs include using robots to do runway sweeping and base perimeter security patrol, and using big-data analytics to process large amounts of collected intelligence information. The RSAF can also enhance its productivity by finding ways to deploy its personnel more efficiently and effectively.

Improving Culture

While taking steps to ensure the quantity of its workforce, the RSAF also has to continually invest in assuring the quality of its workforce. A shift in culture is required for the RSAF to remain effective and relevant in the face of evolving challenges.

Enhancing the RSAF'S Value in Peace

After enjoying decades of peace in independence, it is only natural that the public might start to take national defence for granted. The RSAF has to enhance and communicate better its Value in Peace. This should be done through a deliberate and targeted communication strategy that strengthens both its internal and public engagement efforts. The RSAF should strengthen its communications of its Value in Peace, improve its outreach to the public and encourage advocates to speak up for the RSAF.

Responding to Black Swans

While the RSAF prepares itself for the foreseeable future, it also has to prepare itself for the unexpected. The first step in preparing for such 'Black Swans' is acknowledging the fact that highly improbable events could happen and that no amount of crystal

ball-gazing could help the organisation anticipate such events. While it is not possible to guard against all Black Swans, the RSAF must develop the ability to respond to these events, if they do indeed occur. To do so, the RSAF will need to develop an organisational culture of innovation and train and educate its people to adapt when the unexpected happens.

CONCLUSION

The RSAF has done well and progressed far since its early days, but it cannot rest on its laurels. Developments in the region, coupled with internal resource challenges, mean that the RSAF has to continue to transform to ensure it remains relevant and sustainable in the future. The next 5 essays lay out the holistic strategy that the RSAF has to adopt for it to remain future-ready, in a future ridden with uncertainty and change.

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Sustaining a Strong and Capable RSAF for the Future

By ME6 Sreekanth Shankar, LTC James Phang, MAJ Ng Guo Feng and MAJ Tan Peng Yu

INTRODUCTION

From the early 2000s, the RSAF made strides in its transformation into a 3rd Generation (3rd Gen) fighting force. After years of focused investments in advanced capabilities, making deliberate yet difficult decisions to realise key structural transformations and strengthening the individual and team competencies of our airmen and women, the RSAF has arrived at an advanced stage of its transformation. The RSAF is now capable of full spectrum operations while still retaining the deterrent edge to ensure that the Singapore Armed Forces (SAF) achieves a swift and decisive victory in war.

The first essay has outlined several changes in the strategic environment that calls for the RSAF to look into its next bound of transformation. Amidst a more volatile geopolitical context, an evolving nature of threat and new emerging demographic realities, this essay argues for a potent yet leaner, more integrated and resilient RSAF.

NEED FOR A STRONG AND SUSTAINABLE RSAF

Volatile Regional Environment

A strategic rebalance in the region looms as United States (US) dominance in the region is increasingly challenged by a rising China. There is also an uncertain outlook within the region itself, with shifts driven by the potential rise of nationalism and increased defence spending by Singapore's neighbours. This departure from the status quo will likely be accompanied by a period of increased volatility in Singapore's regional environment as it seeks a new water level. The SAF must remain a credible and deterrent force that enables Singapore to preserve its strategic space and safeguard its national interests. The RSAF must thus continue to maintain an edge over its potential aggressors even as they continue to modernise their forces and be able to address an expanded range of threats across the full spectrum of operations.

Evolving Nature of Threat

Given the changing nature of threat and new instruments of conflict, the RSAF has to review the existing concept of operations and exploit the opportunities and

address the challenges presented by advances in technology. The threat landscape of the present day continues to evolve, especially with the potential exploitation of the cyber and information realms which offer potential adversaries, state and non-state, the opportunity to acquire new capabilities. They offer potential adversaries the opportunity to acquire capabilities that may allow them an asymmetric advantage over conventional and expensive weapon systems.

Demographic Realities

The RSAF needs to maintain a credible and deterrent force structure despite declining manpower resources. A shrinking engineering resource pool driven by changing educational and career preferences will also challenge our ability to maintain a strong engineering competency required of a technologically advanced air force. The evolving societal profile and attitudes may pose new vulnerabilities in the face of threats from hybrid warfare.

MOVING BEYOND THE 3RD GEN RSAF

The 3rd Gen RSAF provides a strong base to build on as we seek to address the challenges presented by a shift in the operating environment.

A More Potent, yet Leaner RSAF

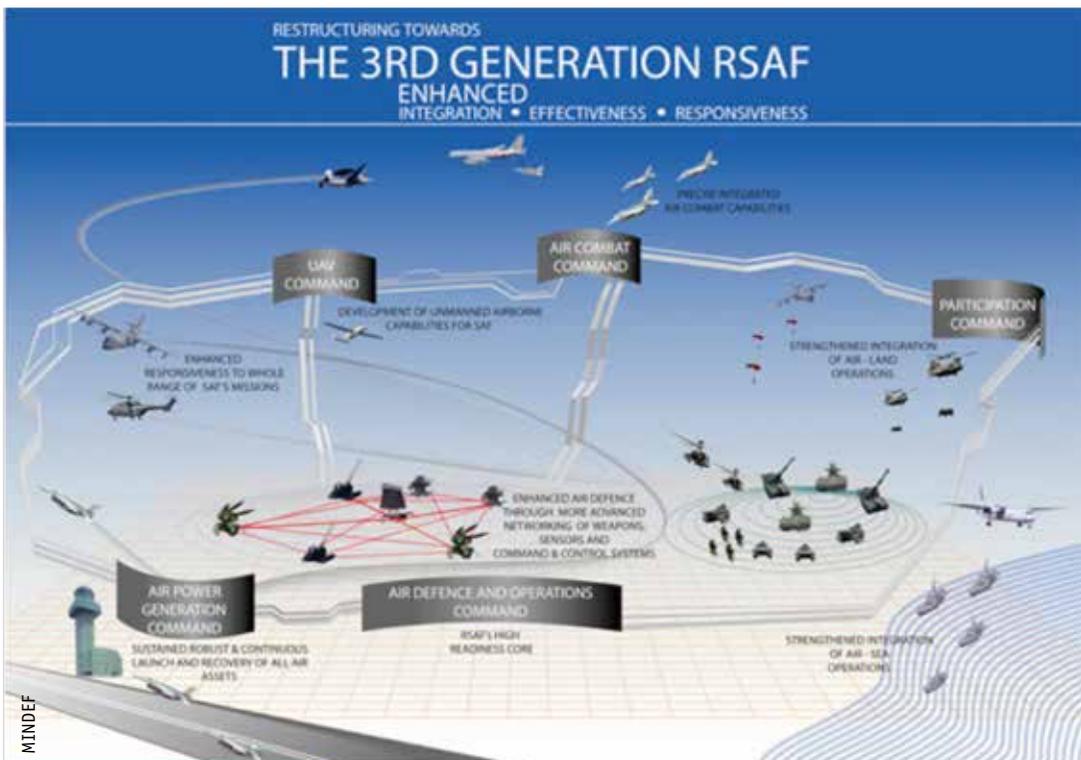
The next bound of development for the RSAF will see the need to build an air force that is more potent yet leaner. The RSAF must be a more potent force to deter heftier adversaries within a more contested and unpredictable geopolitical context. While an all-out war may not be economically palatable, volatility in the strategic environment may increase the likelihood of small skirmishes and conflict scenarios. While the RSAF prepares and adapts to these emerging trends, it needs to remain a lean fighting force as we are faced with a declining national manpower resource pool.

As other air forces in the region continue to modernise, they will increasingly be capable of acquiring more precise and long-range strike capabilities, which will pose challenges to any country lacking in strategic depth. To deter potential adversaries, the RSAF must thus see earlier, think faster and respond more quickly. Seeing earlier requires enhancing our early warning capabilities, through further detection capabilities or leveraging on more varied sources of intelligence. To think faster, we need to strengthen our sense-making abilities through technology and deep specialised skill sets. Responding more quickly requires tighter linkages between intelligence and operational functions at the Headquarters (HQ) and operational unit levels.

Conflict scenarios short of war will be more likely in our future operating environment. The task force concept introduced in the 3rd Gen transformation expanded organisational capacity to react to such scenarios without the need to mobilise our full force potential. To improve our effectiveness and persistence in these scenarios, the RSAF needs to further optimise our manpower and monetary resource requirements to conduct operations with a scalability that is effective and efficient, whilst retaining our capabilities for conventional war. Going forward, a specific focus on new domain capabilities as well as innovations in scalability are crucial to build the necessary capabilities for non-conventional conflict scenarios.

A MORE INTEGRATED RSAF

In the 3rd Gen transformation, we built a more integrated air force by re-organising the RSAF around functional commands and networking our air and ground fighting forces. In the next bound, we need to integrate new capability domains, so that the RSAF is able to address new forms of threats as well as maintain a capability edge over potential adversaries.



Restructuring towards a 3rd Gen RSAF.

The pervasive use of tactical networks in our systems has allowed us to better harness the combined potential of our fighting systems. At the same time however, the RSAF will be potentially more vulnerable to new forms of threats. The capture of the United States (US) RQ-170 Sentinel Unmanned Aerial Vehicle (UAV) by an Iranian cyber warfare unit is testament to the vulnerabilities experienced by advanced armed forces.¹ With these new capability domains, there are important organisational structure and governance issues that need to be addressed, such as how resources can be allocated optimally to build strong organic competency within the RSAF while balancing the SAF's requirements and a governance framework that reaps inter-service synergies while addressing critical service-centric requirements.

In addition to integrating capability domains, the RSAF needs to enhance integration at the SAF level to better support the land and sea battles. As armed forces in the region continue to modernise, they will be increasingly capable of joint operations. To maintain our capability edge, the SAF needs to build on the efforts made in the 3rd Gen transformation to fight as an integrated force. Air power remains the most efficient and effective means to deliver strikes as well as gather accurate and timely intelligence. Through strengthening integration, we can unlock the offensive and intelligence potential of the air force to enhance firepower and information superiority for the Army and the Navy. As achieving air superiority is critical to the SAF achieving a swift and decisive victory, the approach to enhanced integration is to explore more efficient means of achieving air superiority and, thus increasing the capacity of the RSAF to support the land and air battles.

A More Resilient RSAF

Geographical realities are immutable and Singapore continues to face a lack of strategic depth. A more resilient RSAF must be capable of detecting earlier a wide range of threats across air, land, sea and cyber domains, and mount effective and rapid responses despite our geographical limitations.

The RSAF conducts a large part of our training overseas either through our various overseas detachments or participating in foreign exercises such as Exercise Red Flag in the US or Exercise Pitch Black in Australia. This has provided an important avenue to expose our aircrew to cutting-edge fighting concepts and benchmark ourselves against other advanced air forces. However, this must be balanced with the need to maintain a strong local readiness core to safeguard the sovereignty of Singapore's airspace in our complex and unique local operating environment, while continuing to push the frontier in integrated operations with our Army and Navy counterparts.



The RSAF's F-16 fighter aircraft (left) flying alongside the United States Air Force's (USAF) F-22 fighter aircraft (far right) during an aerial refuelling operation as part of Exercise Red Flag-Alaska.

Besides the protection of our physical capabilities, the RSAF must also preserve its soft capability—the psychological resilience of its airmen and women. The Crimean Crisis demonstrated the ability of information operations to undermine the morale and will to fight of the Ukrainian soldiers. The RSAF is a lean fighting force and its people are strategic resources. Our commanders must be equipped with the necessary skills and resources for effective internal communications, while our airmen and women must be imbued with a strong will to fight and core values—a process that must begin in peace.

STRATEGIES FOR THE BEYOND 3RD GEN RSAF

Exploit New Capability Domains

Precision strikes, unmanned systems and Integrated Knowledge-based Command and Control (IKC2) systems were capability focus areas that drove the 3rd Gen transformation. While these capability areas will likely remain key tenets of the RSAF force structure development, we need to exploit new capability domains as force multipliers. The non-kinetic domain of cyber and Electronic Warfare (EW) is a potential area of exploration. Our precision strike capabilities, UAV systems and tactical networks rely heavily on the efficient exchange of accurate information. The protection of our information network system is thus critical. The denial-of-service attacks on Estonian commercial

and governmental web services in 2007 and reports of cyber-attacks preceding the 2008 incursion of Georgia demonstrate the destructive potential of offensive cyber capabilities.² The establishment of the Twenty Fourth Air Force by the United States Air Force (USAF) to undertake cyber operations indicates the criticality of organic cyber capabilities for armed forces and air forces.³ Mastery in these domains will enable the RSAF to exploit cross-domain capabilities so as to strengthen the resilience of our systems and cripple the enablers of the adversary's ability to conduct joint and networked operations.

Space is another possibility. The idea of space is not abstract given the increasing commercial and military reliance on satellites for navigation and communication. The British Air and Space Power Doctrine states that “the provision of accurate location and time data, for example, enables all-weather precision attack and the synchronisation of frequency-agile secure communications.”⁴ Space also offers unique advantages, such as a natural high point and persistence that may introduce new fighting concepts. Traditionally dominated by the larger economies, the commercialisation of the space industry by companies such as Space X and Virgin Galactic opens the possibility for smaller militaries to grow its capabilities in this domain. The lack of territorial lines in space also seemingly overcomes the lack of strategic depth, meaning that a force can potentially overfly anywhere and anytime. However, one should venture into this realm with eyes wide open as it is not without threats. The anti-satellite missile tests by China in recent years, as well as claims of such programmes by North Korea, point towards a potential vulnerability that future advanced air forces might face in their quest towards space capabilities.

Leverage Cutting Edge Technology and Harness Innovation

Technology has been and will continue to be a critical force multiplier for a small armed force like the SAF. We must continue to sustain technological collaboration with key strategic partners such as the US. This is critical considering the huge capital outlay for research and development to create highly advanced air platforms such as the F-15 and the Joint Strike Fighter (JSF). At the same time, we must strengthen our focus on our indigenous defence industry for capabilities unique to our operating requirements. This may be a function of adjusting investment allocation, as well as improving operations-technology integration to streamline collaboration between the SAF and the Defence Technology Community for more focused investments and bringing to fruition projects in the pipeline.



Then-Chief of Air Force, Major-General Ng Chee Khern delivering an address at the F-15 SG roll-out ceremony.

The 3rd Gen transformation introduced several key innovations, with the establishment of the operational commands being one of them. The next bound of transformation should continue to harness innovation in:

- 1) Structures to tighten the operations and intelligence linkage for a more agile RSAF, similar to how the creation of task forces brought together different elements across the SAF to accomplish specific mission types;
- 2) The Concept of Operations (CONOPs) to exploit new domain capabilities offered by both cyber and Electronic Warfare (EW), likened to the shift in paradigm brought about by precision strike and IKC2; and
- 3) Manpower to maximise the employment of service-fit National Servicemen resources and sustain recruitment of technicians and engineers, drawing from the lessons learnt from the introduction of the Military Domain Expert Scheme (MDES) to sustain deep expertise in the SAF.

Strengthen Individual and Team Resilience

Despite the advancement of technology and evolving warfighting domains, the RSAF needs to overlay these with resilience to overcome the uncertainties that accompany any conflict, withstand the impact of attacks by our adversaries and sustain morale as well as combat readiness for protracted conflict scenarios. For instance, many USAF Unmanned Aerial Vehicles (UAV) pilots operating in the Iraq and Afghanistan arena, while operating at a distance from the frontlines, continue to be plagued by Post-Traumatic Stress Disorder (PTSD).⁵ In addition, as the likelihood of smaller skirmishes increases, the RSAF must ready its airmen and women for a higher frequency of low intensity conflicts. Summing up all these requirements, a leaner RSAF will require its airmen and women to be deployed more often and hence they must be able to recover from deployments faster. Therefore, the RSAF must build a comprehensive psychological resilience programme to strengthen the individual resilience of its airmen and women to prepare them for the challenges ahead.

In addition to individual resilience, the RSAF needs to strengthen the resilience of its functional commands—Team Resilience. Faced with the threat of electronic and conventional warfare, the RSAF must enhance resilience across its warfighting capabilities. With nearly every conceivable component networked, the RSAF cannot be confident that its critical IT systems and networks will work under attack from a sophisticated adversary using cyber capabilities with all its other military and intelligence capabilities. The RSAF must therefore build an effective defence to increase the confidence in the IT systems that its warfighting capabilities depend on. In addition, the RSAF must also create buffers and practise contingencies to reduce its vulnerability to such attacks. For example, in the event of a catastrophic network failure, the warfighting capabilities must be able to continue operate, albeit in a degraded mode. Such buffer and contingency plans will not only allow the RSAF to continue to be operational under threat, it will also provide deterrence against potential adversaries as it decreases the attackers' confidence in the effectiveness of their ability to undermine the RSAF. Therefore, the RSAF must improve its cyber defence capability and possess a critical set of segmented conventional systems that will deliver the desired warfighting capability in the face of a catastrophic attack. The RSAF must also adopt a dynamic combat structure which would remain operational should parts of the supporting elements be incapacitated. A classic example would be the air power generation capability, which requires the synchronisation of many combat service support with long logistics chain. If the airbase were to possess smaller segments of air power generation capability, it would be more likely to remain operational during both electronic and physical attacks.

CONCLUSION

The need for a credible and deterrent RSAF remains more pertinent given the impending volatility of the geopolitical environment and the evolving nature of threat. The changing demography adds to the complexity of the challenges the RSAF will face as it embarks on the next bound of development. These shifts in the strategic environment will require a more potent yet leaner RSAF. This means an air force that can see earlier, think quicker and act faster and be able to operate with more agility, especially in conflicts short of war. The RSAF will also have to be more integrated across capability domains, and with our land and maritime forces. A more resilient RSAF must be realised, both in the physical and psychological domains, as the nature of conflict evolves. To realise this, the essay proposes three strategies:

- 1) Exploit new capability domains, such as cyber, EW and space;
- 2) Leverage cutting edge technology by maintaining strong technology partnerships, strengthening our indigenous defence industry and harnessing innovation in our CONOPs, structures and policies; and
- 3) Strengthen individual and team resilience, through a comprehensive psychological programme for our service personnel and strengthening the resilience of our networks.

ENDNOTES

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Moving Beyond the 1-0 Paradigm: Enhancing the RSAF'S Value in Peace

by LTC Tan Hwee, Roy, MAJ Oh Wai Mun, Lance & CPT Tan Xi Jie

INTRODUCTION

During the 2015 General Elections, Singapore Democratic Party (SDP) candidates called for the defence budget to be cut by 40% and to be re-allocated to other areas of urgent need such as healthcare. As Paul Tambyah, the SDP candidate for Holland-Bukit Timah GRC, explained, "Every day more Singaporeans die of heart disease than were killed during Konfrontasi; every year, more Singaporeans die of cancer than during the Japanese Occupation."¹ While calls for cuts in the defence budget are not new per se, they seem to be growing in traction.

One may argue that politicians have and will always play up issues to score political points. However, the tone of conversation within Singaporeans towards defence appears to have shifted over the years. At a Parliamentary sitting on 6th March, 2012, MP Dr Lee Bee Wah had asked Parliament whether top athletes could be 'exempted' from National Service (NS) in gratitude for the honour they have bestowed on the country, even though she was presumably aware of the three fundamental principles that NS must abide to—critical need, universality and equity.² The collective commitment towards defence cannot be taken for granted.

The need for a strong defence force to ensure the survivability of a small and vulnerable nation-state was clear in the founding years of independence. There was strong public support and mandate to build the SAF. The socio-political context has since shifted. As Singapore grew and prospered, a new generation of Singaporeans, who have experienced an extended period of peace, may no longer appreciate the criticality and importance of a strong military in the same way as our predecessors did. While Singaporeans generally support the need for defence, building a strong defence force requires a significant investment of resources. As the threat of war grows increasingly remote in their minds, they are starting to question 'how much' defence is really needed.

There has also been pressure to reallocate resources to fund other competing national needs, such as in the areas of social welfare, education, healthcare and transport. Such pressures are likely to persist in the years ahead. As the Singapore population ages, the need for healthcare services and its supporting infrastructure will grow.

The emergence of evolving security threats, such as terrorism, has also brought into question the utility of sustaining a strong conventional defence force. The efficacy of conventional capabilities such as tanks, ships and fighter aircraft in the context of threats, which need not manifest into a full-blown conflict, nor originate from a state actor, is unclear. One criticism of the SAF is that of being a ‘1-0’ doomsday machine—its impressive suite of capabilities having questionable utility beyond being a great deterrent against a potential aggressor.

In this changing societal context and evolving public expectations, how can the RSAF remain relevant in the eyes of Singaporeans in an extended period of peace, while preserving its core mission to protect Singapore and Singaporeans?

This essay will first maintain that a strong RSAF is, and will continue to be, critical to safeguard Singapore’s security and sovereignty. Second, the RSAF has a duality of mission in peace, and already contributes to many peacetime matters, for instance in securing broader national security interests and expanding policy space. This essay will propose possible contribution areas beyond the traditional security realm that could enhance the RSAF’s overall ability to enhance its missions. Initiatives to enhance our strategic communications efforts, which will underpin our overall efforts, will also be proposed.

FORCE FOR WAR - THE CONTINUING RELEVANCE OF A STRONG RSAF

The mission of MINDEF/SAF remains unchanged—to enhance Singapore’s peace and security through deterrence and diplomacy, and should that fail, to secure a swift and decisive victory over the aggressor. This mission continues to be relevant—history has never been kind to small states and our inherent vulnerability as a ‘little red dot’ has not gone away. Therefore, we can ill-afford to take Singapore’s survival and existence for granted. To that end, the primary value of the SAF remains to deter aggression and to preserve Singapore’s sovereignty. As the ultimate guarantor of Singapore’s survival and sovereignty, the RSAF, as part of the SAF, must continue to sharpen its warfighting edge, to anchor deterrence and to defend against any potential adversary.

One should never mistake peacefulness for peace. Although traditional threats of inter-state conflict and coercion appear to have receded into the background, they have not disappeared. In the realist tradition of international relation and geopolitics, one is either at the table, or on the menu. The strong will take advantage of the weak. A strong conventional military force therefore continues to be relevant. The European experience is instructive. At the end of the Cold War, there was an unprecedented broad reassessment of the position and role of armed forces. The Cold War had hitherto provided the core institutional justification for European armed forces. With the end of the Cold War, European leaders felt that there was little need to invest resources in defence. Some countries have since downscaled their military spending, and some have gone further to dismantle their military apparatus. Norway had sold its previously top secret Olavsvern submarine base, which is now rented out to Russian research vessels, purportedly conducting oceanographic surveys on behalf of the Russian military.³ Russia's annexation of Crimea in 2014 has since conjured up a geopolitical reawakening



Over 3,000 people march in protest against the recent annexation of Crimea.

in the region. Conscription was reintroduced in Lithuania, just 7 years after it was suspended, prompted by fears of the “existing geopolitical situation.”“

The RSAF underpins the SAF’s ‘visible strategic deterrence’. The ability to project air assets quickly over great distances allows us to defend against threats far away from Singapore’s shores, at a place and time of our choosing. With superior air capabilities, we mitigate our lack of strategic depth as a ‘little red dot’. We demonstrate to potential adversaries that we can ‘bring the fight to their doorsteps’ should our survival be threatened. Strong peacetime showing of the RSAF’s capabilities and peacetime readiness also strengthens Singaporeans’ confidence in the SAF.

To establish effective deterrence vis-à-vis potential adversaries, it is not enough for us to be internally confident about the capabilities that we have built up and sharpened. Crucially, others must recognise the strength of the RSAF. One effective platform to achieve this is defence interactions and exercises. The RSAF plays a significant role in this regard through its participation in numerous exercises with established air forces around the world. Through strong performances at these exercises, we establish the SAF as a strong, professional and capable armed force. Others can judge for themselves when they see the RSAF in action. It also gives us the opportunity to benchmark against combat-proven air forces.

Given this, it is imperative that the RSAF continues to sharpen its wartime combat capabilities and edge. As the only aviation combat entity in the country, we must continue the task of protecting Singapore’s skies seriously. Sustained investments in the RSAF will ensure that it continues to be militarily relevant and capable to protect Singapore’s skies for the future. Beyond advanced equipment and technologies, our focus to enhance the professional proficiencies of our airmen and women must also continue unabated.

FORCE FOR PEACE - RSAF’S SECURITY CONTRIBUTIONS IN PEACE

Deterrence, while necessary and critical, cannot guarantee Singapore’s peace and security on its own. While militaries must continue to anchor its ability to defend itself in a conventional conflict, of which the possibility cannot be ruled out, they are increasingly called upon to deal with a wider range of security threats. The previous ‘1-0’ doomsday machine view of the military has given way to a ‘full-spectrum’ view, where militaries contribute to operations beyond war. These can include dealing with the threats of global terrorism, natural disasters, biological pandemics and cyber security.

Today, the RSAF already undertakes many peacetime responsibilities to safeguard Singapore's security. In particular, we defend against threats in the air domain from state and non-state actors alike. Our air defence forces remain on the highest alert to respond quickly to air-related threats, which can manifest in mere minutes, not hours. The threats are real, and the consequences can be catastrophic. The terrorist attack on the United States (US) World Trade Centre in September 2001 illustrates the seriousness of such threats. In the early 2000s, Singapore intelligence agencies had uncovered a terrorist plot by Jemaah Islamiyah to hijack a commercial airliner to crash into Changi Airport. In 2008, the RSAF had scrambled armed fighters to intercept and force down an unidentified aircraft heading towards Singapore. The RSAF remains vigilant against emerging threats in the air, and stands ready to defend our skies, not just during office hours, but 24 hours every day.

Beyond national defence, the RSAF has a broader part to play in peace to safeguard other national security interests. Singapore's national security interests have become more diverse, and the SAF has increasingly been called upon to deal with a wider range of transnational security challenges. In an interconnected world, a security problem in one part of the world can quickly spread to another. The export of terrorism from the Middle East region and the spread of piracy problems in the Gulf of Aden are examples.



The Unmanned Aerial Vehicle (UAV) task group getting ready to launch the Searcher UAV into the Afghan sky.



RSAF's C-130s deployed for Humanitarian Assistance and Disaster Relief operations to search for the missing AirAsia QZ8501 flight in December 2014.

In the last decade, the RSAF had deployed helicopters to support the numerous SAF task group deployments to the Gulf of Aden for counter-piracy operations. Over a six-year period, the RSAF had sent a UAV Task Group, and supplemented the Imagery Analyst Teams deployments with RSAF analysts, to support coalition efforts for stabilisation and reconstruction efforts in Afghanistan. KC-135R air-to-air refuelling tankers were also deployed to support coalition operations.

Humanitarian Aid and Disaster Relief (HADR) is another area that the RSAF will likely need to step up its existing contributions. No affected country by itself has the ability to withstand the impact of natural disasters alone. It is economically unsustainable for a country to prepare for such contingencies based on its own resources. When natural disasters strike, existing infrastructure is often wiped out and normal functions disabled. In these conditions, militaries are often the only organisation remaining to respond at such short notice and will often need the assistance of the international community and regional militaries in the immediate aftermath. Even for a more developed country like the US, the resource contributions from other countries that included Singapore, had greatly aided disaster relief efforts in the wake of the devastation from Hurricane Katrina in 2005.

Over the last decade or so, the SAF has mounted over 20 HADR operations. The RSAF played a central role in many of them because of airpower's inherent ability to project forces and provide supplies quickly over long distances. The RSAF's C-130s were the first to arrive on-scene to commence search operations for the missing AirAsia QZ8501 flight in December 2014. Our KC-135Rs transported a civil defence rescue team in less than a day after the February 2011 Christchurch earthquake. This was closely followed by the airlift of about 110,000 lbs of critical supplies by our C-130s. One of the RSAF's most significant contributions was the delivery of critical supplies to areas decimated by the 26th December 2004 tsunami, under the ambit of Operation Flying Eagle. RSAF C-130s commenced relief operations within one day of activation, and this made an instrumental difference to address the post-disaster unfolding human tragedy on the ground. Our ability to contribute meaningfully to the numerous HADR operations over the last decade had rested on the RSAF's high level of readiness, to respond in short notice.

It is worthwhile to note that the SAF is not alone in such commitments. Many militaries around the world also perform roles beyond the traditional role of defence against external threats. For example, in the Ebola crisis in West Africa, the US military was able to leverage on its ability to mount a rapid and large-scale response in an effort to turn the tide in the fight against Ebola. The US Department of Defence quickly deployed personnel, built critical infrastructure and provided much needed medical supplies, leading to a drop in the number of confirmed Ebola cases within five months.⁵ United Nations peacekeeping is another example where militaries go beyond their traditional role in guarding against external threats. Being an organised and armed force, a military is keenly suited for creating stability in some of the most challenging environments.⁶

Moving forward, it is likely that the RSAF will have to play a bigger role in such operations in the future. The Asia Pacific region accounts for about 70% of all natural calamities globally. Within the scientific community, there is broad consensus that in the context of climate change, extreme weather conditions will continue to persist, if not escalate. For the RSAF to contribute more meaningfully in the area of HADR, there will be a need to build greater capacity. From a sustainability perspective, the RSAF therefore ought to seek more dual-use capabilities that can be flexibly applied in peace and war.

The RSAF is also an instrument of policy—it contributes to the expansion of national policy space. Strategically, this gives Singapore a 'voice' regionally and internationally,

which allows us to ‘punch above our weight’. A key part of expanding policy space is through defence diplomacy efforts. This rests upon the establishment of strong and friendly ties, through extensive military interactions and cooperation. The RSAF operates eight long-term training detachments across Australia, France and the US and numerous other short-term training detachments in overseas locations throughout the world. Almost 24 hours a day, RSAF personnel would be interacting with their foreign military and civilian counterparts. The RSAF’s participation in operations, such as the recent fire-fighting assistance in North Thailand, and the deployment of Chinook helicopters from the RSAF’s detachment in the US after Hurricane Katrina, further strengthens our partnership with key partners around the globe.⁷ A strong web of defence relationships contributes to a robust, open, and inclusive regional security architecture.⁸ This in turn strengthens diplomacy, one of the two key pillars of defence to bolster’s MINDEF/SAF’s ability to secure Singapore’s peace and security.

POSSIBLE CONTRIBUTIONS BEYOND THE SECURITY MANDATE

The SAF is responsible for underwriting Singapore’s survival through its deterrent capabilities. As we move forward, should the role of the SAF, and by extension the RSAF, move beyond the security sector, to contribute not only to Singapore’s survival, but also to Singapore’s success?

This is not a new idea per se. In the early days of Singapore’s independence, our defence planners had envisaged the role of the SAF beyond defence aims. In asking Parliament to pass the National Service Bill in 1967, Dr Goh Keng Swee, who was widely recognised as the SAF’s principal architect, said that the four National Service branches—the full time Army, the People’s Defence Force, the Vigilante Corps and the Special Constabulary—do not only teach technical skills to National Servicemen (NSmen) but also instruct moral values. He said, “This will teach them what good citizenship means and explain the nature of their social responsibilities.”⁹

The RSAF already has a significant impact on other non-defence areas, even as it remains focused on its imperative mission to address external security threats to Singapore. Moving forward, the approach need not be to do more things, but to do more smart things. This means finding more overlap areas that, in strengthening non-defence areas, can in turn strengthen the RSAF’s ability to achieve its mission.

Nation Building

Over the years, the SAF has undertaken, albeit unknowingly, a wider social and political role in the area of nation-building. While this was not the primary role of the SAF in the early years of Singapore’s independence, the potential contributions in

nation-building had always been considered by our first generation of leaders. Indeed, it would have been difficult to imagine that our young men would ever go to war to defend a Singapore that they had no affinity to, to lay down their lives for fellow Singaporeans whom they hardly associate with.

The outcomes of nation-building efforts are closely aligned to MINDEF/SAF's objectives of enhancing Singapore's peace and security. The ability to galvanise the strength of the entire Singaporean population, to rely on the unity of its people, in times of crisis further bolsters deterrence vis-a-vis potential aggressors. Through nation-building, the common bond between the populace and nation will be strengthened, the pivot from which national power would be leveraged from. While enhancing nation-building efforts will inevitably place institutional demands, which may in turn entail potential resource trade-offs with other priorities, such investments into nation-building ought to be taken in the context of RSAF's longer-term strategic contributions to enhance Singapore's peace and security.

The RSAF already has many National Education programmes in-place, from which nation-building efforts could be built upon. For instance, today, at the Air Force Training Command, core values inculcation modules have been instituted as part of the core curriculum for all our airmen and women. Through these modules, our airmen and women have enhanced their ability to exercise values-based decision-making. To enhance the RSAF identity, and to encourage airmen to reconnect with their sense of service and purpose, airmen and women are encouraged to tell their story of what they do, why they do it and the high points of their experience in service. Having their experience formed into a coherent Air Force Story provides a point of reference from which to draw meaning and sense-make the sum of their experience during active or national service. In a similar vein, nation-building modules in our curriculum could be further enhanced and refined. Moving beyond the Air Force story, the RSAF could also encourage its airmen and women to share their 'Singapore Story', from which a common tapestry of stories could be woven for all to share.

The RSAF's Black Knights aerobatics team could also play a bigger role in this regard. Just as sports can positively contribute to the formation of national identity and engender national unity, the Black Knights could help to rally Singaporeans together. The Black Knights' performances at air shows and national day parades have proved to be a crowd favourite and Singaporeans have turned up in droves for these events. These performances, as a demonstration of the RSAF's professionalism and capability, can also serve as a source of pride for Singaporeans.



RSAF's black knights do a curtain split during NDP 2008.

Seeding Capabilities for the Future

The RSAF also has the ability to seed 'transformational' capabilities within Singapore industries, to prepare the country for future challenges. The role of the military has been used to great effect in the US. For example, the rise of Silicon Valley in California had been attributed to its extensive connections to the US military. The relationship was first forged in World War Two (WWII), which has now evolved to produce technologies ranging from chips that powered ballistic missiles to today's data-mining software employed to ferret out terrorists. Many of these technologies have their financial roots in government grants, that supported early research into complex concepts, or military contracts, that provided revenues alongside commercial sales of an early product, such as semiconductors. Fairchild Semiconductor, considered the pioneer start-up of today's Silicon Valley, won its first business through military contracts, building chips that helped send American astronauts to the moon and helped build missiles that armed the US in the Cold War. The first initial public offering out of Silicon Valley was in 1956 for a company called Varian, which sold microwave tubes for military applications.¹⁰

Similarly, we must recognise that the actions of the RSAF could have knock-on effects on the wider Singapore society. For example, the RSAF has trained many aviation engineers to sustain its air operations. Over the years, this has created a sizeable number of aviation professionals that has in turn given rise to a vibrant commercial aviation industry. Today, Singapore is one of the most comprehensive aerospace Maintenance Repair and Overhaul (MRO) hubs in Asia, accounting for a quarter share of the region's MRO output.¹¹ One could argue that the local aviation industry, which contributes 5.4% to Singapore's GDP, would not have been sustainable if not for the RSAF.¹²

The role of the RSAF in seeding a vibrant aviation industry is an instructive example for future possibilities of the RSAF's non-defence related contributions. One opportunity is for the RSAF to spearhead the mainstream adoption of robotics and automation technologies to enhance the productivity of its workforce. These technologies have the potential to ameliorate the impact of the demographic trend of declining birth rates on the RSAF. Through the RSAF's early adoption of such technologies, a viable market for these technologies could be created. The consequent development of a strong supporting commercial sector will in turn provide a good platform for these technologies to be developed around more commercial uses, to aid Singapore companies to raise its workforce productivity.

UNDERPINNING OUR EFFORTS IS STRATEGIC COMMUNICATIONS

Beyond generating greater value in peacetime, it is perhaps just as important to capture this value in Singaporeans' minds. Our citizens should recognise the RSAF's value, both to the country and to the individual. This goes beyond enhancing the RSAF's public standing, to establishing a shared understanding of the RSAF's value. This rests upon the ability to communicate effectively with our key stakeholders. In building on and strengthening the RSAF's relationship with the public, the RSAF secures the societal will necessary for continued investment into maintaining a credible air force. There are three levels that communications could be enhanced: (1) say more – to communicate the value of the RSAF in peace; (2) say better – to improve outreach and build trust and relationships; and (3) say together – to encourage advocates to speak up for the RSAF.

Say More – Enrich Content

As the ultimate guarantor of Singapore's security, the primary value of the SAF is in deterring aggression. An extended period of peace has arguably blunted our people's threat perception and consequently, the need for a strong RSAF. We could consider better communicating the threat to our people. There is a need to strike a balance

between being too alarmist, and being too muted. We have to take into consideration regional sensitivities, so as to avoid triggering a downturn in bilateral relations. One possibility is to craft custom threat narratives to cater to different audience profiles, such as to senior government officials, Regular servicemen, National Servicemen and the wider public.

The value of peace, for the defence ‘price’ we pay, could be better emphasised. Defence falls into the category of services that most Singaporeans do not feel the direct effects of on a daily basis, but if the service were removed, the lack of defence would be felt too late and the price would be grave. Such value is better understood in the context of ‘when peace is lost’. In our history, many of these events pre-date our independence in 1965. The terror inflicted on the populace during Konfrontasi and the horrors of the Japanese occupation in WWII are examples. It is useful to leverage on such stories in our history to remind Singaporeans that peace should not be taken for granted.

For the public to recognise RSAF’s value in peace, a key enabler is to raise their awareness of RSAF’s peacetime contributions. The manner in which this is done ought to keep pace with the changing content consumption habits of our intended audiences. Singaporeans are already one of the most active social media consumers in the world, with the world’s second highest social penetration rate of 59%, more than double the global average of 25%.¹³ We could therefore better leverage on online news and social media outlets to disseminate our messages. Where traditional newspapers and magazines served to ‘broad-cast’ our messages, online media outlets offer us the unprecedented opportunity to ‘narrow-cast’ our messages quickly with relative economy of effort. Online videos and interactive content further enhances our ability to engage our audiences in a way that print media were never able to.

Say Better – Enhancing Engagement

Beyond generating greater awareness, the RSAF could also do more to engage the public. The relationship with the public could transform beyond one of a security supplier-consumer, to one of stakeholders who are invested in the success of the RSAF.

Enhanced outreach programmes have the potential to transform this relationship. Existing platforms, such as the RSAF45@Heartlands exhibitions and the Community Outreach Programme are good baselines from which we could further enhance our efforts. These events allow us to engage Singaporeans in the heartlands who otherwise

may not have the opportunity or inclination to find out more about the RSAF through open houses in the airbases, which are typically inconvenient to travel to. Through face-to-face interactions at these outreach programmes, we establish human touch-points with the community. When Singaporeans think about the RSAF, it is no longer just about an organisation operating advanced equipment, but also about the fellow Singaporeans working tirelessly behind the scenes to keep our skies safe. Moving forward, it would also be useful to increase our touch-points with Singaporeans. For example, we could engage younger Singaporeans through the SAF-Schools Partnership programme.

On a related thread, our engagements with the public must be grounded on public trust and confidence. While information is typically embargoed for operational security reasons, the public could perceive the RSAF as ‘having something to hide’ when we appear to hide under the cloak of ‘security’.

Say Together – Encouraging Advocates

Initiatives in engaging the public have traditionally been organised from a top-down approach and primarily driven by the RSAF’s defined objectives and messages. With changes in our social context, engagements with the public ought to adopt a more two-way approach that also focuses on building relationships with stakeholders so that they can in turn advocate on behalf of the RSAF.

Our most important stakeholder is our internal audience—our Regulars and NSmen. Every Regular and NSman is also part of the Singapore society, and they have touch points with their friends and families. In engaging our people well, they can in turn help advocate for the cause of the RSAF, and further spread the good word about the work undertaken by the RSAF. Third-party advocates can further bolster the RSAF’s public standing, and lend greater credence to the value we claim to generate in peacetime.

CONCLUSION

Heraclitus, a Greek philosopher, had once remarked that “the only thing that is constant is change.”¹⁴ Much has changed in the RSAF’s operating context since it was first established almost five decades ago. One of the secrets in the success of today’s RSAF is our ability to adapt to these changing circumstances. As we move forward into the next phase of transformation, we must remain flexible and nimble, to fit the evolving context that the RSAF operates within.

The RSAF plays a critical role in securing Singapore’s peace and security. Credible wartime RSAF capabilities provide visible strategic deterrence against our potential aggressors. This is a key direct enabler of economic development in Singapore. While

the RSAF must continue to anchor the deterrence mission, there is scope and need to contribute beyond the defence area. The RSAF's ability to better address transnational security threats, such as natural disasters and terrorism, will further strengthen Singapore's security. There are additional roles that the RSAF can play in, for instance in nation-building. In moving beyond the RSAF's 1-0 paradigm, we can strengthen the RSAF, strengthen the SAF and strengthen Singapore. This will in turn enhance Singapore's peace and security, the springboard on which we can build Singapore's future success story.

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Human Capital Challenges for the RSAF

By LTC Tee Pei Ling, MAJ Tjong Wei Chee and ME5 Wong Chong Wai

INTRODUCTION

“World Class People, First Class Air Force”

- The Air Force 21 Vision¹

The Republic of Singapore Air Force (RSAF) has long recognised that the key to its rapid ascendance to become one of the most highly regarded air forces in the region is the strength and spirit of its people. This firm belief is emphasised in its vision statement, which concludes with the statement: “Above all, our people are the heart of our organisation.”²

Even as it transformed into the 3rd Generation (3rd Gen) RSAF to strengthen its capabilities to meet the wider range of security threats to Singapore, the RSAF again demonstrated a remarkable focus and attention to her people by developing a unique framework designed specifically to strengthen the development and management of the 3rd Gen Airmen and women. This people development framework was known to people within the RSAF as the Project CARDINAL framework, named after a bird which is known for its faithful monogamous nature and characterised by a reputation of fiercely defending its territory and young.³

It was envisioned that RSAF would nurture the 3rd Gen Airmen and women, through Project CARDINAL, to improve their professional competency and commitment to the organisation. Since the inception of the CARDINAL framework in 2007, aided by the efforts of the Commanders and ground units, the RSAF had seen an increase in the number of people applying and joining the RSAF with a decrease in the number of people leaving and its engagement levels increasing in the last three back-to-back biennial organisational engagement surveys.

With recruitment, retention and engagement indicators all being healthier than they have ever been, what comes next for the RSAF?

STRATEGIC HUMAN CAPITAL CHALLENGES ON THE HORIZON

Even though the RSAF has done well thus far in strengthening recruitment, retention as well as engagement of its people, it must not be lulled into a sense of complacency and rest on its laurels. The challenges within the Human Capital Landscape are more complex than before and comprise an array of diverse issues which require careful and deliberate medium-to-long term strategic planning. In the commercial world, effective organisations have linked their human capital approaches to their overall company mission. Likewise for the RSAF, we should be wary that an effective human capital strategic plan is necessary in ensuring that the operational mission and desired capabilities of the 3rd Gen RSAF are not compromised.

This essay seeks to identify the key trends and challenges within the Human Capital Landscape which the RSAF will face, assess how these challenges could impact the RSAF, and propose initiatives on how these challenges could be overcome or be converted into opportunities to propel the RSAF forward in the next bound.

STRATEGIC HUMAN CAPITAL CHALLENGES AND IMPACT TO RSAF

Strategic Challenge 1: Low Local Birth Rates and Longer Life Expectancy

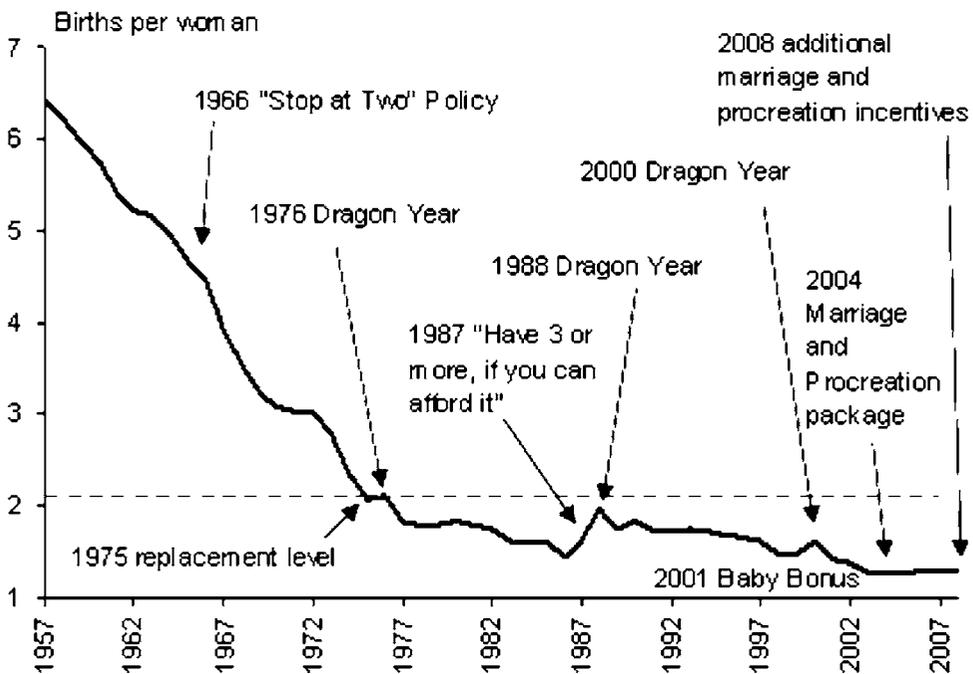


Figure 1: Births per Singaporean Woman from 1957 to 2008.⁴

Since our independence, the Singapore government has implemented policies over the years to encourage certain desired demographic trends. In the early years, there were policies implemented to adjust the population growth rate of Singaporeans to ensure that our nation's development was able to support the large proportion of dependents. As Singapore continued to progress, the effects of the 'stop at two' policy were intensified by other social trends as Singapore continued to prosper and develop. This is one of the many trends observed in many developed countries around the world, where there is a rising proportion of singlehood and later marriages which leads to the total fertility rate declining well below the required replacement rate.

What this means for the RSAF and Singapore Armed Forces (SAF) is that the resource pool of qualified enlistees will continue to shrink. From 2016 onwards, it is expected from projections that the number of Full-time National Servicemen (NSFs) will decline at a rate of 2% per annum.⁵ Subsequently, this will affect the ability of the RSAF and SAF to generate Operationally Ready National Servicemen (NSmen) as the supply of NSFs shrink, and will also have an impact on recruitment since the number of Singaporeans eligible for Regular service decreases.

Strategic Challenge 2: An Ageing Population and Workforce

As Singapore evolved from a developing country to a developed country in the 20th century, it has begun to face the economic effects of an ageing population. The number of elderly citizens will triple to 900,000 by 2030, and they will be supported by a smaller base of working-age citizens. There are currently about 5 citizens in the working-ages of 20 to 64 years, for each citizen aged 65 and above. By 2030, there will only be 2.1 working-age citizens for each citizen aged 65 and above, as shown in Figure 2.⁶

Year	Elderly Citizen	Citizens in working-age band of 20-64 years of age	
1970			13.5
2000			8.4
2011			6.3
2015			4.8
2020			3.6
2025			2.6
2030			2.1

Figure 2: Support Ratio of Active Workforce to Dependents.

To the RSAF, given the shorter career durations available within the service relative to the commercial sector, there will be an impact on both the macro and micro levels. On the macro level, we will be observing an outflow of experienced personnel leaving the service which will gradually outstrip the number of available youths entering the workforce. On the micro level, individuals will also likely consider their long term future prospects in securing a livelihood that sustains their support of elderly dependents for a longer period, which may translate to an adverse impact on manpower retention.

Strategic Challenge 3: Tighter Labour Supply

In Budget 2010, the government began to tighten the policy on the recruitment of foreign workers through measures such as the hikes on levies for work permits and S-passes in a bid to increase productivity and decrease reliance on foreign manpower. These measures were implemented over the following three years. To the RSAF, this has two significant impact.

In 2013, local employment increased 4% in 2013 as compared to 2.9% in 2012. In addition, the median monthly household income from work (including employer Central Provident Fund contributions) for full-time employed Singaporeans rose almost four-fold in nominal terms from S\$7,570 in 2012 to S\$7,870 in 2013.⁷

As an organisation that can only recruit Singaporeans for security reasons, the increased demand for Singaporeans will exacerbate the challenge of the declining birth rates. Besides having a smaller pool of Singaporeans to recruit from, the RSAF must now also be able to stave off competition from the other industries which are not only hiring more Singaporeans but also willing to pay a premium salary for Singaporeans to be part of their workforce.

More specifically for the RSAF, the commercial aerospace sector in Singapore has been growing and will continue to do so. With the industry requiring 375 engineers, 2,600 technicians and 700 licensed aircraft engineers and inspectors and more as it continues to grow, there will be a direct impact on the recruitment and retention of RSAF personnel, particularly in terms of Air Force Engineers.⁸

Strategic Challenge 4: Evolving Aspirations

Through the creation of the Singapore Institute of Technology (SIT) and Singapore University of Technology and Design (SUTD), Yale-NUS Liberal Arts College, and the

Lee Kong Chian School of Medicine, the number of youths in Singapore who are able to attain a university placing and degree will increase from 26% in 2012 to 30% in 2015 and eventually 40% in 2020.⁹ This is notwithstanding the increase in the number of private universities which have emerged in the education scene to leverage on the evolving aspirations of Singaporeans.

The increase in the education levels of Singaporeans, while bringing about positive outcomes such as a more highly educated workforce, has also brought about the other effects such as a delayed entry into the workforce.¹⁰

More specifically to the RSAF, this also means that the supply of labour will shift to become more graduate heavy than before, which will increase the pool of labour for jobs requiring graduates, whilst decreasing the pool for jobs which require non-graduates.

Strategic Challenge 5: Globalisation

From the perspective of labour supply, we have already begun to observe an evolution in the social fabric of our local workforce. Youths today are entering the workforce with higher education qualifications and are generally more affluent as compared to our pioneer generation, leading to greater mobility.

In the Ho Rih Hwa Leadership lectures, Prime Minister Lee Hsien Loong highlighted that there were about 200,000 Singaporeans residing abroad in 2015 and expressed a concern that should this trend continue, Singapore could potentially just “melt away, dissolved by globalisation.”¹¹

Given the education levels and valuable skillsets held by RSAF personnel as well as the Singaporean population as a whole, this will pose yet another challenge to the RSAF from both the recruitment and retention perspectives.

DEVELOPING A HOLISTIC HUMAN CAPITAL STRATEGY

The RSAF needs to develop a holistic strategy comprising specific and targeted initiatives to address the wide-ranging strategic challenges coming up on the horizon.

While the strategic challenges are complex and interconnected in nature, one can try to simplify the problem into an issue of supply and demand. The supply of human capital which the RSAF can employ will continue to shrink, while the operational

demands required of the RSAF will continue to grow in a world where security threats are complex, uncertain and increasingly in scope.

To simplify the articulation of the proposed initiatives for the RSAF, we propose a three-pronged strategy. The first two key thrusts of this strategy will seek to optimise the available human capital resource pool, as well as to minimise the demand for and reliance on human capital. The third key thrust is one of strengthening culture, sense of belonging and developing a high performance culture—the strong foundation on which RSAF will develop its people to become World Class, and continue to push the boundaries to deliver mission success.

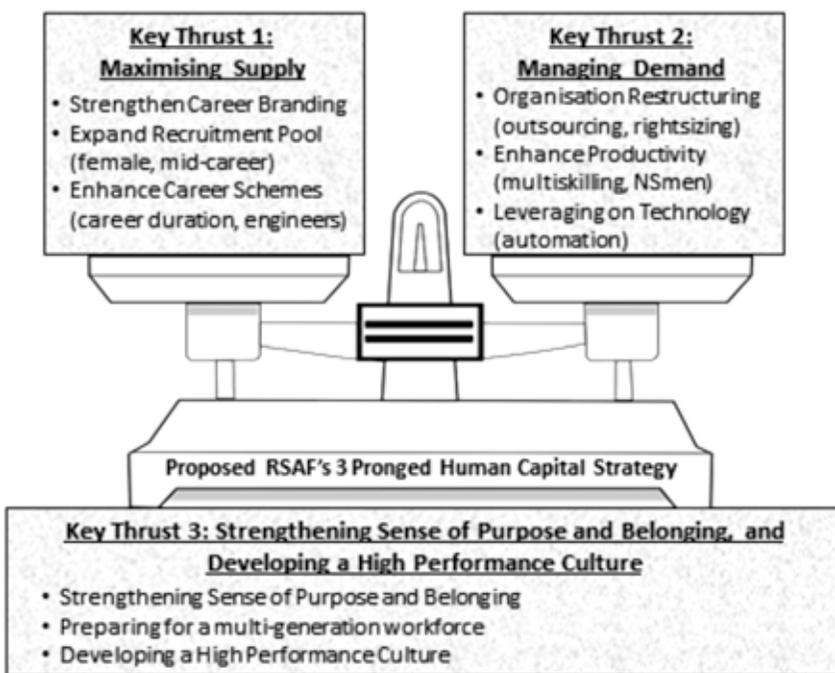


Figure 3: Holistic Human Capital Strategy

KEY THRUST 1: MAXIMISING SUPPLY

Strengthening Recruitment and Career Branding

The RSAF has, over the past few years, been highly successful in her recruitment campaigns. The forward looking policies which enable new recruits to better meet their aspirations through education sponsorship, further their education midway through their careers and dynamic job options within the career have done well to attract people to join the RSAF. Coupled with an attractive branding of an exciting and dynamic career

and anchored on a fundamental, strong purpose, this has enabled the youths today to feel connected to a career in the RSAF. The RSAF has seen job applications rise despite a declining resource pool and the healthy recruitment over the past few years has enabled the RSAF to strengthen her manning levels and grow operational capabilities.

The Air Force Recruitment Centre launched the 'One Force' career branding campaign in 2014 which is the first campaign that spans across all media platforms available. From online websites, to a free to download smartphone app, to social media, the interactive campaign captured the imagination of the target audience and applications soared across all vocations, enabling the RSAF to select and recruit a larger number of interested and eligible candidates despite the declining total number of Singaporeans. The RSAF must continue to remain aware of the latest trends which appeal to the recruitment target audience and generate products to maximise campaign effectiveness.

Moving forward, the RSAF may wish to explore the possibilities of influencing potential recruitment targets further upstream, particularly in the areas of seeding interest in an engineering career in the RSAF. The RSAF can also incorporate military aviation technology into education textbooks used in schools, or collaborate with education school houses to organise competitions and imbue stronger interest in military aviation engineering at a young age. These initiatives aim to strengthen the mindshare for recruitment for future generations.

Expand Resource Pool

Traditionally, RSAF as well as the SAF had focused their efforts in the Basic Military Training Schools which provided great synergy for recruitment as all Singaporean males are gathered together and can be briefed and engaged collectively. However, as the total number of males eligible for enlistment decline, there needs to be other viable manpower sources or novel solutions to address future demands. In this aspect, the RSAF is not standing still. In terms of recruitment policies, new and even more progressive policies have been launched to improve the ability of MINDEF/SAF to attract Singaporeans to make the RSAF a career of choice. Examples like enhancing women's recruitment efforts, policies on strengthening mid-careerists recruitment and re-enlistment frameworks, have all helped to widen the resource pool.

Enhancing Career Schemes

With a substantial amount of the RSAF comprising of engineering and logistics personnel to support its operations, the challenges on the national engineering resources are critical considerations for our future. Engineers are key personnel in building the foundation on which our air operations objectives can be accomplished. With the future of air warfare poised to be even more dependent on technology than ever before, the ability of the RSAF to attract and retain engineering manpower resources are paramount to achieving mission success for the long term.

In view of this challenge, MINDEF/SAF has already launched the Military Domain Experts Scheme (MDES) in 2010. Aimed at strengthening the recruitment and retention of technical expertise in the organisation, the MDES scheme has so far performed well for the RSAF.

In addition to MDES, the teeth of the RSAF, the combatants, also had their respective career schemes enhanced. The Enhanced Officer Scheme (EOS) as well as the Enhanced Warrant Officer Scheme (EWOS) also increased the career duration of both the Officer and Warrant Officer Corps, allowing both Corps to contribute over a longer period whilst balancing the need for leadership renewal and maintain a dynamic organisation.

MAXIMISING OUR NSMEN RESOURCE

Another area which can be maximised is the resource pool of our NSmen. As they form a substantial component of our manpower resource, it would be critical for the RSAF to continually explore and implement novel solutions in maximising their utilisation to augment our active strength. In this manner, the RSAF would be able to cope with evolving operational demands whilst adapting to the steady decline of manpower in the upcoming years.

Given the perishability of skillsets for certain vocations, it is thus apt to consider the implementation of Key Performance Indicators (KPIs) to measure the quality of NSmen training. This serves to maximise the amount of training value for every High Key/Low Key Call up and improve the ability of NSmen to maintain their currency. Secondly, the establishment of these KPIs could provide feedback for units to focus training on work areas that NSmen tend to exhibit lapses in, due to the inherent task complexity or lack of practice.

Investing in select training courses for NSmen would also reap benefits as this could likely improve individual competency and foster unit cohesion. Consequently, NSmen would also appreciate the RSAF's efforts in developing them professionally and in doing so, highlight the importance of their role in ensuring future mission success for the RSAF.

As the population becomes increasingly educated, certain jobs which were identified for regular vocations could potentially be fulfilled by NSFs and NSmen. This will allow our limited regular personnel resource to focus on more operationally intensive tasks whilst increasing the involvement of NSFs and NSmen in more challenging areas where their training and better educational profiles would enable them to discharge their duties with confidence.

KEY THRUST 2: MANAGING DEMAND

Organisational Restructuring

Planning for the impending manpower challenge for the SAF and the RSAF was already underway some time ago. In the words of Lieutenant-General Bey Soo Kiang, Chief of Defence Force from 1995 - 2000, "The manpower shortage faced by the SAF has to be dealt with through organisational restructuring and re-engineering, proper training and education and applying technology to enhance firepower and capabilities while using less manpower."¹²

Organisational restructuring was something which the RSAF underwent in the transformation to become a 3rd Gen RSAF, where its organisational structure was enhanced from an airbase-centric nature to a Command-centric nature. The main aim of this transformation, while not aimed directly at reducing headcount, successfully enabled the RSAF to become a full-spectrum force ready to meet the new emerging threats to Singapore, as well as to become more potent in decisively influencing land and maritime domains. The 3rd Gen RSAF grew to become a flexible, integrated, full-spectrum force without any increase in its demands on manpower.¹³

In other areas which the RSAF has explored before and should continue to explore is to commercialise the non-core activities to strategic partners in the local aerospace industry. The benefits of this are three fold. Firstly, the manpower saved from the commercialisation can be transferred to other more critical areas; secondly, there may be an avenue to retain the expertise of selected retiring RSAF personnel to sustain these capabilities and lastly, the local aerospace industry will continue to grow in strength, gain new capabilities and in turn generate jobs and contribute to the Gross Domestic Product (GDP) as these capabilities are applied commercially to address global customer demands.

We must also restructure to meet the changing demographics of the resource pool. Notably, the proportion of Singaporeans who will be able to secure a university placing will increase from 27% today to 40% in 2030. Therefore, we can no longer expect to meet our manpower needs if the job requirements of the RSAF maintain the same requirements of graduate and non-graduate jobs in the same proportions. Jobs will need to be reviewed, streamlined and re-profiled to leverage on this higher educated workforce.

Enhancing Productivity

With the decreasing manpower pool, one of the key initiatives identified at the national level is the drive to increase the productivity of our workforce. However, it is important to note that enhancing productivity cannot be viewed simply as working harder, or working longer hours per day. Rather, it must aim to enable our people to do more through other means, such as multi-skilling.

Within the Air Force Engineer community, one of the key initiatives to enhance the productivity of our engineers is to fundamentally rethink how our future Air Force Engineers will be trained. Conventionally, our engineers have been trained to be highly specialised in their jobs. While this has enabled them to be more focused in their deployment, it also provides room for efficiency gains as not every system requires to be worked on at any one time. Thus, the training of our Air Force Engineers have been enhanced into the I-competency model, where new engineers are trained in a broader scope of general tasks, following which they can subsequently train to be specialised in selected systems. This will enable the engineering community to glean greater synergy through enabling our engineering to be able to conduct the tasks most frequently required, while retaining the ability to have engineers who specialise deeply in aircraft systems.

Another area through which productivity can be enhanced is to find ways to deploy personnel more efficiently and effectively. For example, in the domains of intelligence, cyber-warfare, or perhaps even some areas of engineering which are of a planning or analytical nature, personnel who are medically unsuitable to perform combat tasks can be deployed as long as they possess the educational and intellectual aptitude.

Leveraging on Technology

Some challenges we face can also provide opportunities. While the aspirations of our people are rising, so are their education levels. Our youths today grew up in an environment of information technology and the concept of networking. Their skills and higher education will provide the RSAF with an avenue to procure and operationalise new systems, relying more heavily on network centric operations and advanced automation which will subsequently reduce the RSAF's reliance on manpower.

KEY THRUST 3: STRENGTHENING SENSE OF PURPOSE, SENSE OF BELONGING AND DEVELOPING A HIGH PERFORMANCE CULTURE

Strengthening Sense of Purpose and Belonging

Another area of key emphasis is to strengthen the retention of our World Class People. The RSAF invests considerable resources to select, recruit, hire and train people and transform them from ordinary citizens to qualified professionals in the aviation industry, and this investment should be protected. To strengthen the engagement and retention of our people, they must have a strong foundation which anchors them to the organisation and see them through difficult, trying times and adversity.

The people in the RSAF must understand the purpose of existence, or *raison d'être*, in their roles and responsibility. Dynamic and wide-ranging security threats is no cause for immediate concern to the average Singaporean citizen as most have grown up in an environment of peace and prosperity. Some may even question the purpose of having the Armed Forces to prepare for a war which neither seems imminent nor probable. Thus, it is critical that the people in the RSAF are themselves clear on what their purpose is. This must be done through continual education on the threats which exist, with relevant examples of countries around the world which have encountered them in recent history. For example, the annexation of Crimea has highlighted the importance of having a credible deterrent force.

It must also be noted that the RSAF should not solely exist for the function of war as there is a strong proposition to strengthen the value of the RSAF in peace. The value of the SAF in peace may be simpler and more tangible to grasp for some services such as the Army, where their presence on the ground is more immediately felt and their ability to directly touch the lives of people will remain stronger. Examples include their presence in Singapore Changi Airport, and also their large presence during national events such as the 28th South East Asian Games and the national mourning of our founding Prime Minister, Mr Lee Kuan Yew. What then is the value in peace of the RSAF? There are missions which are done daily but cannot be disclosed for reasons of security. While they are important, the very people they are protecting would not know, nor understand, and thus may not see our value. Regional Humanitarian Aid and Disaster Relief (HADR) operations are another avenue, but certainly, we do not wish for a regular dose of natural disaster just to prove our worth.

The RSAF must seek ways to strengthen its value in peace and also strengthen the engagement of its people. It must provide an environment in which its people can thrive and do better.

Preparing for a Multi-Generation Workforce

The emerging predominance of a new generational cohort in the workforce—specifically Generation Y and Z, reflects a broad element of social change in Singapore. Although labels for generational shifts are often clichéd and subjective, it nonetheless plays a critical role in guiding organisations to be flexible and tailor human resource management strategies to cater for an increasingly age-diverse workforce. As shown in Table 1, we observe that newer generations have evolved their personal emphasis in significant areas such as motivators, retention and career goals to generally focus on personal interests rather than fulfilling organisational needs. Therefore, future success in securing manpower and maintaining a critical pool of talent lies with an organisation’s ability to recognise these changes and invest significant efforts to bridge the gap between generations. These efforts can include a review of training structures to harness the best learning methodologies for each generation, changing attitudes towards older workers’ abilities in picking up new technologies and increase meaningful interaction between different generation of workers to share experiences (for the traditionalists, baby boomers and Gen X) and freely exchange new ideas (for Generation Y/Z).

	Traditionalist	Baby Boomers	Generation X	Generation Y/Z
Attire	Formal	Business - casual (high end)	Business - casual (low end)	Whatever feels comfortable
Work Environment	Office only	Long hours - office only	Office, home, desires flexible schedule	Office, home - desires flexible schedule
Motivators	Self - worth	Salary	Security	Maintain personal life
Mentoring	Not necessary	Does not handle well negative feedback	Not necessary to receive feedback	Constant feedback needed
Retention	Loyalty	Salary	Security/Salary	Personal relationship
Client Orientation	Personal contact	Telephone	E-mail	E-mail/IM/Text
Technology	Dictates documents, e-mail only in the office, use of library instead of web, limited phone use	Documents prepared by the Associates, e-mail primarily in the office, web use to "google"	Creates own documents, uses mobile and laptop, uses web to research, review etc., e-mail/mobile 24/7	Creates own documents, creates databases, uses web to research and network, use of e-mail/IM/text 24/7
Career Goals	Build a legacy, a life-time career with one company	Build a perfect career, excel	Build a transferable career, variety of skills and experiences	Build several parallel careers, have a several jobs simultaneously

Table 1: Characteristics of the various generations.¹⁴

In understanding and solving Human Resource (HR) challenges associated with generational transitions, organisations can similarly address employee attitudinal shifts which corresponds to 'Life Stages' or 'Eras' that occur in 10–12 year windows. The ability of an organisation to adapt and be flexible in addressing employee 'Life Stages / Eras' aims to improve retention and hopefully, shift one's focus back towards one of loyalty instead of personal relationships in deciding to remain in his/her current career. Looking forward, the SAF must continue to actively foster a sense of pride in serving the country and should seek novel methods to promote this as a 'pull' factor to retain Generation Y and Z regulars.

Developing a High Performance Culture

The following figure shows the difference types of organisational cultures and how they range from a High Performance Culture, where highly empowered and motivated employees drive the organisation forward, to a Compliance culture which requires only that the employees align, conform and execute tasks, and so on. Which category do you think the RSAF is in? Which category do you think the RSAF should be in? Are the answers to both questions the same? A performance culture is based on discipline and it promotes standards of excellence and ensures direct accountability. Therefore, obstructive behaviours and supports will be blocked. Instead, there will be reinforcement and rewards for constructive behaviours. The leaders in the performance culture would play important roles in supporting the organisation. The leadership should not only reside at the top of the organisation but should emerge from, and be cascaded down to the last man on the ground. This leadership must be ongoing, consistent and firmly grounded with on the job learning as well.

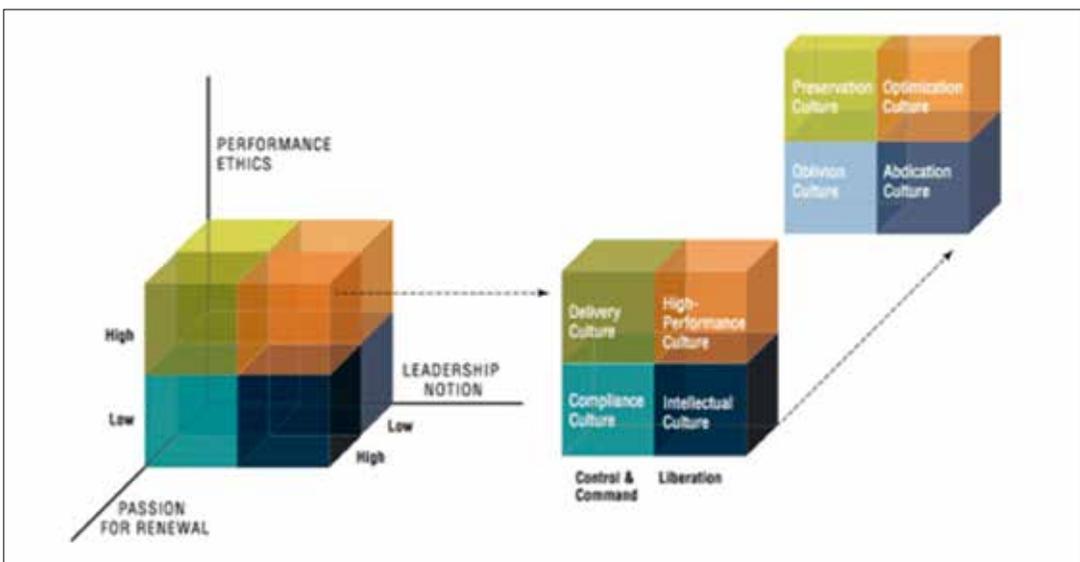


Figure 4: High Performance Culture.¹⁵

High-performance	<i>Performance is in the DNA of the organization and is reflected in the symmetry of values with processes. Little time is needed to control truly empowered people who have accepted responsibility and hold themselves accountable. Headquarters headcount is minimal. Span of control is wide, with a flat organization and rapid, free flow of unfiltered information. Business reviews are joint business improvement and learning sessions.</i>
Delivery	<i>Performance management is about demanding more. Superiors often are omnipotent executives who also may be bottlenecks in a hierarchical organization. Business reviews are energy depleting and frequently are oriented toward justifying results. In this centrally driven culture, headquarters headcount is high and central functions strong.</i>
Compliance	<i>The organization is led by a strong executive whose authority is not to be challenged. The organization is harnessed to serve this commonly recognition-driven leader and to implement that leader's orders.</i>
Intellectual	<i>The organization is an idea bank where analysis and the strategic planning process are robust, but implementation is weak or ideas are not actionable. Leaders are empowered but lack execution discipline and a uniform corporate language. Managing is like herding kittens.</i>
Preservation	<i>The hierarchical organization values the status quo, is worried about disrupting it and is strongly rooted in its past, with a strong affiliation to businesses and locations. Processes are effective because they have been honed over the years in the headquarters-driven culture.</i>
Optimization	<i>The organization is flat, with little hierarchy. It has efficient processes. But the strong results orientation has optimized the organization to such a degree that little room remains for renewal, with little tolerance for failure. Growth is the key challenge of an optimization culture.</i>
Abdication	<i>The culture exhibits excessive empowerment, with senior management no longer controlling and driving performance or renewal. Mid-management is in charge by default. Performance, at best, is accidental.</i>
Oblivion	<i>Strategic myopia, coupled with absence of effective performance management, destines the company to technological obsolescence and eventual disappearance.</i>

Figure 5: Explanation of each region in Figure 4.¹⁶

CONCLUSION

The RSAF is in a position of strength. Since the independence of Singapore 50 years ago, the RSAF's rapid ascendance to become one of the most highly regarded air forces in the region has helped to ensure the safety and security of Singapore, providing a bedrock for the nation's growth in prosperity. This remarkable achievement is only possible because of the World Class People in the organisation. In this respect, the challenges in the Human Capital landscape are considerable and will continue to grow in significance. The RSAF must continue to put the necessary emphasis in this area to ensure that it continues to be the leading air force and a First-Class organisation comprising of World Class people.

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RSAF 2030: Evolving Our Culture for Future Challenges

By LTC Tan Cheng Wee, Mark, MAJ Cumarran K. & ME4 Ng Wei Rong

INTRODUCTION

“Change must first occur in people’s minds; only then can it take place in the structure, processes, performance, and output of the organisation. Before you move bricks and mortar, you must move your mind.”

- General (Ret) Gordon R. Sullivan¹

Organisational culture refers to the norms of behaviour, the customs, the beliefs and espoused values that have been developed over time and are considered valid. It is the glue that keeps an organisation together and allows it to achieve its strategy and desired objectives.² However, regardless of the strengths of an organisation’s culture, it must continue to evolve especially in a volatile and unpredictable environment or risk stagnation, or in the worst case, irrelevance.³ As the future will likely be fraught with uncertainty and new challenges, General Sullivan’s thoughts reiterate the need for the Republic of Singapore Air Force (RSAF) to take active steps in shaping our organisational culture to remain relevant in the future.

The RSAF has been successful in achieving its mission of deterrence thus far, which can be attributed to key elements of its culture that have been entrenched throughout the decades since its inception. Moving forward, these key cultural elements must be retained but our culture must continue to evolve and adapt to the future challenges in 2030. This essay will discuss the challenges of our future environment and the need for our culture to evolve. It will highlight the elements of culture that has enabled the RSAF to be successful to date and suggest how our future culture can be shaped for the RSAF to remain effective and maintain its operational edge.

WHY OUR CULTURE MUST EVOLVE

History is littered with examples that illustrate companies which survived tough times as a result of strong cultures and vice versa. For a long time, Kodak was a giant in the photography and camera-making industry. However, with the emergence of digital cameras and smart phones, the popularity of traditional cameras and film diminished,

causing the great Kodak to go under. Few knew that Kodak actually saw this threat but did little to address the impending situation. The company had commissioned a study in the 1980s to explore future market trends. The study highlighted the ‘threat’ of digital photography and stated that Kodak had about 10 years to prepare for the transition. Kodak’s executives, however, did little to address the threat. Consequently, Kodak’s 27% market-leading share in 1999 dropped to 7% in 2010.⁴ In 2012, Kodak filed for bankruptcy.

Kodak became an industry leader built upon a culture of innovation, which led it to develop a set of business strategies that allowed it to thrive and outperform its competitors. While its employees had ideas and solutions to tackle the competition from digital photography, complacency had set into its leadership and prevented decisive action to combat the inevitable challenges. Its leadership listened less to its employees and ignored the solutions that could have prevented its bankruptcy. Fujifilm, on the other hand, diversified their revenue streams, re-trained their workforce and embraced the inevitable change that was to come.⁵ Similarly, we must recognise the equivalents of ‘digital photography’ for the RSAF and be ready to adapt to suit the changing environment. To engender innovation and change, we must develop a culture that encourages our people to share innovative ideas and remain adaptable for the RSAF to move forward.

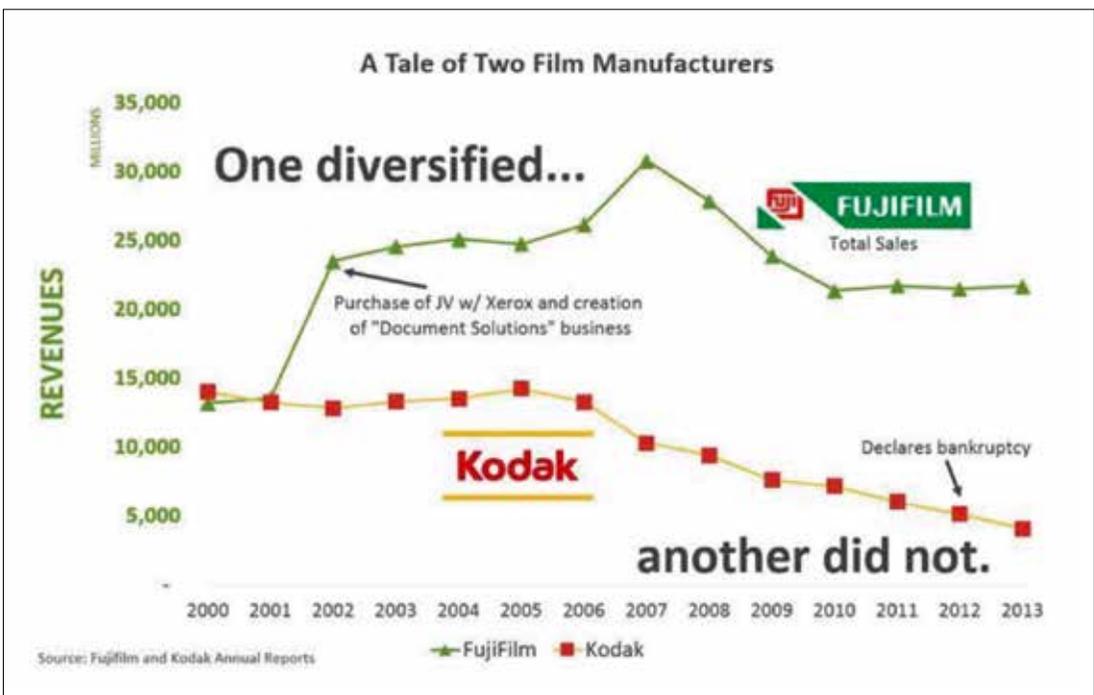


Figure 1: Market share of Kodak vs Fujifilm (which diversified its business).⁶

CHALLENGES FOR THE RSAF IN 2030

Changing External Operating Environment

Our lack of strategic depth and resources will not be the only challenge that we will face in 2030. We also have to contend with the growing militarisation and nationalism of the countries in the region. According to the Stockholm Peace Research Institute, collective military expenditures in Southeast Asia have risen steadily from US\$14.4 billion in 2004 to US\$35.5 billion in 2013 (with the exception of Myanmar and Brunei) and are expected to increase even further.⁷

Our external threats have also become less conventional and will test our resolve to adapt and respond. Transnational terrorism transcends the confines of territorially-defined nation-states in both its objectives and operations. These terrorist groups are difficult to track or eliminate and would require concerted effort to circumvent. The cyber domain has become increasingly important, highlighted by the United States (US) Cyber Command's recruitment of 6,000 cyber experts, the British military setting up a cyber-reserve unit and the North Atlantic Treaty Organisation (NATO) declaring cyber defence as one of its core tasks.⁸ With increasing reliance on networks, the cyber domain could be the place where the next war is won or lost.

Strategic Domestic Challenges

On the domestic front, Singapore's fertility rates have been on a decline and will translate to a smaller manpower pool from which the RSAF can recruit. It is forecasted that the most significant decrease in enlistment numbers will occur around 2030 and will impact our future force if no mitigation measures are taken. Also, budgetary pressures arising from public scrutiny on defence spending and competing inter-Ministry demands will require the RSAF to tangibly demonstrate its value in peace and reinforce the need for a strong and credible Air Force.

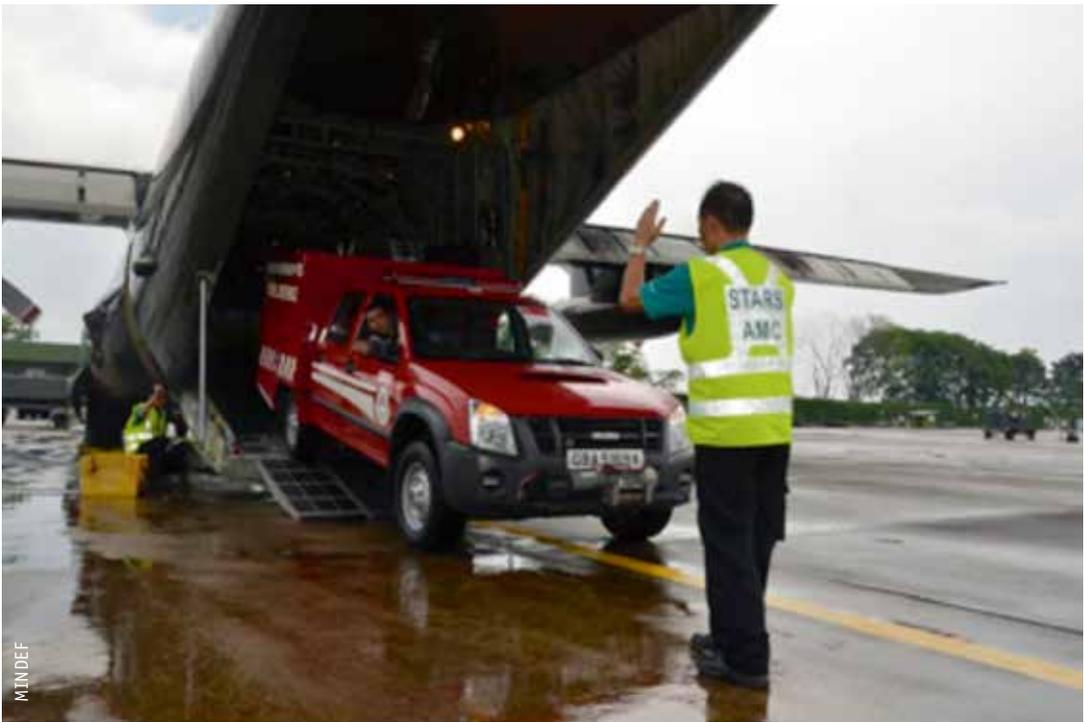
The RSAF in 2030 must continue to fulfil its core mission of deterrence amidst the uncertain geopolitical landscape within our region and have the ability to tackle unconventional threats such as terrorism and cyber warfare. To overcome our manpower constraints, commanders must leverage on the rising educational profile of our people and harness their potential to stimulate innovation and change. New technologies must continue to be pursued, but more importantly, new war-fighting concepts must be developed to fight more effectively and efficiently. Our culture must evolve to become more people-centric to foster innovation and embed the conditions necessary to adapt to the changing environment. The RSAF in 2030 has to be a leaner but yet a more capable force, able to project deterrence against our potential adversaries and be more effective across the peace-to-war continuum.

CULTURE FOR RSAF 2030

Our culture of high standards, professionalism and safety were forged over time and through experiences as a fledgling Air Force from 1968 to the 3rd Generation (3rd Gen) RSAF today. These will continue to be relevant to the RSAF in the future and must form the bedrock of our culture as we evolve with the changing environment.

Culture of High Standards and Professionalism

The culture of high standards and professionalism has allowed the RSAF to consistently punch above its weight and deliver mission success. Our high readiness posture has ensured the peace and security of Singapore and deterred any potential acts of aggression. In operations, we have also responded swiftly to provide aid during Humanitarian Assistance and Disaster Relief (HADR) missions, such as in the search for Air Asia QZ8501 in the Java Sea, in Kuantan as part of flood relief efforts and in Nepal following the 8.0 magnitude earthquake. In multi-lateral exercises, we have benchmarked ourselves with the best air forces and have often come out tops. Our operational capabilities and responsiveness can be attributed to our culture of high standards and professionalism, which must be retained as we move into the future. We must continue to strengthen this culture and ensure that our standards are kept at a high level to continue delivering mission success.



An SCDF vehicle being loaded on to the RSAC C-130 aircraft in preparation to be deployed to Nepal.

Culture of Safety

The RSAF boasts an excellent safety record that would be the envy of many established air forces around the world. The A4 crisis in the 1980s was a stark reminder of the inherent risks associated with air operations and has led to the RSAF developing a strong emphasis on safety. Since then, safety has been entrenched into our culture and policies established to ensure safe operations when conducting our mission. Safety will continue to be an indicator of our operational capability and must be retained.

A Culture for the Future

While a culture of high standards, professionalism and safety has served the RSAF well thus far, we must continue to evolve and address the anticipated future challenges. In 2011, a study attempted to profile the SAF culture using the Competing Values Framework, which is premised upon the dual dimensions of flexibility and discretion versus stability and control, and internal versus external orientations.⁹ It conducted surveys on 4,600 personnel across the SAF and found that the prevailing culture was skewed towards *Hierarchy and Market*. The SAF's structure has made it efficient, organised and consistent (Hierarchy), and also allowed it to be mission oriented so as to push the operational envelope to stay ahead of competition (Market). While *Hierarchy and Market* cultures have served well in the past, the study also established that there was a compelling need to shift culture towards *Adhocracy and Clan* to foster a more creative and entrepreneurial culture.

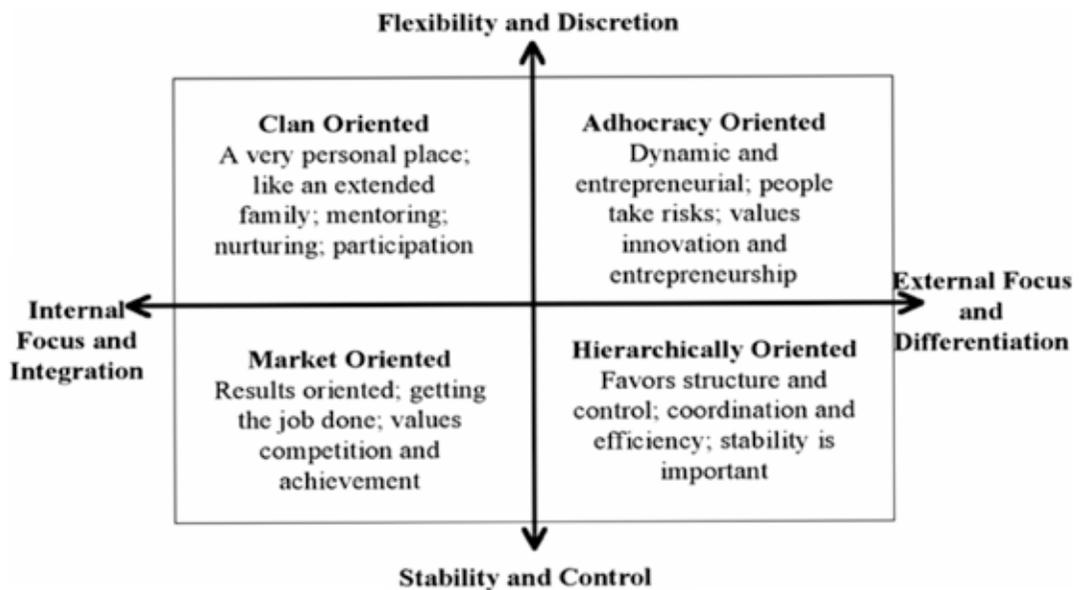


Figure 2: Competing Values Framework.⁸

The RSAF must encourage innovation and adaptability by invoking a shift towards adhocracy and clan cultures. We must shape our culture to be more collaborative to explore new ideas that could reap operational benefits. With a rising educational profile, we see the emergence of a generation of personnel with greater awareness and expressiveness on issues. They are vocal and have strong desires for their opinions to be heard, preferring a consultative rather than directive leadership approach. We must harness the ideas of our personnel to develop innovative ways and Concept of Operations (CONOPs) that will enhance our operational effectiveness to overcome the future challenges.

Embracing the Adhocracy and Clan cultures has paid dividends in several well-established foreign militaries. For example, the Israeli Defense Force (IDF) values the experience and ideas of their personnel. They empower individuals at every level to make decisions and have the ability to influence the outcome of their campaigns. This enables flexibility and speed in response to threats (Adhocracy), and fosters a strong sense of commitment to defence (Clan). Despite the rank structure, subordinates are allowed to challenge their superiors during tactics development to allow discussions to be robust and for plans to be comprehensive. Rational risk taking is also encouraged to explore new ideas and more effective ways of conducting operations. Mistakes are deemed tolerable so long as they do not stem from negligence. This culture fosters innovation and generates effective solutions quickly, making the organisation adaptive without being paralysed by the undue fear of potential risks.¹⁰

Similarly, the RSAF must leverage on our new generation of airmen for a more effective fighting force in 2030. An adhocracy and clan culture will set in place the conditions necessary for a more collaborative and participative environment to engender innovation and exchange of ideas. This way, innovative war-fighting concepts can be developed to address our challenges and realise the leaner yet more capable RSAF. Such an approach would also better engage and maximise the potential of our airmen.

Besides shaping an effective fighting force, the Adhocracy and Clan cultures will also enable the RSAF to enhance our value in peace. Till date, the RSAF has performed credibly in numerous Operations Other Than War (OOTWs), such as delivering relief supplies and evacuating our citizens in the aftermath of the Nepal earthquake, and participating in counter-piracy operations in the Gulf of Aden to keep vital sea-lanes safe and safeguard the nation's commercial interests. The fast-moving and unpredictable nature of these operations requires nimbleness, creative solutions and the ability to work as a team both within and outside of the RSAF to achieve mission success. The shift to Adhocracy and Clan cultures will ensure that the RSAF continues to deliver

positive outcomes from future missions and strengthen its value in peace by portraying a strong deterrence posture and enlarging our political manoeuvring space.

LEADERSHIP & CULTURE: TWO SIDES OF THE SAME COIN

Leadership and culture exerts a mutual and constant influence on one another and are inextricably intertwined. The process of culture creation represents the essence of leadership and reflects clearly that leadership and culture are two sides of the same coin.¹¹ Given the influence of leadership on culture, it will serve as the nexus for organisational culture to evolve. The Cultural Web framework, by Johnson and Scholes, highlights seven key elements (routines, rituals, stories, symbols, control systems, power structures, and organisational structures) that describe organisational culture.¹² These elements are, in turn, centred on a paradigm which embodies the assumptions, beliefs and values of the leadership.¹³ Over time, culture is embedded in an organisation primarily through the leaders' behaviours, such as what they pay attention to, get upset over, reward and punish. The seven abovementioned elements then reinforce the exhibited leadership behaviours and act as secondary determinants of culture. Besides reflecting the organisational values and ethos, leaders are also primary agents for communicating the organisational culture and the impetus for change to his charges. Therefore, leadership will play a crucial role in driving the evolution of the culture in the RSAF.¹⁴

To realise a shift towards the desired Adhocracy and Clan cultures, the corresponding behaviours exhibited by leaders at all levels of the command chain must be adjusted accordingly. For example, leaders need to be more open to *feedback and new ideas*. By proactively establishing avenues for free information exchange, the RSAF will then be able to tap collective wisdom and implement measures timely to stay nimble in the face of tomorrow's challenges. A *forward-looking disposition* will also allow our leaders to identify future challenges and derive out-of-the-box solutions with no precedence. These are, however, possible only if leaders do not fear to appear 'short of solutions', and have the humility to abandon the 'boss knows it all' misconception. In addition, our leaders can practise *participative leadership*, one which puts emphasis on developing greater inclusiveness and appeal to people's desire for their voices to be heard. Together with the focus on individual coaching and nurturing, it will build a strong sense of ownership and shared vision in our people towards the organisation's future.

ALIGNING OUR SUBCULTURES

Large organisations, such as the RSAF, comprise of many smaller entities performing their specific functions to achieve the organisational mission. While an organisation is

often characterised by a dominant culture, it is common for sub-units to exhibit varying degrees of variance to the dominant culture, or subcultures, by virtue of their unique roles.¹⁵ For instance, while it is expected that the Fighter, Transport and UAV Groups all exhibit professionalism and demand for high standards, other aspects of culture such as aggression and risk appetite may vary. Subcultures play an important role in the success of every organisation. They not only enable the achievement of positive outcomes at the sub-unit level, but also afford critical organisational agility to adapt to changing circumstances. In addition, subcultures may serve as a precursor to the eventual modification or replacement of the dominant culture if deemed necessary.¹⁶

It is widely accepted that the representative dominant culture is formed and characterised by the common attributes across subcultures in an organisation.¹⁷ Therefore, while the respective sub-units should be allowed to retain their distinctive subcultures, it is paramount that all subcultures are aligned with the desired overall organisational culture for the latter to take shape. This will require leadership of the sub-units to contextualise the impetus for the organisational cultural shift and secure buy-in of the people. As a result, it will generate and sustain ground traction to shape behaviours on the ground and mould the subcultures to be in line with the overall culture.

CULTURAL CHANGE AS AN OPERATIONAL IMPERATIVE

Given the size of the RSAF and the diverse subcultures that exist within its respective entities, bringing about and sustaining an organisation-wide cultural change is no mean feat. Significant top-down emphasis must be given to ensure ground traction for this large scale endeavour. This is akin to the people development efforts which the RSAF undertook in the form of Project CARDINAL in 2007. Recognising that our people were the key to overcoming challenges confronting the 3rd Gen RSAF, a strategic decision was taken to introduce people development as an operational imperative, to complement organisational restructuring and the induction of new technology. Anchored on the three key thrusts of *Developing Professionals*, *Engaging the Heart*, and *Realising Your Potential*, Project CARDINAL was successful in engendering ownership and buy-in for people development in the RSAF, resulting in dedicated and professional airmen and women who are well-trained to deliver mission success for the RSAF.¹⁸

Building on the foundations of Project CARDINAL, Forging Our Tribe (FOT) is another operational imperative the RSAF embarked on in 2013, which aims to hone team competencies and strengthen the airmen's and women's sense of purpose, identity and belonging. FOT efforts have since gained significant momentum on the ground



Cyberpioneer

Trainees can now look forward to more realistic trainings, thanks to a new suite of training systems.

and reaped initial benefits. The continued command emphasis on FOT through the systematic implementation of initiatives, appropriate resource allocation, as well as timely tracking and reporting will ensure that benefits will continue to be gleaned in the long run.¹⁹

Given the positive outcomes of Project CARDINAL and FOT as a result of a RSAF-level emphasis, it is envisaged that instituting cultural change as an operational imperative will accelerate the pace of its evolution. Ownership at the various levels of command will also ensure that interpretation of the desired organisational culture is consistent and that subcultures are moved along the right trajectory. This will put the RSAF in good stead to navigate the changing external operating contexts and strategic domestic constraints in the near future, and continue to maintain its state of readiness and deliver mission success for the SAF.

CONCLUSION

The RSAF has been successful in achieving its mission of deterrence thus far. This can be attributed to key elements of its culture, such as high standards, professionalism and safety that has been built up and entrenched in its people over the years. Moving

forward, the changing operating contexts and strategic domestic challenges demand that the RSAF continues to evolve its culture to take on greater collaboration and creativeness. These will allow us to better engage and maximise the potential of our new generation airmen and women and, at the same time, develop innovative operating concepts to enhance our operational effectiveness and realise a leaner but yet more capable RSAF. To this end, able leadership plays a crucial role in driving the evolution of the culture in the RSAF, by ensuring the alignment of subcultures that collectively define the overall RSAF culture. Given the scale of this endeavour, it may be useful to institute cultural change as an operational imperative to accelerate the pace of its evolution and reap positive outcomes just like Project CARDINAL and FOT. All in all, this will put the RSAF in good stead to overcome the challenges of tomorrow and maintain the critical nimbleness and resilience to emerge from future 'Black Swan' events unscathed.

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Black Swans need not be Black: Preparing the RSAF to Succeed in Spite of Future Uncertainties

By LTC Goh Sim Aik, ME4 Soon Yi Xiang, Andrew & CPT Lim Peixian, Vanessa

In Nassim Taleb's seminal work, *The Black Swan: The Impact of the Highly Improbable*, he argued that almost all major historical events are Black Swan events—events that are highly improbable yet have massive consequences and can be rationalised only with the benefit of hindsight.¹ Since Taleb's work, the term Black Swan has become vernacular amongst military and civilian organisations alike. The question however is whether organisations, having embraced the Black Swan theory, have put in place measures to prepare themselves to deal with the inevitable Black Swan events.

Entrusted with the mission of defending Singapore's skies, the Republic of Singapore Air Force (RSAF) must succeed in spite of Black Swan events. Failure to achieve mission success shall undo everything that the RSAF, as well as Singapore, has achieved over the last five decades. The consequences of a 9/11 type of attack on Singapore's Central Business District or a Crimean-like annexation of Singapore are unthinkable but not impossible. Given Singapore's lack of strategic depth and nature of our economy, not only must the RSAF be capable of preventing and dealing with such remote events, we must also be able to handle these events on our first attempt, as there may not be a second chance.

Given the unpredictability and devastating effects of Black Swan events, it will be insufficient for the RSAF to merely forecast these events and develop specific contingency plans to deal with them. Rather, to achieve mission success in spite of Black Swan events, the RSAF must have the capacity to cope with and the capability to adapt to them. To develop the capacity to cope and the capability to adapt, the RSAF must focus on mechanisms to identify and guard against Black Swan events. The RSAF must also focus on building a strong organisational culture and developing her people

to be adaptable in times of crisis. The essay will open with a discussion on the theory of Black Swan and its relevance to the RSAF. The essay will argue that the first step in dealing with Black Swan events is to acknowledge their inevitability. The essay will go on to argue that while traditional scenario planning and stress testing mechanisms can help identify and prepare the RSAF for Black Swan events, these mechanisms are inadequate and must be enhanced through the Reverse Stress Testing methodology. The essay will also argue that since it is impossible to Black Swan proof the RSAF, the RSAF must therefore develop the capability to adapt to Black Swan events. To develop the capability to adapt, the RSAF will need to focus on developing an organisational culture of innovation, as well as training and educating our people to acquire the ability to adapt.

THEORY OF BLACK SWAN

The theory of Black Swan was popularised following Nassim Nicholas Taleb's book, *The Black Swan: The Impact of the Highly Improbable*. According to Taleb, a Black Swan event has three characteristics. First, it must be an 'outlier'—something that cannot be convincingly predicted. Second, it must create an extreme effect upon occurrence. Third, it is possible to "concoct explanations for its occurrence after the fact", making it seem predictable only in retrospect.² Notably, Taleb has argued that it is our human mind's apparent blindness to randomness and large deviations that makes Black Swan events black, i.e. unpredictable.³ Given the unpredictability of Black Swans, Taleb suggests that organisations should learn to adapt to their existence rather than to naively try to predict them.⁴

The events of 9/11 provide useful illustrations of the three characteristics of a Black Swan event. Prior to 9/11, the concept of a large-scale, debilitating and catastrophic terrorist attack was generally inconceivable. Just two months prior to 9/11, The New York Times carried an article stating that the terror threat was actually on a decline and that "politically inspired terrorism, as opposed to more ordinary criminality motivated by simple greed, is not as common as most people may think."⁵ Although the downplaying of a potential terrorist threat by a journalist does not necessarily mirror the United States' (US) foreign policy, there is evidence that the Bush administration was warned of a potential hijacking by Al Qaeda via two Federal Bureau of Investigation's (FBI) memos, highlighting suspicions of Arab students at flight schools in Phoenix and Minnesota wanting to fly planes into the World Trade Centre.⁶ These could have been indications of what was to come in 9/11, and the White House and the FBI on hindsight

could have been on high alert, potentially preventing or at least reducing its impact. The fact that on hindsight the 9/11 attacks seemed conceivable makes it a useful case study for Taleb's Black Swan theory.

The RSAF is by no means immune to Black Swan events. The rapid withdrawal of the British forces from Singapore in 1974 following the East of Suez policy and the A4 crisis in 1986 can be seen as Black Swan events that the RSAF had experienced and fortunately survived through.⁷ Nonetheless, that the RSAF has survived through Black Swan events in the past will not guarantee survival in future events. The world is constantly changing; the attributes that the RSAF possessed in 1974 and in 1986 that allowed her to survive both events may no longer be relevant. We cannot assume that the RSAF will continue to have the right attributes to cope with Black Swan events. To effectively cope with future Black Swan events, the RSAF needs to have an institutionalised mechanism to systematically develop the capability to deal with Black Swan events.

ACKNOWLEDGE THE INEVITABILITY OF BLACK SWAN EVENTS

The first step in developing the capacity and capability to deal with Black Swan events is to acknowledge their inevitability. Only by acknowledging that Black Swan events are inevitable will the RSAF have the mandate to invest resources to deal with them. However, acknowledging and investing resources on what is meant to be an outlier can be challenging for all organisations. On one hand, "assessing the potential effects of wildcards may bring one to the point where imagination overtakes research," while on the other hand, if we do not consider these effects at all, we cannot "identify the alternatives against which hedging strategies may be appropriate."⁸ The RSAF needs to first take into consideration Black Swan events in order to come up with possible contingencies and methods to prevent their occurrence or circumvent them when they occur.

Given the many successes that the RSAF has experienced over the years, it may be difficult for her to acknowledge the inevitability of Black Swan events. Not only has the RSAF survived previous Black Swan events, it has also leveraged on Black Swan events to demonstrate its capabilities to cope with such events. For instance, the RSAF's quick response in supporting Operation Flying Eagle in 2004 following the Tsunami in Aceh, Indonesia (it was the scale of damage that propelled the Tsunami to Black Swan status) demonstrated her credibility in being a ready and responsive Air Force. Having

experienced many successful years, the RSAF has to guard against complacency. That the RSAF has done well thus far and will continue to do well in spite of Black Swan events is a dangerous assumption to operate with. The RSAF must operate with the assumption that potential debilitating Black Swan events will eventually occur and must channel resources to develop the capabilities to deal with them. Without acknowledging that Black Swan events are inevitable, the RSAF may not invest scarce resources in measures that can help the organisation surmount future Black Swan events.



A SAF medic seeing to an Indonesian child's injuries in the aftermath of the tsunami

REDUCE ORGANISATIONAL IGNORANCE

Having acknowledged that Black Swan events will occur, the RSAF must then build the capacity to cope with these events. The capacity to cope with Black Swan events can be enhanced by reducing the number of potential Black Swan events. In essence, the RSAF must seek to reduce her ignorance to disastrous events. Ignorance can be reduced via two main ways: first, by gleaning lessons from past Black Swan events and second, by identifying potential future Black Swan events.

To glean lessons from past Black Swan events is to not let the RSAF go down the path of other militaries that have failed in dealing with such events. It is often stated that those who ignore history are doomed to repeat it. Ironically, history continues to

be fraught with examples of nations and military forces relearning the same lessons in different times. For instance, history would have taught Kuwait and Ukraine that they must have a credible defence force to preclude an invasion of its country by Iraq in Kuwait's case, and the annexation of Crimea by the Russians, in Ukraine's case. Yet, Iraq's invasion of Kuwait and the Russian annexing of Crimea in recent history still turned out to be Black Swan events. The RSAF must draw lessons from other militaries and organisations in order to ensure that she does not fall victim to Black Swan events that have already occurred. Studying previous military Black Swans is therefore the first and necessary step in preventing their recurrence in the RSAF. Nonetheless, it must be emphasised that merely learning from history is insufficient. The RSAF must also assimilate the lessons and use the lessons to update her Concept of Operations (CONOPS).

Apart from gleaning lessons from past Black Swan events, the RSAF must also put in place robust and effective scenario planning mechanisms to increase the number of crisis scenarios that the RSAF is aware of, hence reducing the number of Black Swan events left to occur. Today, the RSAF, like many advanced air forces, has in place a war-gaming system that allows us to exercise our forces in various operational scenarios. What is potentially lacking, however, is the exercising of our forces in seemingly unlikely



The Heron-1 Unmanned Aerial Vehicle makes its debut at Exercise Forging Sabre 2015, bringing both sensing and cooperative lasing capabilities to the field for assets to take out multiple mobile targets within a single pass.

scenarios. Realistic training is important to enhance the operational capability of the RSAF, but testing the extreme, albeit unlikely scenarios is necessary too. The RSAF needs to continually seek to expand the war-gaming scenarios from beyond the often tried and tested set-piece scenarios to scenarios that seem unlikely to happen to the RSAF. To this end, the RSAF can possibly adopt the process of Reverse Stress Testing.

Reverse Stress Testing is a relatively new method of scenario planning that is currently employed by corporations and financial institutions worldwide, most notably to preclude another financial crisis following the Lehman Brothers' collapse in September 2008. The Federal Reserve Board describes Reverse Stress Testing as a method where institutions "assume a known adverse outcome...then deduce the types of events that could lead to such an outcome."⁹ The process starts out by identifying catastrophic outcomes first before determining the likely circumstances (or Black Swan events) that can lead to those outcomes. Unlike traditional war-gaming where the scenarios are determined and the exercise is run to determine the outcome and yield lessons learnt, Reverse Stress Testing will allow the RSAF to identify the factors and gain insights to circumstances that will lead to the RSAF's failure, supplementing traditional war-gaming scenarios.

Critics may argue that Reverse Stress Testing can lead to the RSAF pouring valuable and limited resources on solutions in the attempt to deal with highly improbable events. However, such argument misses the point. While the purpose of Reverse Stress Testing is to identify circumstances that will lead to failure, it does not mean that resources must be allocated to capabilities that can preclude those failures. Rather, Reverse Stress Testing seeks to help the RSAF overcome 'inattentional' blindness in scenario planning. Mack describes 'inattentional' blindness as how we "rarely see what we are looking at unless our attention is directed to it."¹⁰ 'Inattentional' blindness in military scenario planning refers to a psychological lack of attention to events that are seemingly not military related. In traditional military scenario planning, outcomes are first pre-determined and follow a set of existing assumptions. The RSAF has to prevent inattentional blindness by challenging these assumptions and going beyond considering military-focused factors that will cause it to fail. Traditional war-gaming scenarios do not allow this to happen because the set-up ensures that the BLUE force always wins, and assumptions are often misconstrued as facts.¹¹ In addition, the RSAF can also explore cooperating with other ministries or external agencies to develop alternative scenarios to challenge existing assumptions and force the organisation to consider external and whole of government perspectives. In doing so, the RSAF

will be exposed to more potential Black Swans and avoid being blindsided by these unconventional scenarios should they occur.

The Yom Kippur War in 1973 illustrates the inadequacies of traditional scenario planning. While the Israeli Defense Force (IDF) did not neglect the possibility of war with Egypt and Syria, it had wholeheartedly embraced a series of assumptions that would preclude the start of the war, and based its war strategy on having sufficient forewarning from its intelligence sources.¹² Some of the assumptions turned out to be true, for example, Egypt would not go to war without Syrian support.¹³ Others, however, such as the need for Soviet fighter-bombers to attain air superiority, proved to be incorrect. Although the IDF correctly identified that the Egyptian Air Force did not have the necessary aircraft to attain air superiority over the Israeli Air Force (IAF), they neglected the fact that delivery of cutting edge Soviet Surface to Air Missiles (SAM) would permit the Egyptians to establish small areas of air denial.¹⁴ Reverse Stress Testing could have allowed the IDF to identify this threat, and hence realise that the necessary pre-conditions for war were present in 1973.

Reverse Stress Testing would also have helped with the other areas of IDF preparation. Among its other assumptions for planning for war, the IDF had assumed that it would receive sufficient (i.e., 48 hours) forewarning of war, which would allow it to mobilise sufficient troops and launch a pre-emptive strike on the adversary, with the effectiveness of the IAF not in question.¹⁵ However, none of the assumptions held—warning of war was received only 6 hours prior to invasion, there were political considerations preventing the IDF from launching a pre-emptive strike and the IAF were ineffective over critical areas of the battlefield due to the SAMs.¹⁶ Should IDF have conducted Reverse Stress Testing, it could uncover the many weak points of its war plan and would be more prepared for the outbreak of war. For example, at the start of the war, the ratio of artillery to mortar units at the Egyptian front was 40:1, and the ratio of tanks at the Syrian front was 8:1; more assets in the area could have potentially reduced the effectiveness of the initial Egyptian and Syrian attack.¹⁷

Similarly, the RSAF can apply Reverse Stress Testing to avoid catastrophic outcomes. For instance, the RSAF could find out in a Reverse Stress Test scenario that it cannot achieve its mission because the launch and recovery rate of aircraft is constrained due to severe haze conditions brought by a huge volcanic eruption in Indonesia (the

Black Swan event) that coincided with a major military operation. With the Black Swan event identified, the RSAF can then exercise the commanders and planners to derive innovative solutions to overcome constraints on launch and recovery rate due to the haze conditions. Even if solutions are impractical or prove to be too costly to implement, the very fact that debates and discussions have been carried out would already enhance the preparedness of the commanders and planners. This leads us to the next point of the need to develop the capability to adapt to Black Swans.

ADAPTING TO BLACK SWAN EVENTS

Reducing the number of potential Black Swan events can enhance the RSAF's capacity to cope with Black Swan events to a certain extent, but cannot Black Swan proof the RSAF. That Black Swan events will still occur means that the RSAF must also develop the capability to adapt to them. The Yom Kippur War, again, provides a useful case study to demonstrate the importance of adaptability in the face of Black Swan events.

The fact that the IDF still won the war in 1973, despite being 'Black Swan-ed' at the strategic level, can be attributed to the ability of the IDF commanders and war-fighters to adapt in the face of Black Swan events. The adaptability is most visible in those who were operating close to the ground. For instance, when the IAF encountered the lethal effectiveness of the Egyptian and Syrian SAMs, the IAF fighter squadrons adapted their tactics accordingly. Some squadrons chose to fly higher to stay out of range, while others chose to fly low level in order to prevent radar from picking them up.¹⁸ The IDF's army also adapted their tactics to nullify the effectiveness of the anti-tank missiles, by relying on infantry to first neutralise the anti-tank units before rolling the tanks in on the Egyptian armies.¹⁹

At the operational level, the IDF used an exceptionally risky but rewarding bridging mechanism to cross the Suez Canal and encircle the 3rd Egyptian Army. The IDF lacked any conventional bridging mechanism as they were not able to procure any before the war. As such, they had to make use of the World War Two (WWII) area pontoon bridging mechanism. This device was painfully driven across the Sinai to the Suez Canal and served as the only way to establish a bridgehead on the African side. In comparison, the Egyptian armed forces had established 7 bridges in its initial assault.²⁰ While the winning of the war does not diminish the importance of Reverse Stress Testing, it does strengthen the point that the capability to adapt is essential to survive a Black Swan event.

The Falklands War also brings across interesting Black Swan events that illustrate the importance of the capability to adapt. The British Ministry of Defence never really considered developing a contingency plan to defend the Falkland Islands. Indeed the Royal Air Force (RAF) and the Royal Navy's (RN) main preoccupation was a potential conflict with the Soviets in Europe.²¹ The Falkland Island's garrisons were merely 42-men strong before the Argentinian Invasion.²² However, when Argentina invaded the Falklands, the British were able to adapt whatever resources it had at its disposal to re-take a set of islands that were thousands of miles away, and in a very different operating environment than what it was prepared for.

In just three days, the RN was able to assemble a task force to re-take the Falklands. The fleet was greatly supplemented through requisitioned civilian merchant ships, amounting to 62 of the more than 120 ships in the Task Force.²³ The RN's two carriers only had a limited number of Sea Harriers to perform air superiority and ground attack missions. This was quickly supplemented by Harriers (of a different variant) from the RAF.²⁴ As not all the aircraft were ready when the Task Force set sail, the British used a combination of airborne refuelling, refuelling at one airstrip in the Atlantic and



Royal Navy Fleet Air Arm Sea Harrier FRS1s of 899 Naval Air Squadron at Yeovilton Naval Air Station. The squadron provided many personnel for action in the Falklands.

container transport in other vessels to ensure that the aircraft would arrive at the Falklands in time.²⁵

The RAF's strategic bombing capability was downsized dramatically prior to the conflict, as it was deemed not to be necessary for a conflict in Europe. At the onset of the Falklands War, the RAF swiftly modified their Vulcan Bombers and Nimrods for air-to-air refuelling in order to perform long-range bombing missions.²⁶ To put things in perspective, the closest airstrip was in the Ascension islands, about 3,400 miles away from the Falklands.

One purported creative solution that the British used to overcome the lack of intelligence as there were no North Atlantic Treaty Organisation (NATO) satellites operating in the area was to supposedly obtain data from a Soviet Satellite operating in the southern hemisphere in that area, courtesy of a Norwegian listening post.²⁷ Although the authenticity of the statement cannot be confirmed, if true, it presents a remarkable display of ingenuity to overcome a problem. Evidently, the key to dealing with a Black Swan event when it arrives is not to berate oneself for a lack of foresight, but to tackle the issue immediately by adapting.

Conversely, Nokia's decline is illuminating of how organisations can fail if they do not adapt to a Black Swan event. Nokia started off as a humble pulp mill and rubber business in 1865 and made the switch to the mobile market in 1992. It was a strategic decision with a view to make Nokia the leader in the telecommunications market.²⁸ From 1996-2001, Nokia saw its turnover increase from 6.1 billion to 31 billion Euros, and was clearly the leader in the mobile market. However, things changed in 2007 when Apple launched the first iPhone. Sale of Nokia phones plummeted and the company reported a 30% fall in third-quarter profits in 2008. Despite finally getting out of the red in 2013, Nokia was still unable to regain its 20th century dominance and was eventually sold to Microsoft. Till now, the Finnish company and its products remain in the shadows of Apple and Samsung in the mobile phone market.²⁹

The launch of the iPhone can be seen as a Black Swan for Nokia as they never predicted that consumers wanted anything more than a product that was first a mobile phone and secondly a lifestyle device. Yet, in retrospect, it is obvious why consumers will see mobile phones as a lifestyle device first, mobile phone second. The technology employed by Apple was already in existence. Ironically, Nokia was one of the first companies to introduce these now highly sought after functions like a built-in camera, email access and application downloads in their mobile phones.³⁰ Despite its head start in the smartphone market and possessing all the necessary technology to develop

something truly revolutionary, Nokia was unable to capitalise on its early success and allowed Apple and eventually, Samsung, to gain dominance of the mobile market.

Critics have analysed the decline of Nokia as a classic case of how stagnation, complacency and a failure to adapt can cause the downfall of a corporation. “Nokia even saw what was coming—what smartphones were becoming—sooner than most, but they failed to realise how quickly they needed to change or, that the time they had to prepare for their next business leap was shrinking exponentially.”³¹ The failure to realise the need for change and to adapt in the face of the iPhone was a key contributing factor to Nokia’s steady decline. The Nokia management did not recognise the Black Swan soon enough and did not acknowledge that the iPhone would be a threat to its market relevance. In fact, they waited a whole year before they introduced their first touchscreen smartphone, the Nokia 5800, which was eventually unable to rival Apple.

DEVELOPING ADAPTABILITY

Taleb noted that military people are good at adapting to Black Swan events.³² While this is particularly true at the tactical level, where the reality is to adapt or to die, the history of adaption at the operational and strategic level is much more sobering.³³ The tactical adaptations in the Yom Kippur War clearly illustrate Taleb’s assertions. Adaptability, as defined by the Institute of Defense Analyses (IDA) in the US, is “the capacity to bring about an effective response to an altered situation, a metaskill that requires the integration of both cognitive and relational skills.”³⁴ To ensure that the RSAF is able to adapt at all levels in the event of a Black Swan event, the RSAF must promote an organisational culture that facilitates and encourages the development of the adaptability skill in its people and to provide robust training and education for its people to be adaptable.

THE RIGHT CULTURE

To survive a Black Swan event requires the right culture to permeate through the organisation; a culture that recognises not all problems can be foreseen, that promotes adaptability in its people and that offers them the right environment to anchor their fundamentals whilst thinking on the spot. Without the right culture, the IDF would not have resorted to the exceptionally risky but rewarding bridging mechanism to cross the Suez Canal and encircle the 3rd Egyptian Army. Similarly, the RN and the RAF would not have pulled off the operational plans to retake Falklands.

The RSAF needs to value a culture of adaptability. Such a culture is necessary to counter the bureaucratic inertia that encourages people to adopt the 'tried and tested' approach for guaranteed success in the face of limited resources. Schelling summarises this fear of the unknown, stating that "(t)here is a tendency in our planning to confuse the unfamiliar with the improbable. The contingency we have not considered seriously looks strange; what looks strange is thought improbable; what is improbable need not be considered seriously."³⁵ The RSAF needs to encourage our people to think out of the box and consider the improbable. To do so, there must be sufficient command emphasis to reinforce to our people that the organisation values people who are constantly trying new ways to do things on a day-to-day basis, and not just in the face of a Black Swan. This will encourage our people to go the extra mile and strive to constantly innovate and improve our daily work environment such that when a Black Swan event occurs, our people are sufficiently agile and nimble to adapt.

TRAINING AND EDUCATION

Beyond culture, the people within our organisation must have the necessary skills and mindset to adapt when a Black Swan event occurs. Given that it is unprecedented, the solution to a Black Swan problem needs to be derived from scratch and cannot be found in previously developed methods. Our people must know when to adapt, and how to adapt. To be adaptive and to constantly innovate, one must possess strong fundamentals in the first place. The organisation must ensure that our people have the time and space to anchor their fundamentals, which is especially relevant at the junior level. Training and educating our people to ensure that they are well grounded in their fundamentals is essential.

Beyond possessing strong fundamentals, to adapt in Black Swan events, our people must be able to make good decisions. People in every field make decisions based on intuition.³⁶ "...what enables us to make good decisions is intuition, in the form of very large repertoires of patterns acquired over years and years of practice."³⁷ The RSAF must identify the range and depth of experiences that commanders must have in order for them to be adaptable in crisis. The leadership development programme must then put future commanders through those experiences in a structured and deliberate manner. The programme must be institutionalised at every leadership level and not just focused on top leadership positions. Adaptability at every level of leadership is necessary for the RSAF to cope with and adapt to Black Swan events.

SURVIVAL PSYCHOLOGY

Besides having the skills and experience required to adapt, the RSAF must also have the resilience to survive the onset of Black Swan events. Looking again at the Falklands War and the Yom Kippur War, in both cases, the military and civilian leadership focused on solving the immediate Black Swan event at hand. The British Government formed a War Cabinet that met on a daily basis to oversee the entire operation, similarly the Israeli unity government consulted frequently with the military leadership to discuss courses of action. In both cases, the issue of finding out what went wrong was left to parliamentary commissions after the war: the Franks Report for the Falklands War, and the Agranat Commission for the Yom Kippur War. Exposing people to experiences in the leadership development programme is the best way to gauge their Survival Psychology ability. During such practices, the RSAF can identify those with innate survival psychology ability and those without. For those without, there exists a possibility to coach them to develop a survival psychological response.

CONCLUSION

Black Swan events can have a devastating impact and the RSAF is no less susceptible to them. While the RSAF already has robust scenario planning mechanisms to reduce the chances of a Black Swan occurring, more can be done, such as the institutionalising of Reverse Stress Testing. In spite of all the mechanisms put in place, a Black Swan event will still be inevitable. As such, the RSAF needs to be an organisation that has the capability to overcome Black Swans and can do this by engendering the right culture, skillset and mindset in our people. Our people need to acknowledge that we cannot plan for everything and that surprises do occur. Given this, new solutions will have to be formulated within a short span of time. It is important to be able to adapt fast enough to reduce the potential debilitating effects of a Black Swan. To do so, our people need to innovate and think on their feet. With the right command emphasis, our people will be more encouraged to innovate on a daily basis and constantly find new ways of improving their workplace efficiency such that when a Black Swan occurs, adapting and innovating will not be an unfamiliar concept. Our people also need to be anchored in strong fundamentals so that they are still able to perform their primary roles while constantly sourcing for better ways to go about their daily work in the face of a Black Swan event. Lastly, being prepared for a Black Swan event will strengthen the very resilience required to withstand it when it occurs.

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