
Harnessing Defense Technology - Singapore's Perspective

By

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Introduction

Singapore is a small nation with very limited natural resources. Even our most basic needs-water, food and fuel-have to be imported. We depend on external trade for our survival. Our size and circumstances make us vulnerable to the vagaries of the international environment. To ensure that we can continue to survive and provide a good standard of living for our people, it is imperative that Singapore must be prepared for any challenges to its stability and security. We adopt the concept of Total Security, which is the linchpin of our defense and security. Total Security embraces three elements: Diplomacy, Total Defense and Internal Stability.

Military defense is central to Total Defense. A strong armed forces is the ultimate guarantee for our peace and sovereignty. The absence of a credible defense force may be interpreted as a sign of weakness, and may invite aggression. A credible defense force is a necessary assurance to our people and foreign interests alike that Singapore is a safe place to live and to invest.

Given our limitations and constraints, the use of technology as a force multiplier is critical to us to give the Singapore Armed Forces a qualitative edge. Singapore has the necessary conditions to exploit technology. We have a good education system that emphasizes science and technology. But because we are small, there will always be a limit to what we can afford and what we can do by ourselves. To overcome this, we need to source for much of our technology overseas. This means leveraging on foreign expertise and seeking greater cooperation in defense technology with other countries.

"Global strategy for a national capability" is the strategy that we adopt to develop and strengthen our national defense technological capability.

National Capability

In building a national capability we are very selective of the technological capabilities that we would build in the country. We focus only on those areas that will contribute decisively to the battlefield. For example, we focus on electronic warfare, intelligence, command, control and communication, guided systems and systems engineering.

Secondly, for those capabilities that we choose to develop, we aim to develop them to world-class standards. This is so that we are able to bring something to the table when we cooperate with other countries.

Thirdly, we adopt an integrated approach by getting all the various parties such as our defense industry, universities and research institutes involved. We also work closely with other government agencies such as the National Science and Technology Board. Doing so allows us to optimize whatever R&D investment we intend to make, especially expensive R&D infrastructure.

An integrated approach also means that our researchers, scientists and engineers must work very closely with our warfighters who are ultimately the end-users of the technology. We involve our warfighters in every stage of our defense technology planning and management.

Because we are small and we are limited in resources, we put a lot of emphasis on planning. Slightly less than two years ago, we set up a dedicated office called the Directorate of Research and Development to conduct technology master-planning so that we could optimize as much as possible the limited resources that we have.



Lastly, we aim to be a technology application leader, and not a technology leader, because to be a technology leader means doing basic research, for which we lack the resources to do.

Global Strategy

As I have mentioned earlier, Singapore has very limited resources and it is impossible for us to do everything by ourselves. That is why we have to adopt a global strategy in building up our national capability.

A critical aspect of this global strategy is thus to buy whatever and whenever we can. This is a sensible and cost effective approach for us. There is no reason for us to build the system when

we could buy it. For example, we will not develop aircraft. Instead, we will be better off by committing our resources to improve these off-the-shelf systems at incremental effort to obtain greatly enhanced performance to meet our specific operational requirements.

The second approach is to be flexible in our dealings with our foreign partners. Singapore is a small country but this has its advantages as well. We respect the sensitivities of our friends and adopt a pragmatic and flexible approach when working with them.

We are constantly searching for global partners. In any cooperation, we firmly believe that both sides must be able to contribute and be able to derive mutual benefits. Only then can the collaboration result in a win-win situation.

Through frequent visits, both incoming and outgoing, we hope to be to give a better understanding of Singapore's limitations and capabilities to our prospective foreign partners. Where there is a need, we also make use of the formal government-to-government mechanisms such as memoranda of understanding (MOUs) and agreements to build up a sustainable relationship. For example, we have set up a joint research fund that is contributed to equally by Sweden and Singapore, in order to encourage collaboration in defense research and development between the two countries.

Examples of Cooperation

Let me now give you some examples of the benefits that we reap from exploiting technology as a force multiplier and from cooperating with other countries.

First Unmanned Air Vehicles (UAV), the Singapore Air Force (SAF) has long recognized the tremendous potential of unmanned air vehicles for battlefield surveillance and reconnaissance. UAV is particularly suitable for the SAF because it is less manpower intensive than human intelligence. Casualties will also be reduced. Reducing casualties is important for Singapore as the bulk of the SAF is made of conscript soldiers and reservists, which we called operational ready National Servicemen. We are mindful that our limited resources do not permit us to work on the entire spectrum of UAVs similar to the comprehensive range of UAVs that U.S. is working on. By and large, the Ministry of Defense will buy and adapt systems to meet our requirements. We are constantly looking out for exploration that could bring technologies into answering our peculiar requirements.

The second example I would like to share with you is how we have exploited training technology. We have very limited air space to train our pilot. Yet at the same time, we want to provide our pilots with realistic training. So, to satisfy the training needs of our pilots, we cooperated with Indonesia to develop a state-of-the-art Air Combat Maneuvering Range in Pekan Bahru, Sumatra in Indonesia. This is a range-less instrumentation to help analyze and assess the performance during combat training. Besides the Air Force, training simulators are also extensively used in the Army and the Navy.

Limited resources and land have driven the SAF to rely more on simulation to train our forces at all levels. Simulation systems are also used for mission rehearsals, tactics and doctrine development. We are now considering simulators for integrated training and joint-service training.

a. Integrated Training. The emphasis in the past has been on stand-alone individual or small combat team training. However, in modern warfare, it is important for an individual/unit to be able to function as a member of a combined operation. Trainers and simulators could be networked together, wherever operationally beneficial and technically viable, to facilitate combined-arms and integrated training.

b. Joint-Service Training. Simulators and training systems could incorporate the capabilities for training across all services. The training systems could be geared towards greater understanding of joint doctrine, tactics and planning procedures. The ultimate goal is to facilitate the creation of a virtual battlefield in which all elements of an actual battle can be exercised and simulated realistically.



By networking simulators together, a simulated battlefield can be created to provide training for large scale exercises thereby reducing the need to conduct live exercises involving real men and real equipment that are very expensive and complicated to organize and run. These simulated battlefield exercises can be conducted as often as desired without incurring huge training costs. Moreover, such networking will facilitate the training of troops in the same exercise scenario even though they may be geographically dispersed at the various overseas training sites.

For the last example, I would like to cite our cooperation with Australia. With Australia, Singapore had signed an agreement on cooperation in defense and technology. We have successfully completed a number of joint projects on areas such as communications and engine performance simulation. Currently, we have an on-going project with Defense Science and Technology Organization (DSTO) on joint experiment test and analysis on ship shock.

Conclusion

In conclusion, I have outlined Singapore's approach in defense technology. Technology is multi-faceted. A strong defense technological capability is defined in several dimensions: the quality of technology in our systems and equipment, our ability to be smart buyers, our ability to do R&D, and the quality of our people. Development of technology therefore requires a multi-pronged approach across a broad front. Technology is always in a state of change. But what is unique today is the rate of technological change. This is where Singapore, being small, has an advantage as we are able to cope with the high rate of modern technological change.

About the Author

Tan Peng Yam is Deputy Director, Directorate of Research and Development, Ministry of Defense, Singapore. Other appointments include Assistance Director, Technology Cooperation Office, Directorate of R&D, and Engineer, Defense Science Organization, Ministry of Defense. He holds a Bachelor of Engineering (Electrical Engineering) degree from the University of Tasmania, in Australia.