MINDEF
SINGAPORE

SPEECH

SPEECH BY MINISTER FOR DEFENCE DR NG ENG HEN FOR THE DEFENCE TECHNOLOGY PRIZE, ON 20 OCT 2022, 1030HRS, AT DSTA AUDITORIUM

Friends and Colleagues,

Senior officials,

Distinguished Guests,

Ladies and Gentlemen,

Introduction

1. As Peng Yam (Chief Defence Scientist) said, it is a good feeling that we can hold this year's Defence Technology Prize (DTP) award ceremony in person. But holding this ceremony in person owes much to the direct contributions of your community, this Defence Technology Community (DTC), in our nation's fight against the COVID-19 pandemic. I have enumerated them before, so I will not repeat, but DSO and DSTA's expertise provided significant resources in our fight against COVID, without which, I am certain that our healthcare and other systems could have been overwhelmed.

2. Against COVID-19, we are enjoying the fruit of our labours – so society is more relaxed, the norms, weddings are coming back, social functions. The larger World outside – look at what is happening, turn on to your main media or you surf the net – security risks have increased

MINDEF Communications Organisation
Public Communications Directorate
MINDEF Building, 303 Gombak Drive, #01-26 Singapore 669645 Tel: 9228 6190 Fax: 6769 5139

significantly. And I think one of our primary roles for the SAF and the DTC, must therefore be to help prepare Singapore and Singaporeans for an unpredictable period ahead.

Changing Nature of Warfare and Defence Technologies

3. We have had a lot to "download", in the SAF terms, for the last two years – so many things happening– the COVID-19 pandemic, the Ukraine invasion, the inflations, supply chain disruptions. And in our modern context, every event is packaged, repackaged, analysed, and talked about – so much information, compared to, say 20 years ago. But in that surfeit of information, there's always a danger that we miss the wood for the trees. You know this game, "Where's Wally" – where there is so much clutter, and you ask yourself "where's Wally". For us, I think, we have to ask ourselves "who's Wally". We may miss the main lessons, so let me drill down on the main lessons for the DTC. There were lessons learnt from the pandemic and the Russian-Ukraine war, that either helped shape our thinking or improve our capabilities. From dealing with the pandemic, we relearnt the importance of good Command and Control (C2) systems in dealing with any crises. A simple epiphany, that in any crisis, C2 is paramount. Whether it was during the Humanitarian Assistance and Disaster Relief efforts in the wake of the 2015 Nepal Earthquake, where our Changi RHCC's OPERA system, which is a C2 system – and it was useful and they adopted it as a central C2 system to coordinate the relief efforts there; or in 2020 when DSTA managed the development of the COVID-19 C2 systems to support multi-ministry task forces in this pandemic. With many agencies, many programmes, many responses, how do you put it together so that things work. DSTA provided them with that backbone of the C2 system. The generic and cardinal insight is that in the fog of battle, without situational awareness of a comprehensive and effective C2 system, it is very difficult to impose order and security, and efficiency. And this was again learnt and relearnt, whether it was from contact tracing – because initially for contact tracing, you had the problem of last mile: you could trace and then your trail goes loose, or goes missing, and you have to put it together in the system so that you will be more efficient. Whether it was the Migrant Worker dorms – it is not as if the Migrant Worker dorms pre-COVID had very good C2 systems to begin with, but when you needed to know who was infected, who should be isolated, who should be allowed out so that they are not kept too long, you needed that kind of system. Or in the Community Recovery Facilities – all these instances, DSTA had to step up and provide the backbone. It is a considerable source of comfort and satisfaction that the ability of MINDEF organisations and the SAF in C2 were reaffirmed. I say this now because we could have dropped the ball – other agencies ask us, and we march in like

superheroes and then we do not perform. But it did not happen – we stepped up, whether it was the SAF or DSTA or DSO, and I think quiet satisfaction is when others affirm, and other agencies and other leaders say there are some agencies that can do, some agencies that do it better, and some agencies should ask for help from the other agencies to show that they can do.

4. What about biological threats per se – I think we have learnt a lot too. Rapid diagnosis against a new organism is a critical enabler – I think that is a given, if you are dealing with a bio-threat, quickly characterise it is a key, because without which you would be punching against shadows. Just think about it – just two that we have gone through in our own experiences, SARS and COVID-19. With SARS, we characterise it, and remember the two instruments that helped us maintain order were thermometer and the mass thermal scanner. But for COVID, none of you went out, or you may have bought thermometers, they're not very useful – it just did not work. But there lies the problem, you know, to be able to characterise and understand the organism. Bio-terrorists could potentially use novel organisms and even known ones, which can mutate. In other words, once introduced into the population, we are the cells in petri dishes, and we are the source of mutations. So XBB, they call it a Singapore variant, which we vehemently deny because there is this entity called GISAID which you do your genetic analysis and you populate it and tell the world what new variants you've discovered. And Singaporeans are very hardworking, and we are the only ones populating it, so every variant there is ours. But we have to do our part, and the rest do not test, so you know, the reality is really that mutations will occur. So when they do, ready-to-use kits will not be available. And Singapore will need that indigenous capability to isolate, type, characterise bio-threats. I think we were very fortunate that the COVID-19 virus in relative terms was not that lethal. SARS virus was more lethal; if you have something in the order of ebola, all bets are off. If you have a virus that is both lethal and transmissible, it is a worldwide crisis – a real crisis. And that DSO able – was among the first to produce new kits for rapid diagnosis using our existing BSL3 labs. If the virus required BSL4, you would have a problem. We have to depend on others because we do not have it, and in that waiting process, many lives will be lost. And we learnt the lesson very early, we announced that we are going to do it, we were going to build up the BSL4 labs – I presume it is progressing, it will be done soon. There are many examples of BSL4 labs in cities, so it is not a problem. We debated, we looked at it, and the systems are in place – in fact, it is actually very robust.

5. Similarly, I think there were many lessons to be learnt from the Russian-Ukraine war, not least because it is the most contemporary battle fought using modern technology. We ask ourselves

what is the last war fought using modern technology, it was the Iraq war, which was even then long ago, and we are not sure if it applies to modern warfare. All organisations within MINDEF and SAF must dissect the progress of the battle at every stage to learn lessons for ourselves – when it is costing somebody else, if you do not learn the lessons, you've wasted it because in the next round, you may be the victims. So this is a golden opportunity to dissect it in detail – why did it fail, why were they not able to get air superiority, why was it that the assumptions were wrong – all these various aspects, we should not waste this precious opportunity.

6. I think there are some lessons, but one obvious, indeed glaring lesson is that military intelligence from civilian crowd sourcing can shape the outcomes of key battles. We do not discuss them – we think in our exercises, we think that well, Phase 1, Phase 2, Phase 3, civilians do not come in. Because e before the start of the Ukraine invasion, there were pictures, videos and satellite images of Russian tanks and armed units widely circulated on social media, from civilian sources – I am not talking about military sources. According to the Carnegie Endowment for International Peace, researchers noticed, post-ops of course, a build-up of traffic on Google Maps in the early hours of the morning, caused by Russian armour on the highway linking Russia to the Ukrainian city of Kharkiv. The Washington Post also reported that TikTok was flooded with videos showing sophisticated Russian weaponry and military vehicles speeding up on railways, highways and local roads enroute to Ukraine, accompanied by suitable music in a TikTok video. These geo-tagged information sources unwittingly allowed military analysts to piece together information on the movement of Russian convoys. Now if that is not a disrupter, I do not know what is. Have you have factored that into your military plans, or have you not allowed it to challenge your assumptions?

7. Another is that public opinion and boosting the morale of your own people is as important as the hard edge of warfare. The image of a calm President Zelensky broadcasting from somewhere amid the bombings that were occurring in Ukraine, reporting, appealing for resources from other countries, I think did much to maintain the resolve of the Ukrainian military and people. So when he spoke at the Shangri-La Dialogue, we kept back the announcement till as late as possible, obviously for security reasons, but even then you sort of ask yourself, how many places can you broadcast from Ukraine and I am sure that there was a potential target, but, the fact that you can have a president quietly appealing to the world at large – we were not the only conference he appeared at , there to counter tool was the devastation of ammunition dropped on civilians, these were the effects, they shaped the public morale as well as the morale of your troops. And

remember, we are just not passive spectators, this is our business. What have you learnt from every episode that has occurred. We want to study earnestly the details in order so that we are able to defend or conduct information operations in the heat of battle. There should be two ways - in other words, just like the medical community every week comes up with thousands of articles of what they studied in terms of the response to the COVID virus. Militarily, at least for the SAF/MINDEF we should expect many discussions, what is it has learnt, what has this modern warfare campaign challenged our assumptions for the next one. If we have not learnt it, then it is all wasted. So I challenge you, study it earnestly, challenge your assumptions about what it means for us as we defend Singapore.

8. These new domains cannot be solely left to any arm of the SAF or MINDEF agency. Requisite skills in these domains must permeate across, including the DTC to develop technologies and systems that can enable the SAF to be more effective in these new domains.

9. I am happy to report that the DTC has also helped make progress in conventional capabilities for the SAF. So we have not stood still even though we had to deal with the COVID pandemic. For example, DSTA acquired the Orbiter-4 Closed Range UAV (CR-UAV) this year, and it has now provided the RSAF with enhanced ground situational awareness. DSO has facilitated progress in unmanned systems, and they worked with RSN, ST Engineering to develop the autonomous underwater vehicles, it is called Meredith-400 - for seabed surveillance; and the Veloce 15 mini-Unmanned Aerial Vehicle – this is the first locally developed hybrid Vertical Take Off and Landing (VTOL) Fixed-Wing system, for the Army to use for its intelligence, surveillance, and reconnaissance.

10. All of you know that we are going to establish the Digital and Intelligence Service (DIS) this year, and this will increase the demands, because the digital battlefield is inherently weighted towards the use of technology. But it is just not technology alone, a strategic masterplan as well as an effective system to raise, train and sustain vocationalists that will determine whether the DIS will be effective or not. You can't hire them and tell them, alright, the computer is your battlefield, you go and do battle, and it just doesn't work. What are your threats, what are your scenarios, what are your key objectives, similar to the kinetic domain. But for the DIS, Ops-tech integration, as with the other services, is a crucial enabler for the SAF. And I am glad that the Digital Ops-Tech Centre (DOTC) will be built and forge close Ops-tech relationships with the DTC so we can produce more innovative technologies and operational products in the SAF. We are also going to build cyber ranges, it is the equivalent of kinetic ranges which will be needed just as they do with rifles, ammunitions. In a

weaponised environment, in the digital domain, are you sure that you have hit your target, or have you caused collateral damage. So the cyber ranges will test your marksmanship. In May this year, I visited Estonia, which hosts the NATO cyber range and they showed me their mock-up, it wasn't in a room much bigger than this, but very effective water systems, computer systems, there is key installations for which you can red team, as well as blue team. It allowed them to be able to conduct cyber defence exercises and trainings to test, validate and enhance cyber readiness capabilities. And our people have added to that range and they are using some of our systems there. For the SAF, we too must commit adequate resources to build a state of art cyber-range. I have given our relevant commanders this challenge. To make it the best in the world. Make it so that others want to use it. I think it will happen.

People as the DTC's Most Important Asset

11. Our defence tech organisations – DSO and DSTA – and the soon-to-be inaugurated DIS, unfortunately will have to compete for limited resources. We have all our dreams and aspirations but ultimately you have 35 thousand babies a year. Remember this joke about when Iceland got into the Olympic finals – Iceland has about 300 thousand people, you minus so many needed for police, finally they left 11 which they sent to the world finals, and they got into the world finals, so that was Iceland. We may have to do the same for the people that we want because your IT industry globally is growing. And MINDEF and the SAF must provide competitive remuneration and career prospects to attract talent. We have to do it creatively, but it must be done. We also need to widen collaborations with universities, research institutions and the private sector, to draw on their technical expertise especially for dual-use technologies. An example of this is MINDEF is working with AI.SG, which is an organisation supported by NRF and NUS, to launch the inaugural AI Challenge for Defence later this year, and DSO scientists will work with personnel from external agencies to develop AI models for defence applications.

Recognising DSO's 50 Years of Contributions

12. This year, DSO celebrates its golden jubilee. Their commemorative dinner, a lot of reminiscing and previous leaders coming back, Prime Minister was the Guest-of-Honour, there was much to celebrate. But suffice to say for today's event that throughout these 50 years, DSO has successfully delivered advanced technologies and strategic assets to the SAF. These include

advanced datalink systems, indigenous guided systems; sonar signal processing technologies; advanced electronics.

13. For the present and future, DSO will continue to build capabilities in AI, cyber, cryptography and data analytics which we need to detect deepfakes and the recognition of targets.

Striving for Excellence in Science and Technology

14. Our region, and indeed the World at large, has entered into an unpredictable period. The sailing for the decade, perhaps decades ahead, may get turbulent and even dangerous. The SAF and DTC must help Singapore and Singaporeans weather the storms ahead. When the ship is amid turbulent waters, remember you are not passengers, you are the leaders. So you must have a plan, and if it gets stormy, you must make sure we are the ones to help Singapore and Singaporeans weather the storms. Just as we did during the COVID pandemic, the SAF with the Army, Navy, Air Force and DIS; and the DTC with their scientists and engineers must restore calm and confidence by providing effective solutions and responses to security threats. I like the ethos that we have exhibited during when crisis occur. It is just alright, let's get the work done, this is a challenge, this is what we need to get Singapore through, we want to deliver. That ethos will stand us in good stead.

15. When the going gets tough, it will be qualities such as boldness, innovativeness, persistence, resolute, calm, a warrior spirit that will help our people overcome any challenge. These qualities are exemplified by our DTP award winners today.

16 In the individual award category, Mr Wong Chia Sern designed and implemented large-scale, secure, and resilient networks for MINDEF/SAF. Dr Chieu Hai Leong is one of our leading experts in the use of natural language processing for defence applications.

17. In the team award category, we are recognising eight recipients. Among these, we have the Next Generation Army CCIS Team which delivered an advanced C2 system to support Army operations; the Advanced Payload Team which developed a miniaturised advance sensor system. This one is not top secret, the Platelet Cryopreservation Team, unless it confers on you superhuman strength. Congratulations to you all. I can't say much more than this. You know what you have done,

you know how important it is, that should be a quiet satisfaction for you. These words do not make up thousands of hours, many years that you slog to make a breakthrough. I know that. And for the Platelet Cryopreservation Team made a difference because now you can increase shelf-life of platelets from one week to two years for emergency use. For those of you who knows, platelets are very important, if you get dengue, your platelets plunge from normally 140 thousand to less than 5000 and you will bleed internally, then you need these platelets. And when you have a dengue outbreak, there's a shortage because you need people to keep donating. I think this will make a difference. So all these contributions significantly enhance our defence and national security.

Conclusion

18. Congratulations to all award winners. Thank you all within the DTC for your dedication and hard good work. Thank you.

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