A MARITIME FORCE FOR A MARITIME NATION

RSN 50
1967 - 2017
MARITIME NATION • MARITIME FORCE

Celebrating 50 Years of the Navy

REPUBLIC OF SINGAPORE NAVY

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Formidable-class frigate RSS *Tenacious* berthed at VivoCity opposite Brani Terminal for Navy@Vivo in June 2016.

A MARITIME FORCE FOR A MARITIME NATION

Celebrating 50 Years of the Navy

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A Sikorsky S-70B Seahawk naval helicopter overflying the Singapore Strait and past the Marina Bay area en route to base after training in the South China Sea.

Prime Minister Lee Hsien Loong inspecting the Midshipman contingent at the Commissioning Parade for Officer Cadets on 26 June 2016.

MESSAGE

Singapore is a maritime nation. From the 14th century, to its founding in 1819 and its independence in 1965, our island's prosperity has been inextricably linked to the sea. The seas are our lifelines and will continue to be so. Without them, Singapore would not survive, let alone prosper.

For 50 years, the Republic of Singapore Navy (RSN) has defended Singapore and kept her waters safe. In the early years, RSN pioneers saw action and bravely defended Singapore at sea during Konfrontasi. Since then, the RSN has remained resolute and reliable in its duty to guard our nation against threats from the seas.

Today, the RSN is a modern and flexible force that protects Singapore's sea lines of communication and contributes to regional peace and security.

The RSN is also an effective instrument of defence diplomacy. Through port calls and naval engagements, it makes friends and fosters interoperability with other navies. This builds mutual understanding and trust, the basis for the RSN to work with other navies on common security concerns.

By collaborating with friends and partners, the RSN contributes to the maritime security of our region. Today's security threats are increasingly transnational and no country can tackle them alone. Safe and secure seas are vital for Singapore to continue to flourish, and for our maritime region to grow.

To the men and women of the RSN, thank you for five decades of dedicated service to Singapore. May the RSN continue to perform outstandingly as the maritime force for our maritime nation.

LEE HSIEN LOONG
PRIME MINISTER

Deputy Prime Minister Teo Chee Hean arriving at the launching ceremony of the second littoral mission vessel, *Sovereignty*, on 16 April 2016.

MESSAGE

At its birth on 5 May 1967, the RSN had just two wooden ships, RSS *Panglima* and RSS *Bedok*. The task ahead – to build a Navy from scratch and to protect the independence that was thrust upon Singapore – was a tall order. With stout hearts and single-minded determination, our pioneers went about their work and laid firm foundations for the RSN of today.

The journey to build a capable Navy was not easy. The Navy had to weather great storms, especially in its early years. Never flagging in adversity, we pressed on, as did the successive generations of Navy men and women. In 50 years, the RSN has been transformed into a modern and balanced maritime force that operates effectively on the surface, in the air and beneath the seas. This is well recognised internationally by military experts and established navies.

At 50, the RSN can be justifiably proud of its achievements. However, the RSN's accomplishments were far from preordained. They were forged out of the sacrifice and hard work of the men and women of the RSN who served with dedication. It will require successive generations to do the same for the RSN to continue to succeed. The future of the RSN lies in the hands of today's and tomorrow's generations. Stay the course and continue flying the Navy Ensign high.

I congratulate the RSN on its Golden Jubilee. I am proud to be part of the Navy Family. May the RSN continue to move "Onwards and Upwards" in the service of our maritime nation.

TEO CHEE HEAN
DEPUTY PRIME MINISTER

Minister for Defence, Dr Ng Eng Hen, and his wife, Professor Ivy Ng, disembarking from the newly commissioned submarine, RSS *Archer*, on 2 December 2011.

FOREWORD

"Geography is destiny" and since historical times, Singapore's destiny and that of Southeast Asia have been shaped by influences that arose from its surrounding seas. There are records of sea trade from India and China as early as the 6th century that brought with it cultural and religious influences, including Hinduism and Buddhism. Islamic influence and European colonisation followed. Over centuries, land and air routes have been greatly developed but Singapore will always remain a maritime nation in a maritime region.

Today, about a thousand ships ply the Singapore Strait each day, testament to our nation's strategic siting at the crossroads of Asia and the rest of the world, between critical sea lines of communication in the South China Sea and the Malacca Strait.

The RSN therefore has an onerous but critical responsibility to keep Singaporeans safe from maritime threats as well as vital waterways open. Over the 50 years since the inception of the RSN, successive leaders have understood this challenge and developed the necessary capabilities for the RSN to fulfil its mission.

This book, *A Maritime Force for a Maritime Nation*, commemorates the RSN's Golden Jubilee through poignant stories of the men and women who built up the RSN with stout hearts and unflagging spirits that overcame odds to transform a fledgling constabulary force into the 3rd Generation RSN of today.

This commemorative book should serve as an inspiration to present and future generations of RSN servicemen and women to be fully committed to their vital roles for the SAF and Singapore. I wish all men and women of the RSN a meaningful and happy 50th anniversary!

DR NG ENG HEN
MINISTER FOR DEFENCE

The Chief of Defence Force, Lieutenant General Perry Lim, speaking to the crew of RSS *Freedom* before they sailed for patrol on 31 December 2016.

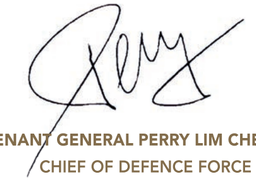
PREFACE

Today's 3rd Generation SAF is an integrated fighting force, capable of full-spectrum operations from peace to war. The RSN is an integral part of the 3rd Generation SAF and serves as Singapore's first line of defence in peace. The RSN protects Singapore's sovereignty at sea and keeps its shipping lanes safe and secure.

Over the past 50 years, the RSN has honed its interoperability and integration with its sister services. When I was a junior officer in the Guards Formation, the Navy was a familiar partner to me. I saw how the RSN progressed from providing transportation support for the Army to one that we worked with to conduct ship-to-shore and amphibious operations. As Chief of Defence Force, I flew in a Sikorsky S-70B Seahawk naval helicopter to observe an anti-submarine drill during a major Fleet exercise last year. I saw how the RSN has sharpened its capabilities to deal with a wide array of threats, and how sea-air integration has advanced to today's complex maritime air operations involving fighter aircraft, maritime patrol aircraft and naval helicopters.

Whenever duty called, the RSN has always delivered to achieve mission success. The RSN has deployed for joint operations thousands of miles from home, to contribute to peace support operations and protect international sea lanes so that global trade, the lifeblood of Singapore's economy, can flow unhindered.

Looking ahead, the security environment is changing rapidly. The RSN needs to rise to these new challenges, as it has done in the past. I am confident that the RSN is ready and up to the task. May this book motivate and energise present and future generations of servicemen and women as they work to chart the RSN's journey into the future. Congratulations on the RSN's Golden Jubilee!



LIEUTENANT GENERAL PERRY LIM CHENG YEOW
CHIEF OF DEFENCE FORCE

The Chief of Navy, Rear Admiral Lai Chung Han, at the decommissioning ceremony for the *Fearless*-class patrol vessel, RSS *Independence*, on 8 March 2017.

PREFACE

As a small maritime nation, Singapore relies on the sea as its economic lifeline and its link to the rest of the world. Since 1967, generations of Navy men and women have dedicated themselves to defending Singapore and its waters. As the RSN turns 50, our commitment to this mission and purpose remains resolute. We are the maritime force for our maritime nation.

Our Navy pioneers have laid strong foundations for the RSN and we owe them a great debt of gratitude for their sterling service and selfless sacrifice. During the 1970s, a low point in the Navy's history, our pioneers helped the RSN regain its footing. And with keen foresight, they charted the way ahead and built the RSN into the balanced and potent force that it is today.

We are also deeply grateful to the families of our servicemen and women. Thank you for your unwavering support and for looking after the family when we are away. You are our pillar and source of strength.

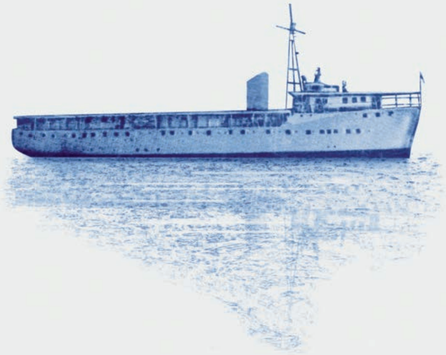
To commemorate our Golden Jubilee, we have put together this collection of articles, interviews and features to celebrate the adventures and achievements of the men and women of the RSN. I would like to thank Lieutenant Colonel Lim Huay Wen and her team for their supreme effort in stitching this volume together. Through its pages, the Navy Spirit of solidarity, resilience and enterprise shines through. It is a spirit forged by the crucible moments of the last 50 years, in overcoming adversity and rising above our constraints and circumstances. It is this same Navy Spirit that will continue to propel the RSN "Onwards and Upwards"!

Happy RSN50!

REAR ADMIRAL LAI CHUNG HAN
CHIEF OF NAVY

Aerial view of Boat Quay and the Singapore River in October 1953. Picture: Singapore Press Holdings

SINGAPORE, a MARITIME NATION



SINGAPORE'S MARITIME HERITAGE

Professor John N. Miksic

Singapore's immutable reality is that it is a maritime nation. Its fortunes have always been heavily dependent on trade. Throughout its history, Singapore has been a centre of maritime activity. Singapore lies at the junction of three seas: the South China Sea, the Java Sea and the Bay of Bengal. In the Age of Sail, this location gave the ports of the region a major advantage – it was one monsoon away from China in the east, and India in the west. For 2,000 years, various harbours have struggled for supremacy in this region, with Singapore right at the heart of this competition.

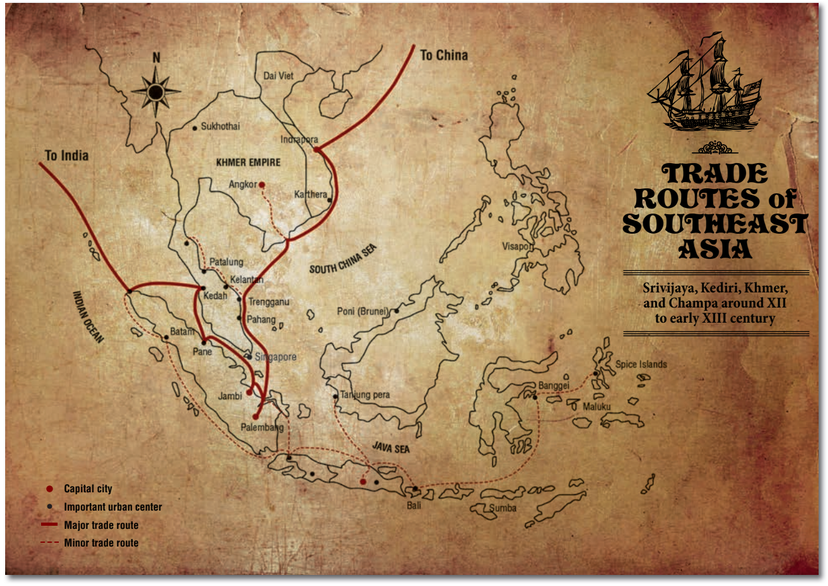
THE SRIVIJAYA PERIOD, 680-1025

Singapore's maritime heritage can be traced back to as early as the 7th century. The first great maritime kingdom in the Singapore-Riau-Sumatra region was the Srivijaya empire, with its capital at Palembang, South Sumatra in present-day Indonesia, and its influence extending as far north as Kedah on the Malay Peninsula. Karimun, an island 40km west of Tuas, was a lookout post for Srivijaya. An inscription on a cliff in Karimun proclaims that Ghautama, who was probably the island's chief, had a prized possession – an ancient navigational instrument called an armillary sphere. This implied that he and his people were seafarers; they were probably *orang laut* (sea nomads in Malay), who migrated between Singapore to Karimun according to the season. These sea nomads were Singapore's indigenous people.

Even powers as far as India wanted to control the Singapore Strait because of its strategic importance. The Chola kingdom of South India launched a naval invasion against the Singapore area in 1025. It took Srivijaya by surprise and succeeded in conquering a number of ports in the area. This was the first instance of a recorded naval contest over Singapore, which would frequently recur over the course of history.

THE MALAYU ERA, 1030-1300

The Malay kingdom of Malayu took advantage of the situation to establish its rule over the Singapore area. Malayu realised that the Straits of Malacca and Singapore were heavily utilised, and decided to turn a profit by charging a toll for ships passing through the south end of the Straits of Malacca and Singapore. One in three ships paid this toll at Karimun to avoid taking the longer route through Malayu's main base in Sumatra.



Map of trade routes in 13th to 14th century Southeast Asia. Picture: Straits Times Press for the RSN

THE TEMASEK ERA, 1300-1400

Singapore rose to international prominence around 1300, and established itself as the main entrepot at the southern entrance to the Malacca Strait for the rest of the 14th century. The port of Singapore served a regional network that encompassed the Riau Archipelago and extended as far as South China, and supplied foreign goods to a hinterland in Malaya.

In 1320, a Chinese official came to Long Ya Men (Dragon's Tooth Strait, Keppel Harbour) to purchase tame elephants, and the island's ruler began sending diplomatic missions to China. Temasek, as Singapore was then called, was seen as strategic by the Chinese. They viewed the Nanhai (southern ocean) as being divided into a western and an eastern half by Temasek, or more precisely, the Dragon's Tooth Strait. Temasek was 49th in Chinese trader Wang Dayuan's list of 99 places; in other words, it occupied the central position in the entire network of ports stretching from China to

Africa and it was symbolically the link between the east and the west. Temasek was coveted by both of Southeast Asia's main empires of the 14th and 15th centuries: the Thai empire of Ayutthaya on the mainland and the Indonesian empire of Majapahit on the islands. Their spheres of influence overlapped precisely where Temasek was situated. Thus, the Chinese, Indonesians, and Thais all recognised Temasek's strategic location.

Temasek was also one of the earliest overseas Chinese settlements. Archaeologists have found many thousands of pieces of Chinese ceramics from the late Yuan Dynasty (1300 - 1367) on the north side of the Singapore River, along with Chinese coins, glass beads and other objects. Temasek was also fortified; Chinese merchant Wang Dayuan mentioned an attack by Xian (Siam, probably people from the Chao Phraya valley) which lasted for a month, but could not break through its defences. The aggressors attacked from the land, suggesting that Temasek's maritime defences were strong enough to deter them from that approach.

A fragment of the Singapore Stone with inscriptions from the 14th century, which stood at the mouth of Singapore River, points to an ancient civilisation in the Majapahit era in Singapore. Picture: Courtesy of Professor John N. Miksic

A 14th century Chinese compass, excavated from Fort Canning Hill, indicates that Singapore was a trading hub then. Picture: Courtesy of Professor John N. Miksic

THE MALACCA ERA, 1400-1511

Around 1396, Temasek, now renamed Singapura, was attacked again. Singapura's ruler, Parameswara, survived the attack and fled to Malacca, where he founded a new kingdom – the Malacca Sultanate – that included Singapura. By 1405, Malacca was important enough for Admiral Zheng He from China to visit it and establish a base there. A detachment of his fleet that visited Singapura reported that it was still a connecting node where passengers would stop over and change ships. In this way, 15th-century Singapura resembled modern Singapore as a transit point for people and cargo.

Singapura was the Malacca Sultanate's main naval base. It had 40 three-masted cruisers, a considerable naval force for that time. Malacca's fleet maintained peace in the Malacca Strait, suppressed piracy, conducted trade on behalf of the Sultans, and enabled Malacca to extend its political influence over much of the Malay Peninsula and East Sumatra by 1500. This fleet was responsible for the region's stability and peace, and contributed to its prosperity.

THE JOHOR ERA, 1500-1600

When the Portuguese conquered Malacca in 1511, the Malay ruler fled to Johor; Singapura, however, remained the main centre of Malay naval power. The Portuguese admiral, Emanuel Godinho de Eredia, advocated that Portugal occupy Singapura, which he realised was more strategically situated than Malacca. He never received support for his idea.

THE LOST CENTURIES, 1600-1800

The 300-year-old port of Singapura experienced a disaster sometime between 1605 and 1610. No archaeological remains from the period 1600-1800 have been found. Singapura was probably attacked by Aceh, a kingdom located at the northern tip of Sumatra, which had sought to replace the Johor-Singapore-Riau area as the centre of Malay culture. Aceh maintained a policy of resistance towards all European attempts to control Southeast Asian trade and territory, but proved to be unable or uninterested in governing the Singapore area. Without strong governance and a maritime force to police the region, piracy flourished in the waters around Singapore for the next two centuries.

THE FOUNDING OF MODERN SINGAPORE, 1819 ONWARDS

Singapura's fame, however, lived on through folk tales and the *Malay Annals*, which influenced the British statesman, Sir Stamford Raffles, to establish a British trading post there. He realised that Singapura could reclaim its former glory due to its strategic location.

In the early 1800s, the British East India Company administered settlements in Bencoolen and Penang. The region was a centre of entrepôt trade. The company had substantial trade links with Imperial China, which were vulnerable as the company lacked a permanent presence along shipping routes in Southeast Asia, where Dutch influence was heavy. Raffles, who had been sent to Southeast Asia as its agent, convinced its directors to allow him to secure a trading post to address this. Thus, in February 1819, he established the trading settlement of Singapore.

Within months, a flourishing bazaar was established along the Singapore River. In a few short years, Singapore outstripped the other European colonies and Malay ports in the Malacca Strait, attracting large numbers of Asian traders and fostering an expansion of trade which benefited all parties. The company also banned customs tariffs and minimised port charges, which further incentivised merchants to call at Singapore. By 1821, almost 3,000 ships had sailed there, bringing with them millions of dollars in trade.

CONCLUSION

Raffles' selection of Singapore as a British trading post was validated by the rapid restoration of its status as a significant trading hub, after two centuries of obscurity. Almost another 200 years later, Singapore's maritime industry remains an integral part of its economy. This is testament to Raffles' foresight, and the immutability of Singapore's strategic location astride the world's key sea lanes. Singapore was, and continues to be, a maritime nation.

Professor John N. Miksic is a member of the Southeast Asian Studies Department of the National University of Singapore. He specialises in archaeology, ceramics and trade, as well as ancient Southeast Asian history and religions. An expert in pre-colonial Singapore, Professor Miksic has led archaeological excavations at Fort Canning and around the Singapore River.

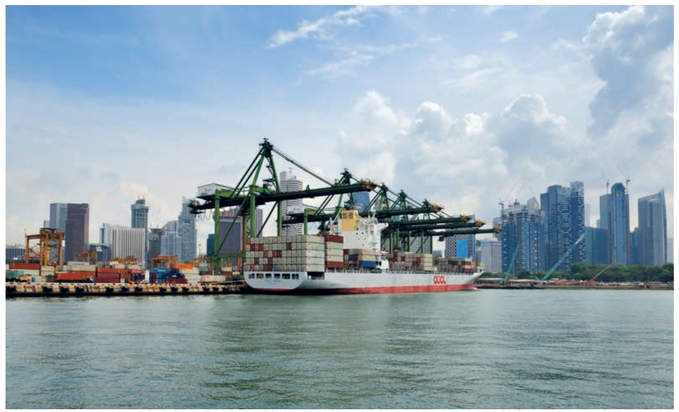
A MODERN DAY GLOBAL HUB PORT AND INTERNATIONAL MARITIME CENTRE

Maritime and Port Authority of Singapore

With more than 90 per cent of the world's trade carried by sea and Singapore's strategic geographical location, seaborne trade is the lifeblood of the Singapore economy. Today, the maritime industry is a thriving ecosystem comprising the global hub port, international maritime centre, shipping sector and offshore and marine engineering sectors, and is connected to more than 600 ports in more than 120 countries. The industry, dubbed Maritime Singapore, contributes 7 per cent of Singapore's Gross Domestic Product (GDP), employing 170,000 people in over 5,000 maritime establishments.

BECOMING THE GLOBAL HUB PORT

Singapore's status as an important regional entrepôt began from as early as the 11th century. Singapore and its surrounding waterways were seen as conduits linking the East to the West. After Singapore gained independence in 1965, establishing its status as a transshipment hub and growing the maritime industry became priorities. The Port of Singapore Authority (PSA) was formed in 1964 to look after port operations and provide port services.



PSA Singapore Terminals operates four container terminals with a total of 52 berths at Tanjong Pagar (facing page), Keppel (above), Brani and Pasir Panjang as one seamless and integrated facility. Pictures: MPA

The operationalisation of the first container berth at Tanjong Pagar in 1972 was a defining moment in independent Singapore's maritime history. Since then, Singapore's port has expanded by another eight terminals and the volume of goods it could handle grew from 1 million twenty-foot equivalent units of containers in 1982 to more than 30 million units in 2016.

In 1996, the Maritime and Port Authority of Singapore (MPA) was formed after a decision was taken to corporatise the PSA to allow it to focus on its core business of operating the port. MPA took over the regulatory functions of PSA and was tasked to spearhead the strategic development of Singapore's maritime industry.

Today, the Port of Singapore is recognised as the world's busiest transshipment hub, accounting for almost one-seventh of the world's total container transshipment throughput and more than 4 per cent of global container throughput in 2016. It has been named 'Best Seaport in Asia' 28 times by logistics trade publication Asia Cargo News, for its leadership, innovation, service quality and reliability.

While geography predisposes Singapore's success as a maritime hub, competition from neighbouring ports in Southeast Asia and from those as far as China and Britain is stiff. China's 'One Belt,

One Road' initiative – which aims to revive trade along the Silk Road, the ancient trade route between Asia and Europe – can change the regional landscape and spur greater integration and larger trade flows. Traditional business models are becoming outdated as emerging technologies in the maritime and logistics sectors are creating new value chains. These, coupled with increasing interconnectedness of the global economy and closer integration of global supply chains, are part of the evolving environment that offers both opportunities and challenges for the maritime sector. Singapore has to strive to stay ahead of the competition.

Concept image for the Next Generation Port in Tuas. Picture: MPA

KEEPING SINGAPORE'S EDGE IN THE COMPETITION

To better position Singapore for the future, the MPA is developing and promoting Singapore as a premier global hub port and international maritime centre, building up a qualified workforce for operations and research, and advancing Singapore's maritime interests. In 2014, it introduced the Maritime Singapore Future Ready Framework to guide its plans.

Today, Singapore has built a vibrant international maritime ecosystem by attracting shipping companies with different types of knowledge-based services to Singapore. It is home to 130 international shipping groups that provide an entire gamut of commercial and technical maritime services. In 2015, Singapore was ranked the top shipping centre among 43 global maritime hubs by the Xinhua-Baltic Exchange Shipping Centre Development Index, and the world's leading maritime capital by consulting firm Menon Economics.

In the pipeline are plans to consolidate and expand container operations at the Next Generation Port in Tuas, which will utilise new technologies to improve efficiency and productivity sustainably and safely. Singapore is also building the requisite infrastructure to handle liquefied natural gas bunkers as such gas increasingly becomes a viable alternative fuel. Since 2011, it has committed $100 million to the Maritime Singapore Green Initiative, to incentivise maritime companies to adopt clean and green shipping practices that go beyond International Maritime Organisation (IMO) conventions.

MPA also engages the international maritime community to address common maritime challenges, through events such as the Singapore Maritime Week and maritime defence exhibition IMDEX Asia. It also participates in international forums, such as the IMO and the Tripartite Technical Experts Group on safe navigation in the Straits of Malacca and Singapore to safeguard Singapore's maritime interests and to uphold its global reputation. All these initiatives would be futile without capable people who are passionate about the maritime sector. The Maritime Singapore brand was created to

Coordinating Minister for Infrastructure and Minister for Transport Khaw Boon Wan using a ship simulator at a Singapore Maritime Week exhibition in April 2016. Picture: Singapore Press Holdings

cultivate in Singaporeans a sense of pride in and belonging to the maritime industry and to attract more talented individuals to join it.

MARITIME SECURITY – VITAL FOR SINGAPORE'S SUCCESS

A nation's ability to enforce maritime security has become increasingly important to port users. A safe port and its environs provide assurance to ship owners that their vessels and cargo will arrive on time, secure and unimpeded. Hence, Singapore's maritime security agencies are key stakeholders of Maritime Singapore to ensure that the nation's port terminals and waters and their approaches remain safe and secure for all.

MPA works closely with Singapore's defence and homeland security agencies to safeguard the nation's maritime interests. Regular engagements among MPA, RSN and the Police Coast Guard (PCG), ensure the security of Singapore's waters against threats such as terrorism and sea robbery. The close cooperation extends to MPA's counterpart agencies in Indonesia and Malaysia to keep the Straits of Malacca and Singapore safe and secure for shipping. Further afield, MPA is supportive of RSN's participation in counter-piracy patrols off the coast of Somalia under the multinational Combined Task Force 151 (CTF 151).

In addition, the RSN-led National Maritime Security System (NMSS) pools expertise and resources from MPA, PCG, Immigration and Checkpoints Authority (ICA) and Singapore Customs with the aim of detecting maritime threats early and responding to them in a timely and coordinated manner. The RSN and the PCG secure the approaches to the Singapore Strait and Singapore's waters, while the ICA and Singapore Customs oversee security within the ports.

Operating from the Singapore Maritime Crisis Centre in the Changi Command and Control Centre, the NMSS adopts a holistic approach to maritime security, coordinating and executing integrated response plans against maritime security threats at the national level. In 2011, one of MPA's two Port Operations Control Centres was relocated there for greater synergy with the other agencies. With its partner agencies in the NMSS, MPA is committed to the maritime security of Singapore.

CONCLUSION

The growth of Maritime Singapore has been remarkable in the first 50 years of nationhood. However, Singapore cannot afford to rest on its laurels and bask in its present-day status as a global maritime hub. The maritime industry is highly cyclical in nature and today faces unprecedented challenges characterised by volatility and fundamental shifts in business models. Singapore has weathered previous downturns and has emerged leaner and stronger each time. This is the time for Maritime Singapore to build new capabilities and skill sets so that it can capitalise on new opportunities when the upturn arrives.

The Singapore Naval Volunteer Force on parade as the Singapore Naval Ensign was raised for the first time at Telok Ayer Basin on 5 May 1967. The guard of honour Contingent Commander was Lieutenant Buang Hassan and Second in Command was Sub-Lieutenant Roland Vivian Simon. Picture: Singapore Press Holdings

GROWING the MARITIME FORCE

SINGAPORE'S NAVAL DEFENCE BEFORE NATIONHOOD

The port of Singapore grew from strength to strength under colonial Britain, first becoming a part of the Straits Settlements in 1826, and later a Crown Colony in 1867. The opening of the Suez Canal in Egypt in 1869 brought a new wave of prosperity to Singapore by reducing the transit distance from Europe to East Asia by nearly 5,000 nautical miles. Within one year, the value of Singapore's trade increased by more than 1.8 times, from $39 million in 1869 to $71 million in 1870. However, the road to Singapore's modern-day success was not always smooth sailing.

THE SINGAPORE STRATEGY

Peace and prosperity took a hit during World War I, which pitted the Allied Forces against the Central Powers from 1914 to 1918. During the war, while Singapore was not physically threatened, the German light cruiser, Seiner Majestat Schiff (SMS, His Majesty's Ship in German) *Emden*, attacked merchant ships from the Indian Ocean to Penang, Malaysia, over a period of two months from September 1914. These attacks effectively blocked Singapore's western shipping route and disrupted the flow of trade to Singapore.

After World War I, the British decided to build a major naval base in Singapore to support a fleet that could be deployed to secure British maritime interests in the region. The sustained attack by SMS *Emden* had emphasised the importance of this requirement. The British also saw the move as necessary insurance against Japan's growing military ambition.

Believing that a landward attack from Malaya was unlikely, the British chose Sembawang as the site for the new naval base. It was located between the Malay Peninsula and Singapore, and situated as far from the open sea as possible. This allowed the coastal artillery on the southern and eastern coasts of Singapore to open fire on attacking ships before they came into striking range of the base. Thus, the Singapore Naval Base was established.

The British then devised the 'Singapore Strategy', revolving around basing a fleet of warships in the Singapore Naval Base, which could intercept a Japanese force headed for India or Australia. The initial proposal to build a British Pacific Fleet was shelved due to budgetary constraints, and so, the plan was for the main fleet to sail over from the British Isles when required.

However, this strategy was premised on being able to deploy sufficient ships and would not be viable if the bulk of the Royal Navy was needed in home waters. Ultimately, the British decided to reduce fiscal spending and adopt the more risky strategy – a decision that they came to regret when Singapore and Malaya fell to the Japanese in 1942.

THE EARLIEST FORM OF THE NAVY

The British realised that the pragmatic way to supplement the regular Royal Navy was to establish a volunteer force. This force, known as the Royal Naval Volunteer Reserve, provided much needed support in areas such as medical, intelligence and port administration services during World War I. Many of these volunteer sailors were given gallantry awards and medals. As a result of this success, Royal Naval Volunteer Reserve Divisions sprung up quickly across the British Empire.

Thus, in 1934, the earliest form of the Singapore Navy began to take shape. The Straits Settlements Royal Navy Volunteer Reserve was raised to supplement the crew of Royal Navy ships that were rotationally deployed to Singapore and the region. It was commanded and staffed by the British, and drew volunteer sailors from the local populations of Singapore and Malaya.

The Singapore Division, with an initial complement of around 25

Left: Telok Ayer Basin in the 1960s.

officers and 150 ratings, was based in Telok Ayer Basin, which was reclaimed in the early 1900s to form the area now known as Shenton Way, and was assigned His Majesty's Ship (HMS) *Laburnum*, a *Flower*-class corvette, as its headquarters. Sea training was conducted on the colonial governor's yacht, *Sea Belle II*, as well as visiting Royal Navy ships.

THE FALL OF SINGAPORE

With the prospect of World War II looming, the British Admiralty sent 'Force Z' to Singapore, which was made up of the battleship, HMS *Prince of Wales*, the battlecruiser, HMS *Repulse*, and four accompanying destroyers.

The volunteers of the Straits Settlements Royal Navy Volunteer Reserve were also mobilised, tasked with coastal patrols in the Singapore Strait at the onset of the war, and later, troop and civilian evacuation duties during the Japanese invasion.

British Prime Minister Winston Churchill argued that a small mobile force of modern ships was sufficient to deter war or pin down enemy forces by the threat the force posed to their movements.

Without air cover, HMS *Prince of Wales* and HMS *Repulse* were sunk on 10 December 1941 by Japanese planes when they sailed out to meet the Japanese invasion force. The Japanese troops invaded the Malay Peninsula and before long, Singapore fell to the Japanese.

The Japanese invasion of Malaya had been so successful because of the speed in which they had gained control of the seas and the airspace above it, and in the process, cut off Malaya's exterior lines of communication. This meant that the British could not have brought reinforcements even if they had wanted to, and that ground forces in Singapore and the other colonial territories in Southeast Asia could not have withstood the onslaught of the Japanese for long.

This chapter in Singapore's history made it clear that keeping its external lines of communication open is essential for its survival. This required Singapore to raise a capable maritime force that possessed strong naval and air power, without which, it could easily be cut-off and choked, as the World War II experience has shown.

THE STRAITS TIMES TUESDAY, JULY 5, 1966 PAGE 7

The bravest, most dangerous and luckless decision made by one man in the face of impossible odds

A rendezvous with death off Kuantan

The tragedy of the Prince of Wales and Repulse

ON the evening of December 8, 1941, the battleship Prince of Wales, the battlecruiser Repulse and four British destroyers left the great Singapore naval base and headed north to intercept a Japanese invasion armada off the east coast of Malaya.

Only 36 hours earlier the assault on Pearl Harbour had set the Pacific ablaze with war. All day Japanese troops had been streaming ashore in the Philippines, Indo-China and northern Malaya.

Before leaving his base Admiral Sir Tom Phillips had urgently appealed for air cover for his two big ships for it was suspected that Japanese bombers were already using captured airfields in Indo-China.

But in Singapore the RAF had only a few squadrons of Brewster Buffaloes, old, short-range fighters on lend-lease from America and hopelessly inadequate against the enemy's modern planes.

As the flotilla passed Changi signal station

The 35,000-ton battleship Prince of Wales had been in service only six months when Japanese aerial bombs blasted her to the bottom.

World War I and belonged to the vanishing race of battle-cruisers in which weight of armour was sacrificed for additional speed.

She was about five knots faster than the flagship and 10,000 tons lighter. Her armour was thinner and though she had been modernised in 1932, her ack-ack defences were much fewer and partly obsolete.

Between them the two ships carried more than

operator in the Prince of Wales reported the first stream of approaching aircraft.

Ten minutes later every ack-ack gun in the British ships was chattering and pounding in a crescendo of fury.

Sailing through the grey shell-bursts the Mitsubishis concentrated on the Repulse. Two bombs crashed through her forward deck, causing fires and

into the sea by the force of the explosions.

Leaving the dying battleship the torpedo bombers wheeled round, their wingtips almost touching the water, and thundered in towards the Repulse. The destroyers were entirely ignored.

Hit again and again the Repulse almost vanished in towering clouds of spray

and smoke. A blast in the stern jammed her rudders. Another ripped into the engineroom. The ship lurched sickeningly to port until water foamed along her quarter-deck.

Just before 12.30 the calm voice of Captain Tennant sounded over the loudspeaker system: "Abandon ship, and may God be with you all!"

Up from below the men streamed, many of them wounded, dazed and blackened with smoke and oil. Hundreds flung themselves into the sea without waiting to cut loose the rafts and floats.

At 12.33 p.m. the Repulse rolled over on her side and sank. With her went 513 of her crew, most of them already casualties from the murderous hammering of bombs and torpedoes.

Survivors from the Prince of Wales clamber aboard the destroyer HMS Express. Soon after, the great battleship heeled to port and sank.

Agony

While the Vampire and the Electra concentrated on picking up survivors from the Repulse the remaining destroyer, the Express, daringly ran alongside the sinking Prince of Wales to take off as many of her crew as possible.

By now the Japanese had gone. For nearly an hour the seamen of the battleship jumped or hauled themselves by ropes on to the destroyer's deck until about 1,000 men had been transferred.

Only when the Prince of Wales had listed so far that her bilge keel showed above the water did the

STRAITS TIMES Special Feature

Express back away. At 1.20 p.m. the battleship went down, and Admiral Sir Tom Phillips died with his ship.

Her agony was just ending when Flight - Lieut. Vigors led his Brewsters over the scene. The sky was empty of enemy planes. Only the bobbing heads and scum-coated wreckage in the water told of the battle that had been fought.

As Vigors flew low over the water he saw some men cheerily giving him the thumbs-up sign. He also saw others shaking their fists—for many embittered sailors of the Prince of Wales and Repulse were asking "Where was the — air force all the — time?"

Clockwise from above: A report in *The Straits Times* on 5 July 1966 on the sinking of HMS *Prince of Wales* and HMS *Repulse* by the Japanese in 1941. Picture: Singapore Press Holdings

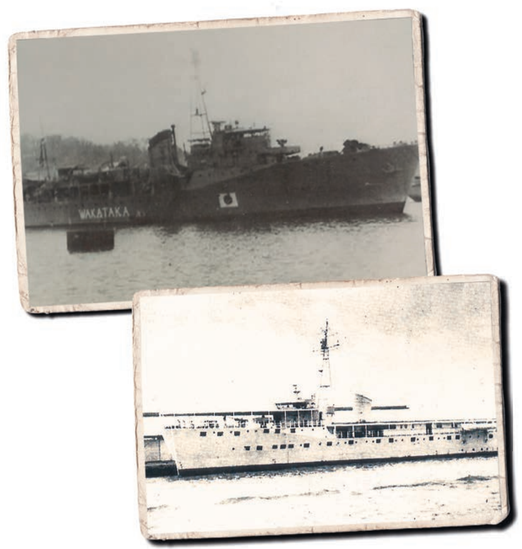
The insignia of the Malayan Royal Navy Volunteer Reserve.

The seized Japanese minelayer (above) was first named HMS *Laburnum*. It was renamed KD *Singapura* and then RSS *Singapura*.

Pictures: Courtesy of Adrian Villanueva

POSTWAR DEVELOPMENTS

The Straits Settlements were dissolved in 1954. The naval volunteer force was renamed the Malayan Royal Naval Volunteer Reserve. To replace its first headquarters ship that had been sunk during the war, the Singapore Division was given a seized Japanese minelayer, which also adopted the name, HMS *Laburnum*. This would later be re-christened Kapal di-Raja (KD, His Majesty's Ship in Malay) *Singapura*, and subsequently Republic of Singapore Ship (RSS) *Singapura*, and would remain as the headquarters ship of the Navy until 1968. The Singapore Division also recruited its first batch of women personnel in 1956, who became radar plotters, communication



specialists and administrative assistants under the Singapore Women's Auxiliary Naval Service or SWANS. It comprised four officers and 50 to 70 ratings, many of whom went on to serve in other parts of the Singapore Armed Forces (SAF) after independence.

In 1963, when Singapore joined the Federation of Malaysia, the volunteer reserve was renamed the Royal Malaysian Naval Volunteer Reserve (Singapore Division). When Indonesia launched Konfrontasi (Confrontation) – armed attacks aimed at destabilising the federation – between 1963 and 1966, the volunteer force defended Singapore against the sea intrusion of Indonesian marine commandos. Some 170 reserve officers and ratings were mobilised into active service. With Indonesian troops regularly attempting armed incursions from the sea, it became apparent that Singapore's seaward defence was essential. The volunteer reserve then became the Singapore Naval Volunteer Force after the separation of Singapore from Malaysia on 9 August 1965. Based in its headquarters ship, RSS *Singapura*, in Telok Ayer Basin, it initially had only two wooden naval ships – RSS *Panglima* and RSS *Bedok* – to undertake the considerable task of ensuring Singapore's seaward defence. The race was on to build up a Navy almost from scratch.

Singapore may not have had a full-fledged navy before its independence, but its pioneer naval defenders were no less indomitable, courageous and dedicated. Today, the Navy carries on the tradition of its forebears – to protect its maritime nation and contribute to the stability of its maritime region, so that both nation and region can continue to enjoy peace and prosperity.

The SWANS bade farewell to Captain A. C. D. Leach, CO of the Royal Malaysian Naval Volunteer Reserve (Singapore Division), in a parade on 28 November 1967. Picture: Courtesy of Mrs Judy Kong

AVERAGE DAILY CERTIFIED SALE EXCEEDS 135,000

The Straits Times

Estd. 1845. THURSDAY, MARCH 11, 1965 ★ 15 CENTS KDN 1189 1965

At least 33 injured—in the building and on the road

TERROR BOMB KILLS 2 GIRLS at BANK

New base to step up war on border Reds

By ARTHUR RICHARDS

KUALA LUMPUR, Wed. — A joint Malaysia-Thai military base will be set up at Sungkhla, a holiday resort about 600 miles from Bangkok, this month to intensify the war against the remaining 500 Communist terrorists on the border.

This was announced today by the Thai Deputy Defence Minister and chairman of the Joint Chiefs of Staff of the National Security Council, Field Marshal Dato Bunny Chitkasem, on his arrival here for the final round of border talks between the two countries.

'Piece enemy'

Dato Bunny was accompanied by the deputy to the Thai Chiefs of Staff, Lt.-Gen. Kriangsak Chamanand, and a 15-man delegation.

The talks will culminate in the signing of the Thai-Malaysian border pact agreement on Saturday at 3 p.m.

Dato Bunny told reporters: "The war against the Communist terrorists must go on.

"Thailand and Malaysia are determined to eject the enemy from our common frontiers.

"I don't say how serious the Communist threat is, but you can never forecast what the Communists will do. We have to keep a good watch to meet any challenge."

★ See Back Page, Col. 7

SINGAPORE, Wednesday

A BOMB explosion killed two office girls in the Hongkong and Shanghai Bank building known as Macdonald House in Orchard Road here this afternoon. At least 33 other people were injured.

The extent of the damage on the mezzanine floor of the 10-storey building made it a simple matter to determine where the bomb was placed —near the lift.

An inner wall at this level was blasted inwards and collapsed in a mass of rubble into the bank on the ground floor.

Windows shattered

Killed immediately were Mrs. Suzie Choo, 30, private secretary to the Bank Manager, and Miss Juliet Goh, 23, a filing clerk in the bank.

Many others—in the bank and on the road—fell like ninepins, many seriously injured.

Every window within a hundred yards was shattered, and almost every car immediately outside the building and across the road was damaged.

An Australian Trade Commission station wagon, parked near the entrance was flung on the road divider.

[The offices of the Australian High Commission are immediately above the mezzanine floor.]

Passing cars pulled to a halt. A taxi-driver and his two passengers were injured.

But there was no panic. Swiftly the road was cleared. Ambulances and fire engines rolled in.

The full extent of the tragedy began to unfold only as the dead and the injured were carried out.

Two buried

The bomb exploded at 3.07 p.m. — just eight minutes before the Weaver Brothers' motor mechanics were due to gather by the side of the building for their tea break.

It is not yet known if the bomb had a timing device.

The explosion ripped off a lift shaft — but it was one of the inner walls on the mezzanine floor that took the full force of the blast.

On the other side of this wall was the correspondence office of the bank, in which Mrs. Choo and Miss Goh were working. Both were buried by rubble.

★ See Back Page, Col. One

IN RAIN, ambulance attendants carry out a victim of the explosion.

A DOCTOR'S nurse renders first aid to a man injured by glass splinters. He was later admitted to the General Hospital.

—STRAITS TIMES PICTURES BY KOK AH CHONG

David 'Food wasn't bad at all' is freed

Copter crash

STOP PRESS

TWO ON DANGEROUSLY RA LIST

SINGAPORE, Wed. —

STOKVIS REFRIGERATORS MADE IN ITALY

NEW! 1965

ESSO GAS COSTS SO LITTLE

A CYLINDER LASTS AN AVERAGE FAMILY ONE MONTH

THE DIFFERENCE IN COOKING COMES FROM ESSO GAS

GO MODERN . . . COOK WITH ESSO GAS

THORENS "THE ROLLS-ROYCE" AMONGST TRANSCRIPTION TURNTABLES

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DAH SIM OPTICAL HOUSE

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Above: RSS *Panglima* in the 1980s.

Left: Reported in *The Straits Times* on 11 March 1965, the bombing of the Hong Kong and Shanghai Bank building, also known as MacDonald House, on Orchard Road, was the deadliest of at least 42 bombings during Indonesia's Confrontation with Malaysia and Singapore. Picture: Singapore Press Holdings

ACTION ON THE FRONT LINE

Major (Retired) Roland Vivian Simon, 84, served in the Navy from when it was the Singapore Division of the Malayan Royal Navy Volunteer Reserve till he retired from the RSN in 1987. He recalled his experiences during and after Konfrontasi.

Three defining moments of my naval career are forever etched into my memory.

In 1965, I was in command of the minesweeper, KD *Lanka Suka*, when it received a signal to assist KD *Panglima* off Sultan Shoal Lighthouse, near Jurong Island. Two Indonesian customs boats had ignored warnings and intruded into Singapore territorial waters. When KD *Panglima* fired a warning shot, they left, only to return with a third customs boat and two *Komar*-class motor torpedo boats.

Lieutenant (LTA) Andy Miller, Commanding Officer (CO) of KD *Panglima*, and I came up with a battle plan. He would concentrate on the three customs boats while I would handle the other two. I informed the Navy headquarters (HQ) about our plan and called for reinforcements. We were on standby to evade any torpedoes for a tense seven minutes, until four aircraft from the Royal Air Force and Royal Australian Air Force flew over from Tengah Air Base, and a British frigate approached us from the direction of Pulau Pisang, Malaysia. The five boats immediately headed for Karimun Island.

When the frigate arrived, I briefed its captain, who commended us for our bravery. Unaware that the motor torpedo boats were unarmed, we had hoped for the best and were prepared for the worst. I remember telling Miller that we might not survive – but we did. We stood up to their challenge, unwittingly called their bluff and emerged unscathed, thanks to our reinforcements.

In 1966, KD *Lanka Suka* spotted an Indonesian customs boat alongside a Malaysian police patrol boat off Pontian, Malaysia. I signalled to the customs boat to leave, or we would shoot. However, the boat lingered. When its crew scrambled towards its 12.7mm gun, I ordered one round to be fired across its bow from our 40mm Bofors gun. Thereafter, it sped off – I had never seen a customs boat move so fast – black smoke billowing from its exhaust pipe, towards Brothers Island off Sumatra, Indonesia.

In 1967, I was in command of RSS *Panglima*, which was patrolling off Pulau Senang when gunfire was heard. Near Sultan Shoal, an Indonesian customs boat was firing at a large *tongkang* (bumboat) with automatic weapons. We went full speed to the rescue. When we came within range, I told my Executive Officer, LTA Ng Kim Yam, to fire our starboard Bren gun at the wheelhouse and radar scanner of the customs boat. It retreated. I reported the incident to HQ before inspecting the *tongkang*. The helmsman had been shot dead by the customs boat. An old man knelt down and begged me not to shoot him. He burst into tears when we gave him coffee and reassured him that everything was all right.

When RSS *Panglima* went for its scheduled maintenance a year later, guess which ship was at the next slipway? It was the customs boat, with bullet holes all over its wheelhouse and radar scanner. When our new crew members asked what had happened, its crew members replied: "Don't you remember? You shot at us!" They said it was a good thing we didn't use our Bofors gun or we would have sunk their boat that day.

MAJ (RET) Roland Simon at the Remembrance Day Service at Kranji War Memorial on 13 November 2016.

BEING A GOOD OFFICER, RESERVE OR REGULAR

Semi-retired business consultant Adrian Villanueva, 76, was a Reserve Officer in the Malayan Royal Naval Volunteer Reserve and the Royal Malaysian Navy Volunteer Reserve. He later served as a Senior Military Research Officer and Branch Head in the Ministry of Interior and Defence before leaving for the private sector in 1971. He shared his experiences of being mobilised during Konfrontasi.

Mr Adrian Villanueva as a young Sub-Lieutenant circa 1964. Picture: Courtesy of Mr Adrian Villanueva

I was very active as an army cadet in school. When I left school, I joined the Singapore Royal Artillery Volunteers as a recruit. I was asked to be an officer cadet, but even though I came in fifth in the course in 1959, I was not commissioned because I was said to be too young. The CO said: "I give you one year, you come back." But I just saluted and walked out.

Then I applied to the Malayan Royal Naval Volunteer Reserve, which took me in. At that time, I wanted to join the Royal Navy as a regular, but there was no chance – they were only interested in recruiting reserves from the locals. However, I had the opportunity to do active service when I was one of the officers mobilised to serve in the Tawau Assault Group during Konfrontasi.

The first time I was deployed to the front line, I was very confident. My fiancée, who is now my wife, thought I was crazy. I went out to sea and the Indonesian commandos shot at my position. I asked the senior officer: "What would happen if a mortar shell drops in the middle of my boat?" He replied: "We'd die, of course!"

So out came my rosary and pistol; I couldn't sleep much for a month! I told my sailors: "You better make sure your weapons are well maintained!" I kept my pistol and my Sterling by my side at all times.

After one month, I got used to it. My wife later said: "If I knew what you did (was so risky), I would probably not have married you." But I loved the excitement.

Once, we were told by the Senior Officer of the Tawau Assault Group to patrol the border. My sailors were very scared; they were 19-, 20-year-olds. Through the binoculars, you could see the Indonesian commandos in prone position, waiting for us. One wrong move and they would have blasted us out of the water. I told the sailors: "I am going to man the Oerlikon. Do you want to die from their gunfire or do you want to die from my pistol? Because that is cowardice." I had to lead from the front.

As Gunnery Officer, I would make sure that all the guns were oiled properly. My CO, Lieutenant Commander Hamish Mcgowall of the Royal Australian Navy, seconded to the Royal Navy, said: "Forget about the 'R' (referring to the insignia for a Reserve Officer), as far as I am concerned, you are the same as all the rest. I expect you to be an exceptional Gunnery Officer."

So I grew into the responsibility, and till today, I believe that duty is duty, absolutely no nonsense.

At the end of the day, I was driven by my love of serving, pride in the unit and great mutual respect between my peers and me.

For his contributions during Konfrontasi, Mr Adrian Villanueva was awarded medals by the British, Malayan and Singapore Armed Forces, which he still wore in October 2011. Picture: Courtesy of Mr Adrian Villanueva

THE SWANS OF *SINGAPURA*

Mrs Judy Kong (third from right) and other members of the SWANS at Telok Ayer Basin in 1965. Picture: Courtesy of Mrs Judy Kong

The original RSS *Singapura* was a seized Japanese minelayer that was deemed unseaworthy and modified into the headquarters of the Singapore Naval Volunteer Force. The RSN is privileged to have the President of the Republic of Singapore name Changi Naval Base as RSS *Singapura* – Changi Naval Base, after the ship, during the International Maritime Review on 15 May 2017. Mrs Judy Kong, 69, Ms Jessie Lau, 77, and Ms Iris Ng, 75, former members of the Singapore Women's Auxiliary Naval Service (SWANS), comprising female naval volunteers, recounted their training and life on board the original headquarters ship.

Ms Lau: I joined the SWANS after my classmate, Mabel, did so and invited me along, saying that I would learn something new and that it would be interesting. I was curious, and so I gave it it a shot. I was taught to swim and to use the Morse code and flags. There was so much to learn!

Ms Ng: I was attracted to the chance to travel with the SWANS after seeing its newspaper advertisement, not realising that it was a military organisation. During Konfrontasi, I was one of the few SWANS deployed to KD *Malaya* in Woodlands, as a telephone operator, while the men who used to do the job were deployed to sea. I recall being excited; I was young and had not known that it was a matter of life and death.

Mrs Kong: In August 1964, I turned 17 and joined the SWANS, after hearing about it from a classmate's sister, who was a member. I felt that it was some way that I could contribute to Singapore, which was facing political instability from the threat of communism and unemployment from the impending withdrawal of the British.

We held day jobs, and trained for three hours in the evenings, twice a week on board RSS *Singapura*. At around 5pm, a truck would drive us from the gate of Telok Ayer Basin to the ship berthed at the jetty. We would march up its gangway, salute and go to our classroom. Its porthole offered a breathtaking view of all the ships in the harbour. Occasionally, we would visit the other parts of the ship as part of our training, such as observing what the engineers did in the engine room. The occasional weekend training was fun! The excellent cook on board would also provide us with delicious food.

The members of the SWANS during their annual shoot at Rifle Range Road, circa 1966. Picture: Courtesy of Mrs Judy Kong

Our First Officer, Barbara McIntyre, had been seconded from the Women's Royal Naval Service in the Royal Navy, after which the SWANS was modelled. She was prim and proper, setting the tone for the SWANS. When she appeared, we became more serious and sat straighter.

We participated in social and sporting activities too, including an annual sports competition between the Singapore and Malayan Divisions of the Royal Malaysian Navy. We held our annual dinner and dance, the SWANS anniversary celebration and Christmas parties for underprivileged children at warehouses in the basin.

We were keenly aware of the need to defend the nation because no one else would do it for us. We went through a time when the history of Singapore was being shaped; from a British colony to an independent nation. We are part of Singapore's history. The kinship from having been on RSS *Singapura* together is still there even today. I'm heartened that its name will live on in RSS *Singapura* – Changi Naval Base. I hope that it will remind the men and women of the RSN of their responsibility to defend Singapore.

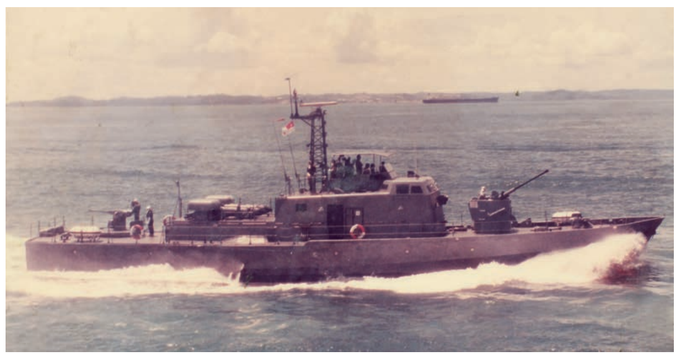
Naval volunteers, including (from left to right) Ms Iris Ng, Mrs Judy Kong and Ms Jessie Lau, would board ramp powered lighters at the Jardine Steps, behind Vivocity, to go to Pulau Blakang Mati (now Sentosa) for training.

THE EARLY DAYS – THE NAVY IN THE LATE 1960s AND 1970s

On 5 May 1967, the white-and-red Singapore Naval Ensign was hoisted for the first time in Telok Ayer Basin, and thus, Singapore's Navy was born. Finally, the nation's sailors would serve under its own flag rather than as volunteers under another's. The ceremony was a grand affair, with the whole Navy standing proudly on parade.

Addressing the Navy's pioneers, Commander Jaswant Singh Gill, Executive Officer of the Singapore Naval Volunteer Force, said: "This white ensign is the outward sign of our existence as a naval force… remember that its reputation is in your hands, and resolve to do your best to ensure that it will be regarded with honour and respect wherever it flies."

The pioneers had the herculean task of building a Navy from scratch. With memories of Konfrontasi and World War II fresh in the minds of Singaporeans, security was the young nation's utmost priority. Despite the magnitude of the task, the pioneers went about with gusto to lay the foundations for the RSN of today.



The Navy acquired the *Independence*-class patrol craft in 1969.

Recognising that maintaining Singapore's seaward defence with only two wooden ships was impossible, the Navy expanded its capabilities rapidly, acquiring the *Independence*-class patrol craft in 1969 and the missile gunboats in 1972.

The missile gunboats, though small, were equipped with the latest sensors and weapons; these 'pocket battleships' packed a punch that could rival that of much larger warships. In 1974, RSS *Sea Wolf* successfully conducted the first Gabriel missile firing, and with this, the Maritime Command (as the Navy was then called) became the first Navy in this region to successfully fire an anti-ship missile.

When duty called, the Navy answered. Its first test came in 1974. The Japanese Red Army and Popular Front for the Liberation of Palestine attacked the Shell oil refinery complex on Pulau Bukom to disrupt the oil supply from Singapore to other areas, especially South Vietnam. The four terrorists, two from each terrorist group, attempted to escape by hijacking the ferry, *Laju*, at the jetty. The ferry was surrounded by naval and Marine Police vessels, and the terrorists' escape was foiled. The incident underscored the need for a robust capability to enforce Singapore's maritime security.

By 1975, the Navy had rapidly moved out of its infancy. The time

In 1974, the Navy became the first in the region to successfully fire an anti-ship missile, after RSS *Sea Wolf*'s Gabriel missile firing.

Navy and Marine Police vessels effecting a cordon around the hijacked ferry, *Laju*, in 1974.

had come to give it due recognition. In April 1975, the Maritime Command was renamed the Republic of Singapore Navy (RSN) – one of the three services that made up the SAF.

The early years of the Navy were promising and the future seemed bright. However, dark clouds were gathering over the horizon.

In May 1975, South Vietnam fell to communist forces, marking the end of the Vietnam War and triggering a massive exodus of 'boat people' via the sea.

Under Operation Thunderstorm launched by the Singapore Government, the RSN's medical personnel worked with the Army to set up and man quarantine areas for the 'boat people' and an SAF Field Hospital at Bedok Jetty to provide medical aid to them. RSN ships patrolled Singapore waters to render assistance to the 'boat people', providing them with food, fuel and water for their journey to other areas.

Although the operation itself lasted only 13 days, the Navy was tasked to continue with surveillance patrols right through to the early 1980s as the boats continued to trickle in. The high operational tempo stretched the RSN to breaking point. All of its ships were tasked for these patrols and could spend 13 to 15 days at sea every month, on top of their routine harbour duties.

Everything outside of the patrols was set aside – there was no time for training, maintenance or doctrine development.

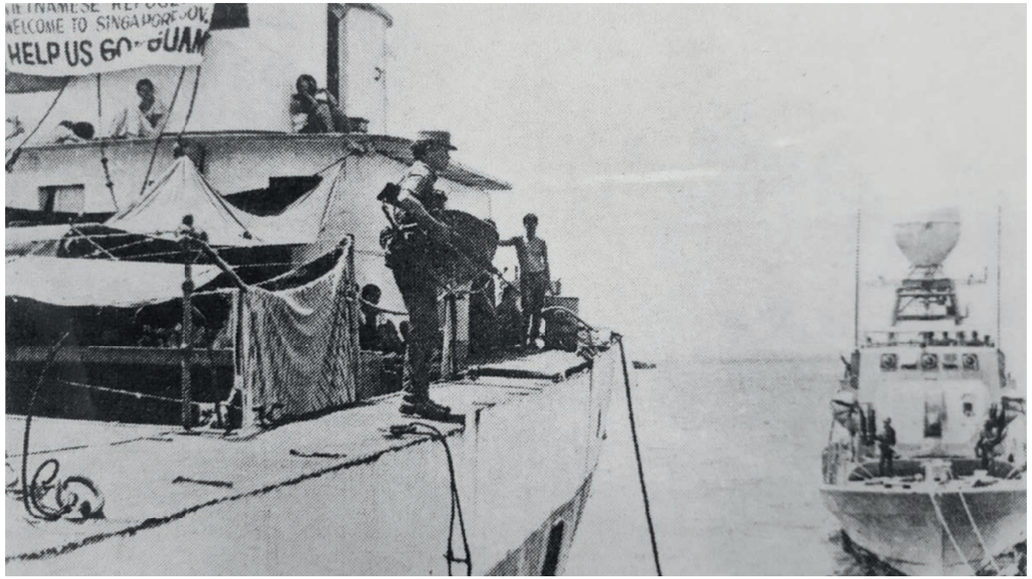
The RSN was rapidly wearing down its ships. Because of operational needs, ships were often put out to sea in a barely functional state. As a result, professionalism slipped and readiness levels dropped drastically.

At the same time, the Navy faced difficulties in defining its strategic role. The RSN seemed to be preoccupied only with constabulary duties. Consequently, the operational utility of the Navy was in serious question. Morale fell. Many good people left.

Despite this, some excellent leaders stayed and remained true to the cause, executing their tasks professionally and motivating their men and women to press on. Through this tough period, the persistence and dedication of its people made the difference. Much like how Singapore's separation from Malaysia resulted in Singaporeans banding together, the RSN's trying circumstances through Operation Thunderstorm helped to forge a stronger Navy Spirit among those who remained. They counted on one another to tide them over the difficult times.

Rear Admiral (Retired) James Leo reflected that the early struggles of the Navy strengthened its leadership and built enduring camaraderie within the service. With the chips stacked against it, the Navy looked inwards for strength. RADM (RET) Leo said: "The commanders saw the importance of discussing issues at hand with those under their charge. That was how we made known to one another our expectations, built openness and trust, and forged ahead. This truly set us apart and saw us through our toughest times."

Because of those who did not lose heart and persisted through the challenging times to turn things around, the RSN was able to regain its footing and get back on track in the 1980s.



The end of the Vietnam War in May 1975 triggered an exodus of 'boat people' via the sea. The Navy was tasked to carry out surveillance patrols of Singapore waters right through to the early 1980s as the boats continued to trickle in.

EXPERIENCE WAS THE MASTER TEACHER

Lieutenant Colonel (Retired) T. D. Namasevayam S/O T. M. Doraisamy, 66, joined the Navy in April 1971. He has held command of *Independence*-class patrol craft RSS *Freedom*, missile gunboat RSS *Sea Hawk*, *County*-class landing ship tank RSS *Persistence*, as well as the patrol craft squadron, coastal patrol craft squadron, minesweeper squadron and civil resource squadron. Having retired from uniformed service, he is now a Defence Executive Officer in the Navy.

When I was first posted on to the *County*-class landing ship tank, RSS *Endurance*, as a Midshipman in 1972, there was no taskbook, no training structure. The training was ad hoc; we were assistants to the officers, shadowing them and picking up scraps of knowledge along the way. They'd ask us to do tasks that we could chalk up to our professional experience – maybe trace that pipeline or study the ballast system, and that's how we learnt about the ship. And slowly they'd give us some coaching and opportunities to practise driving the ship. And that was how we learnt the ropes.

For 10 months, I was also the Coxswain of the port landing craft, which ran the ferry service to shore for the ship that was anchored off Sembawang. Once, we drove the craft all the way to Pulau Brani to collect rice. On the way back, the battery of our portable radio failed. Then, the engine deteriorated. A couple of hours after we were supposed to reach the ship, we beached at Changi just to call to say that we were safe and heading back. Some guys on the ship were frantic with worry. When we arrived, it was past 10pm. We still had to unload all the sacks of rice, and crank up, drain and secure the craft. After all that work, I still got my "take 7" – seven days' extra duties for not taking spare batteries and not calling earlier. But we learned from our experiences. Sometimes, we made mistakes, but that sharpened our judgement.

On another occasion in 1979, when I was the Executive Officer on RSS *Resolution*, my CO, MAJ (RET) R. V. Simon, knocked on my door at 2am when we were out at sea. "Come with me, XO, listen." *Squeak squeak squeak*. "Can you find out what's wrong?" I thought: "It's 2am… He wakes me up to tell me this." But I said: "Yes Sir." I called up the Coxswain and the Buffer and we put our ears and fingers to the bulkhead to trace the source of the noise. Finally, after 30 minutes, we found it – the fire mains pipe in the tank deck was grinding against the stringer bracket. It took us another 90 minutes to rig up the staging to reach the 6m-high tank deck and hammer and lash in wedges to secure the pipe. The moment we knocked on the CO's door to report to him, he opened it and said: "Thank you." He had been listening and knew that the noise had stopped.

My CO had just trained me to be a good CO one day. Any number of untoward things could have caused this "little noise". He taught me about responsibility – the weight of command. Senior or junior, experienced or fresh-off-the-boat, we continued to learn; we were trained along the way by the people, ships, environment, circumstances and problems. We improved by trying new things, safely and sensibly. Today, training is more structured and guided; there is a proper system in place. The Navy has come very far from the early days.

Top: Second Lieutenant T. D. Namasevayam served as the Gunnery Officer of patrol craft RSS *Daring* in 1975. **Above:** Captain T. D. Namasevayam, then CO, hosting a visitor on board his ship with his officers. Pictures: Courtesy of LTC (RET) T. D. Namasevayam

LTC (RET) T. D. Namasevayam, a former Naval Officer, now serves as a Defence Executive Officer.

THE PATHS OF THE PIONEERS

When Military Expert 4 (ME4) Lim Kheng Peow, 60, enlisted in the Navy in 1975, its recruitment tagline was: "Join the Navy, see the world." He got his first taste of travelling abroad – and 3m-high waves – sailing on board the *County*-class landing ship tank, RSS *Intrepid*, to Kaohsiung, Taiwan. "I saw thin cracks amidships, and started to worry that the ship might break into two! I remember thinking, did I buy enough insurance?" he chuckled. These ships had much sea time, having served with the United States Navy since World War II before coming into service under the RSN for just a dollar each – "a goodwill price from the US", he revealed.

Besides material fatigue, engineering problems also surfaced. Most of the critical defects were rectified by the crew. ME4 Jaya Sankaran, 56, who was the Main Engine Room In-Charge, recounted how his department rushed to repair the landing ship tank, RSS *Excellence*, when its port engine failed en route to Goa, India: "Besides the challenges of bad sea state and the space constraint, the engines had been running non-stop for four days – it was hot as hell! We worked from 6am to midnight. But we achieved it!"

The crew also took immense pride in their seamanship. They went into 'Do-It-Yourself' mode to make ropes for bell strikers and "all sorts of decorative knots for the gangway", reminisced ME5 Nagara Raja, 58, showing a white, knotted seaman's belt he had made while serving as a weapons specialist on the *Independence*-class patrol craft.

Practising this sailor's craft provided distraction from the cramped living conditions on board the patrol craft. The sailors had to squat along passageways and even on the exposed deck to eat their meals. They had to take turns to use the bunks in the small forward mess. The most unpopular were the first two shorter bunks near the bow of the ship. ME4 Lim, who served as an Electrical Technician on the patrol craft, RSS *Daring*, lamented: "The fore part of the ship would pound, and the bed would go up and down. I always slept there, though." Grinning, ME5 Roger Seow, 62, quipped: "Because you were the shortest man on board!" The upside: no competition for those bunks.

Pioneer sailors, such as (from left to right) ME4 Jaya Sankaran, ME4 Lim Kheng Peow, ME5 Roger Seow, ME5 Michael Chan and ME5 Nagara Raja, helped one another through tough times.

Their missions also caused physical and mental hardship. In the mid-1970s, when Vietnamese 'boat people' were attempting to reach Singapore, the missile gunboat, RSS *Sea Tiger*, once had to stay at sea patrolling for 12 days. This was far longer than the seven days it was designed for. Water had to be rationed as water production on board was limited. Preventing these 'boat people' from entering Singapore was an emotional struggle. ME5 Seow, who was its Chief Radar Plotter, recalled: "We felt great sadness for them. But orders were orders."

The recurring theme: life on board the Navy's earlier platforms was not easy. When asked what kept him going despite tough times, ME5 Seow said: "The people. We always looked after one another. I would have lost so much if I had left." ME5 Michael Chan, 56, remembered how the crew of RSS *Sea Scorpion* helped him rush back from a sortie in the South China Sea after learning that his wife was in labour. "I got to witness the birth of my child because of them," he said, smiling.

Over the years, the ships may have changed – their capabilities and living conditions have improved – but their pioneers' drive, discipline and courage, as well as the Navy Spirit, have endured.

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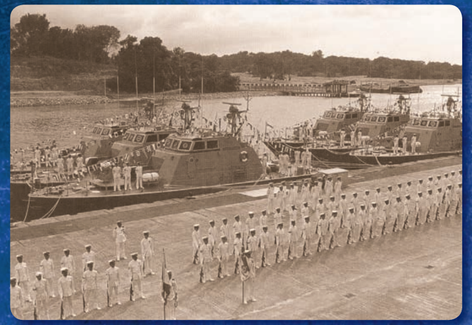

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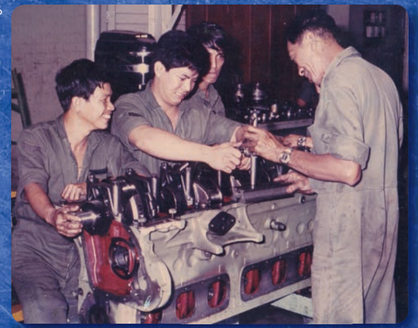


1 Commissioning of the RSN's 12 *Swift*-class coastal patrol craft by Minister for Defence, Mr Howe Yoon Chong, on 20 October 1981.

2 Boarding the bumboat from Jardine Steps. Before the Brani Causeway was built, one could either take the ramp powered lighter, ferry or bumboat to go to Brani Naval Base.

3 An engineer at the Naval Support Base tracking the maintenance schedule of the Fleet.

4 Firemen from the Navy's Fire Safety Branch unrolling their fire hoses as part of their gear checks.

5 Chief of Navy, RADM Teo Chee Hean, and the Navy's men and women taking part in the Navy's 25th anniversary jog around Brani Naval Base in 1992.

6 Trainees attending a lesson in engine-top overhauling at the Naval Technical Training School.

LIFE IN BRANI

Brani Naval Base on Pulau Brani was opened by the founding Prime Minister, Mr Lee Kuan Yew, on 26 January 1974. It was chosen because of its ideal location right opposite the harbour. It was home to the RSN for 26 years until it closed on 12 October 2000. Chief of Navy, RADM Lui Tuck Yew, said at the closing of Brani Naval Base:

"The history of Brani Naval Base is synonymous with the history of the Navy's early years. And the history of Brani is replete with tales of heroism that have assumed legendary status. Thinking back to the time I have spent here, three sets of values stand out – the passion our people have in their work, the fighting spirit we displayed in the midst of great adversity and the common bonds we share as a Navy Family. We must cherish these time-tested traditions and values and make sure that we imbue them in each succeeding generation wearing the Navy uniform."

THE RSN'S 'EUREKA' MOMENT

Peter Ho

In the early 1980s, resources were tight, even for the Ministry of Defence (MINDEF), which commanded a large chunk of the government budget. In those days, defence took by far the largest slice at about 6.5 per cent of GDP. But Singapore's economy was very much smaller than what it is today. So with a budget that was modest relative to the need to build up the SAF into a capable deterrent force, Minister for Defence Howe Yoon Chong, a tough and tough-minded minister who was once the Head of the Civil Service, decided that absolute priority must be given to building the Air Force. The Army and the Navy would mop up the leftovers.

Minister for Defence, Mr Howe Yoon Chong (centre), officiated at the commissioning of 12 coastal patrol craft at Brani Naval Base on 20 October 1981. He was accompanied by Commander of the RSN, COL Khoo Eng An (right). Picture: Singapore Press Holdings

The Navy, straining under the burden of operations to look out for Vietnamese 'boat people', felt that it was amply justified to get more funds to acquire more and new ships. Then a staff officer in Naval HQ, I recall the Navy trying to argue for three more missile gunboats, which were upgraded versions of the existing 45m Lürssen-Werft missile gunboats (their hull forms were based on German motor-torpedo boats whose antecedents go back to even before the First World War), and to equip them with Harpoon missiles, which would be new to the RSN inventory. Initiated in 1978 and ominously code-named Albatross, the project progressed through the system slowly and painfully.

Mr Howe was resolute. With withering logic, he dismissed the need for Project Albatross, because the money would be better spent on getting the Air Force a squadron of F-16s, which would be able to perform more strategic roles than the missile gunboats could ever hope to do. And when the Navy persisted, his dismissive response was that he was prepared to buy a few barges, mount 20mm Oerlikon guns on them, and hire a few tug boats to tow them around to patrol Singapore's waters. Nothing we could say, no argument we could make, would move Mr Howe. He was unshakeable in his determination to build up the Air Force, which he saw as critical to the defence of Singapore.

Not surprisingly, this period saw a very demoralised Navy, worn down by the unceasing operational demands of patrols, and bereft of even the possibility of upgrading the Navy beyond its small and modest fleet.

That was the mood of despondency when I became Head of Naval Plans Department in 1983. So in a way, there were no plans to make, and certainly none to implement, as we were not going to get any budget to do anything transformative or of significance.

When you are in that situation, you either mope, or you start to think and to think hard, as I did. This parlous situation goaded me into thinking hard about what the Navy's mission really was. Was it just about patrolling Singapore's waters or dealing with Vietnamese boat people? Or was it something else? It did seem to me then that one of the reasons for the failure of Project Albatross was the lack of a clear strategic mission for the Navy, and as a result, it had been relegated to a default role of patrolling Singapore's waters. In a way, I was already dimly beginning to acknowledge what Mr Howe must have seen with blinding clarity – that the Navy, in just conducting patrols and transporting equipment for the SAF to overseas training areas, was neither strategic nor critical in the defence of Singapore.

The 'eureka' moment came one day when I was looking at Singapore's trade statistics, hardly a pot-boiler. I discovered that its trade-dependency ratio in the 1980s was about 4. In other words, the value of its trade was four times the size of its GDP. Today it is about 3.5. Obviously, as it is an island nation, most of its trade would come by sea. The shipping routes carried not just Singapore's trade, but equally important, its energy needs and its food. These sea lines of communication were literally Singapore's lifelines, and so, the Navy's strategic mission should be protecting them.

With this insight – that with the benefit of hindsight now looks so obvious – we started working on a total strategic makeover of the Navy. The first step was to write a paper that laid out the arguments for the Navy's new strategic role in the protection of the sea lines of communication. This transformed the Navy, because for the first time, there was clarity of its strategic role, one that was recognised as vital to Singapore's survival and security. MINDEF accepted – even embraced – this role. As a consequence, it soon allocated a larger budget to the Navy. In December 1984, a decision was made to upgrade the entire 185 Squadron of missile gunboats by including a full electronic warfare suite, and installing Harpoon missiles in addition to the existing Gabriel missile system. Five months later, approval came through for a new squadron of 62m-long missile corvettes, which would even have an anti-submarine capability. The Navy had entered a golden era. Reflecting this bounce in optimism, there was even a tagline, "Building Tomorrow's Navy Today".

By 1979, the Port of Singapore had become the third biggest port in the world. Picture: Singapore Press Holdings

What did I learn from this turnaround of Navy fortunes? First, never give up, even in the face of apparently insuperable odds, like when the minister says "no". I learnt that persistence is an essential quality of any planner and policymaker. I also learnt that decision-makers – at least in Singapore – do keep an open mind. But it is important that the right arguments are pitched at them. These arguments must invariably be strategic. Second, it is always worthwhile to spend time reflecting, and thinking, especially strategically. When you are able to align plans and policies within a larger national strategic framework, then their odds of passing muster improve.

I also took away a lesson from this period that I have never forgotten. I learnt to eschew the inclination to equal misery, which is a cop-out from taking hard decisions. As the Minister for Defence, Mr Howe was right to establish priorities for the defence of Singapore. When resources were limited, as they certainly were in those days, he decided that the Air Force should get the priority and the lion's share of the defence budget, above the rest. I am now persuaded that if he had succumbed to the ideology of equal misery, and instead pursued an approach of trying to make each service happy, we would not have the 3rd Generation SAF that we have today.

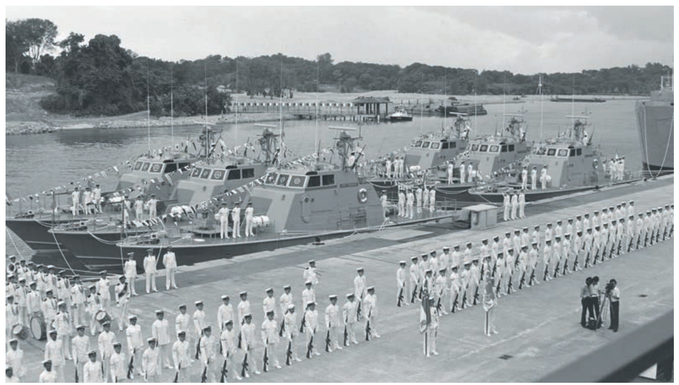
After serving as a naval officer and holding various command and staff appointments in the SAF, **Peter Ho** was transferred to the Singapore Administrative Service in 1989. From then, he served first as Deputy Secretary in MINDEF and the Ministry of Foreign Affairs, and then as Permanent Secretary in both ministries. When he retired from the service in 2010, he had been concurrently Head of Civil Service and Permanent Secretary for Foreign Affairs, for National Security and Intelligence Coordination in the Prime Minister's Office (PMO), and for Special Duties in the PMO.

BUILDING A BALANCED NAVY – THE RSN IN THE 1980s AND 1990s

With renewed clarity of purpose, the RSN trimmed its sails and set about a new direction – to become the maritime force that could defend not only the waters of Singapore, but also keep its economic lifelines open. Operation Thunderstorm and the subsequent patrols had stretched the RSN to its operational limits, leaving no capacity to hone its war-fighting edge. If the fleet were to become a credible maritime force, it urgently needed to regain and develop its war-fighting abilities.

SHARPENING THE WAR-FIGHTING EDGE

In 1981, the RSN commissioned 12 coastal patrol craft. Quickly becoming the RSN's patrolling workhorse guarding the Singapore Strait on a 24/7 basis, the coastal patrol craft relieved the missile gunboats of their patrolling duties, allowing them to refocus on their strike capability. Upgrades to the missile gunboats were made in the form of Harpoon missiles



Commissioning ceremony of 12 coastal patrol craft on 20 October 1981. Picture: Singapore Press Holdings

The missile gunboat was upgraded in the 1980s with Harpoon missiles and electronic warfare systems.

and the electronic warfare systems, to increase their striking range and survivability. More significant were the installation of action-information and data-link systems, which allowed the ships to establish and share tactical plots at sea. Although the technology was nascent and connectivity at that time was limited and sometimes patchy, they marked the RSN's first foray into tactical picture compilation and fighting cohesively as a force at sea.

But to win at sea, the RSN first needed to develop its own tactics and doctrines, and learn to fight with the ships it had. The first Tactical Training Centre at Brani Naval Base was built in 1980 to hone tactical acumen in its warfare officers. War-gaming at the shore-based tactical trainer also helped the RSN to identify the gaps in its existing capabilities to formulate plans on future capability buys. The Fleet also embarked on fortnightly warfare exercises and set up doctrine development groups in the various domains of warfare.

In the mid-1980s, the RSN further expanded its strike capability with the purchase of six missile corvettes. Compared to the missile gunboats, the missile corvettes were equipped with better sensors, as well as action-information and command and control systems. These meant that the missile corvettes could see farther and higher, and exercise command and control over a larger area. Its lightweight torpedo and variable-depth sonar, while nascent, provided the RSN with means to deal with submarine threats. The Barak anti-missile missile, added in 1996, enabled point defence against air threats. With this upgrade, the missile corvette became the first RSN platform capable of fighting in all three dimensions – air, surface and underwater. Less apparent though, was the missile corvettes' role in seeding the RSN's subsequent growth in the underwater and air

The *Victory*-class missile corvettes with their anti-air, anti-surface and anti-submarine warfare capabilities marked the RSN's foray into three-dimensional warfare.

domains with the frigate project. The early investment made in the missile corvettes laid strong foundations upon which the RSN built and honed its anti-submarine and anti-air warfare capabilities.

Winning at sea requires ships to work hand-in-hand with aircraft. Ships without aircraft cannot see as far and wide; aircraft without ships have limited 'bite' and endurance. Complementing the surface strike platforms were advances in maritime air operations. The RSN deployed personnel to the Republic of Singapore Air Force's (RSAF) 121 Squadron, which operated the Skyvans. This marked the first of many Navy and Air Force collaborations. The Skyvans provided the ships with rudimentary maritime air surveillance. In 1993, the Navy replaced the Skyvans with the Fokker-50 maritime patrol aircraft. The Fokker-50s had better sensors and expanded surveillance coverage. Capable of being armed with Harpoon missiles themselves, they significantly increased the surface fleet's area of influence at sea by allowing the ships to fully exploit their long-range Harpoon missiles.

The final acquisition of this period came in the form of the *Challenger*-class submarines. A small crew of RSN sailors was sent to Sweden in 1996 to learn the ropes of operating submarines. Armed with heavyweight torpedoes, the submarines are equipped to strike a lethal blow to the enemy's surface fleet. Their stealthy nature also

Left: The Fokker-50 displaying both the RSN and RSAF crests, symbolising the close integration between the two services to achieve mission success.

Above: A Barak missile being fired from the missile corvette, RSS *Victory*.

Left: The *Bedok*-class mine countermeasure vessels are equipped with mine disposal vehicles capable of detecting, locating, identifying and destroying modern sea mines. **Right:** The acquisition of the *Challenger*-class submarine in 1996 gave the RSN a newfound ability to operate in the underwater dimension.

makes them difficult to locate, and compels the enemy to dedicate disproportionate resources to do so. With the newfound ability to operate in the underwater dimension, the RSN now possessed a greater range of strategic and operational options to enforce the security of its sea lines of communication.

SECURING THE SINGAPORE STRAIT

While building its war-fighting edge, the RSN was careful not to neglect its defences close to home. It replaced its ageing *Bluebird*-class minesweepers with *Bedok*-class mine countermeasure vessels in 1991 and developed systems-level mine countermeasures doctrine that included a mine watch system in the Singapore Strait. In 1993, the indigenously designed and built *Fearless*-class patrol vessels replaced the ageing *Independence*-class patrol craft and *Swift*-class coastal patrol craft, with the latter transferred to the newly formed PCG.

BECOMING MORE FLEXIBLE AND ADAPTABLE

Flexibility and adaptability were the considerations when the RSN contracted Singapore Technologies Marine to build the *Endurance*-class landing ships tank to replace the *County*-class ships in 1996. The latter had been upgraded in the 1990s, with improved engines, fast landing craft and the Mistral missile system, but was ageing.

With a capacity 40 per cent larger than its predecessor, the landing ship tank can accommodate fast landing craft and support medium- and heavy-lift helicopter operations. It leverages technology and automation to maintain a crew of around 80 personnel – relatively small for its size. In 2000, RSS *Endurance* circumnavigated the world, becoming the first RSN platform to do so. Though built to support the Army's training, the landing ships tank were designed to be as flexible and multipurpose as possible, and have been adapted for peacetime missions ranging from humanitarian assistance and disaster relief to peace support operations.

During this time, the RSN continued to contribute to various international operations, sometimes at short notice, demonstrating its operational readiness. It was called to action in December 1997, when SilkAir flight MI 185 nosedived into the Musi River, about 55km northeast of Palembang, Indonesia, while en route from Singapore to Jakarta. The flight carried 104 passengers, including 46 Singaporeans. The Navy deployed its missile corvettes, mine countermeasure vessels and naval divers to assist in the search and rescue mission led by the Indonesian Armed Forces. They undertook operations to recover wreckage for three weeks under adverse weather conditions, strong currents and poor underwater visibility. In 1999, the *County*-class landing ships tank were sent to Darwin, Australia, to support the United Nations-authorised International Force in East Timor peacekeeping operations. They transported personnel, equipment, vehicles and stores between Darwin and Dili.

HERALDING THE NEW MILLENNIUM

Slowly but surely, the RSN grew from strength to strength. It gradually regained its footing after the decade of hiatus by steadily introducing new capabilities. With improved capabilities, it began to increase the complexity of its exercises to sharpen its fighting edge. Participating in bilateral and multilateral exercises also became an excellent way for it to benchmark itself against other navies. The number of interactions with other navies grew from about six a year in the 1980s, to about 30 a year in the 1990s. These exercises broadened in scope and increased in complexity over time. With maturing capabilities and having proved its mettle in exercises and operations, the RSN heralded the new millennium as a maritime force that was strong in its fundamentals and confident of its operations. The foundations of a balanced navy had been laid.

The RSN participating in a passage exercise with the US Navy in 2002.

A NEW ERA OF NAVAL WARFARE

Picture: Courtesy of LTC (RET) Hia Chek Phong

LTC (RET) Hia Chek Phong, 67, was the pioneer CO of the Navy's first missile corvette. He also commanded the missile gunboat squadron from 1984 to 1987. He recounted the challenges of operating the new class of ships.

The missile corvettes signify Singapore's resolve to protect its maritime interests, especially its sea lines of communication. They were an improvement over the missile gunboats in terms of seakeeping, sustainability and war-fighting capabilities. They were the culmination of a decade of planning. On 8 June 1988, RSN's first missile corvette, RSS *Victory*, was launched in Bremen, Germany. I had the honour to be appointed as its first CO. I was given an experienced and hardworking crew to operate the first of this new class of ships that integrated three-dimensional warfare (anti-surface, anti-air, and anti-submarine) for the first time in the Navy. The main challenges were learning to handle the new platform safely and developing tactics that would maximise the new capabilities.

Before missile gunboats were acquired, no COs had any tactical background from their days aboard the patrol craft, which had no missile or electronic warfare support measures. Ships had to learn to fight and operate in tactical groups, raising the steep learning curve even further. The Navy's first Tactical Training Centre in Pulau Brani made the training more efficient, and frequent at-sea exercises built up our confidence in tactical effectiveness. We had to move from manoeuvering in formations (looking pretty) to positioning ships for combat (fighting effectively). Commanding the first missile corvette was an opportunity for me to learn new skills and contribute to the Navy's doctrines, tactical guides and procedures for detection, threat identification and weapon engagement, and development of squadron-wide tactical sense on how to perceive the battle space and pre-empt the opponents' actions.

The Navy had to overcome many engineering and logistical challenges too. As we operated longer and farther in rougher seas, makeshift solutions had to be found for equipment failures, such as a radar antenna that toppled, until our engineers found ways to improve equipment reliability. Ship-handling was another challenge. The longer and faster missile corvettes behaved differently from the missile gunboats because of their higher free board and larger superstructure, which require longer stopping distances and result in more acute shallow-water effects that offer "heart-stopping" moments. Once, we returned to Benoi Basin after a sea trial at a slightly high speed, and continued surging forward even after all the engines were stopped. I ordered for all engines to slow astern (reduce the ship's forward momentum) but the ship still carried on forward. And in front of me, were six brand new Police Coast Guard boats, to be commissioned the very next day. I ordered full astern on all engines. The ship stopped just in time.

The missile corvettes have served the Navy well, having been deployed far and wide – as far as the Indian Ocean in the west, Guam in the east and Auckland, New Zealand, in the south – and participating in various operations and exercises. Almost three decades and a mid-life upgrade later, the Navy's longest-serving operational ships continue to do the Navy proud in overseas deployments and exercises. With these lean, nimble craft that packed a big punch, the Navy became a force to be reckoned with.

MAJ Hia Chek Phong, CO of RSS *Sea Dragon*, on the open bridge of the missile gunboat in 1978. Picture: Courtesy of LTC (RET) Hia Chek Phong

SEE FARTHER, STRIKE FASTER

LTC (RET) Toong Ka Leong, 55, joined the Navy to sail, but ended up flying instead. After 14 years in the surface fleet, he became one of two pioneer Navy Tactical Aircraft Coordination Officers in 121 Squadron to operate the Fokker-50 maritime patrol aircraft for the Navy. Today, the aircraft plays a vital role in providing maritime air surveillance and defending Singapore's sea lines of communication.

Unlike their foreign counterparts, the Fokker-50 and the supporting Navy personnel are managed by the Air Force rather than the Navy. Each plane is flown by two Republic of Singapore Air Force (RSAF) pilots, with an airman as the loadmaster; and is aided by two Navy Sensor Operators and a Tactical Aircraft Coordination Officer. LTC (RET) Toong, who was then serving at Coastal Command, was told by his commander that he had been selected because his experience in the coastal surveillance system would be useful. His initial concern about working outside the Navy proved to be unfounded, and he went on to "enjoy some of the best years" of his Navy career there, he said.

The Fokker-50s represented a quantum leap for the Navy, which previously used SH-7 Skyvans. LTC (RET) Toong described the Skyvans as "flying coffins". He recounted: "At that time, the Skyvan was very primitive, very hot, very noisy, non-pressurised and non-air-conditioned. It had just a simple radar, and contact information had to be painstakingly relayed to HQ using voice communication."

The new aircraft could "fly so much farther, faster, and then identify the target for HQ or the Task Group at sea, and send the target over", he said. Each Fokker-50 could survey an area that was greater than 100 times the size of Singapore – a more than 20-fold increase in area than that covered by the Skyvan.

Pioneering new capabilities meant going into uncharted territory. The team underwent technical training in different countries. LTC (RET) Toong said: "Certainly there were a lot of bugs and we had to do a lot of testing to make sure things worked well."

The team also had to establish tactical procedures – within the crew in the aircraft and between the aircraft and the surface force – to integrate the aircraft into the Navy and the SAF. Finally, the team had to formulate training programmes for the squadron.

The pioneers' efforts paid off when the squadron achieved full operational capability status in 1997, in a ceremony officiated by Second Minister for Defence Teo Chee Hean. To top it off, the team won the Best Tactical Support Unit award that year.

Looking back, LTC (RET) Toong never felt out of place as a Navy man in the Air Force – thanks to his colleagues and "one of the best COs" he had worked for, LTC (RET) Geoffrey Lui. He elaborated: "When you feel you are well looked after, your self-motivation is very high, you don't need to be told what to do. As long as I saw something was not right, whether it was my responsibility or not, I would try to correct it."

Top: CPT Toong demonstrating the work of a Tactical Aircraft Coordination Officer during a visit by then-Minister for Defence Tony Tan.
Above: CPT Toong (first from right, standing) with 121 Squadron colleagues during a visit by then-2nd Minister for Defence Teo Chee Hean.
Pictures: Courtesy of LTC (RET) Toong Ka Leong

LTC (RET) Toong with a model of the Fokker-50, which he operated as a pioneer Tactical Aircraft Coordination Officer, at the Navy Museum.

THE SILENT SERVICE

In April 1996, a group of intrepid Singapore sailors made their first foray into the frigid, unknown waters of the Baltic Sea off a town called Karlskrona, Sweden. Their mission: master the art of submarine operations from the Royal Swedish Navy, and then put it into practice in Singapore.

Among them was Colonel (Retired) Cyril Lee, now 56, the first CO of RSS *Challenger* and subsequently, 171 Squadron, which operates the RSN's submarines. Unlike the other pioneer submariners who had been selected from volunteers, he was told by the then-Chief of Navy, RADM Kwek Siew Jin: "You've been volunteered." With no second thoughts, he accepted the challenge.

Each prospective submariner was chosen by a multidisciplinary team comprising representatives from the medical, logistics, training and operations communities, and had to clear a comprehensive battery of physical and psychometric tests to prove their mettle and fitness. To COL (RET) Lee, the most important attribute required of a prospective submariner was "the desire to serve and learn something new".

The crew had to pick up a set of completely new skills. For instance, they could not rely on radar or visual navigation. Instead, they had to learn to navigate using only the bearings detected by sonar to determine the position, course and speed of other ships on the surface, a skill that was unheard of in the Navy at the time. In this and other aspects, teamwork proved to be immensely important. "The team compensates for you," COL (RET) Lee noted. When he had difficulties with accurately ranging contacts, his Sonar Officer would recommend changing the range to fit the fire control solution, leading to more effective team performance.

The pioneer submariners also had to deal with the unforgiving Swedish winter. As the CO, COL (RET) Lee had to keep watch on the bridge in cold winds at temperatures as low as -16 degrees Celsius. Once, a well-meaning officer offered him a cup of hot coffee. In his haste to warm up, he burnt his lips on the hot coffee and angrily set it aside. Minutes later, it had become a block of ice. On another occasion, during a storm in the Baltic Sea, with winds going up to 45 knots and waves up to 3m high, the submarine had to charge its batteries – which has to be done at periscope depth near the sea's surface – and some of the crew became seasick. Once the batteries had been sufficiently charged, the submarine dived to the normal "safe depth", but the roll continued. The submarine had to dive even deeper to wait out the storm.

Upon their return to Singapore, the four submarines quickly proved their value to the RSN. In one of the first bilateral exercises featuring the submarine with the US Navy, it managed to get close enough to the US aircraft carrier to take a picture without being detected, despite the protective screen by sea and air assets.

With the experience of operating these submarines, the Navy went from "literally accepting the recommendations from the shipyard" to being able to specify to the shipyard and combat systems providers what it needed for the *Archer*-class submarines, COL (RET) Lee noted. "No other navy I know of was able to make this kind of jump, from just buying off the shelf to specifying requirements to meet its specific operational needs, within 10 years," he said, "and this is something that the RSN can be really proud of."

LTC Cyril Lee (seated, leftmost) with his pioneer submariner officers in Karlskrona, Sweden, in 1998. Picture: Courtesy of COL (RET) Cyril Lee

COL (RET) Cyril Lee, with the dummy torpedo at 171 Squadron, which operates the RSN's submarines.

SAFE IN MY WAKE

Sea mines pose significant threats to not just the Navy's fleet, but also Singapore's sea trade and maritime shipping, especially if the busy Singapore Strait is attacked. Realising this, the RSN began building its mine countermeasure capability in 1975 with two *Bluebird*-class minesweepers, RSS *Mercury* and RSS *Jupiter*, from the US Navy.

By the 1990s, these minesweepers were outdated. The RSN had to acquire more modern minehunters with forward-looking sonars and remote-operated vehicles, to avoid exposing the minehunting platform to the risk of mines, and to increase the confidence levels of mine clearance. The Navy's search for such a minehunter ended in Sweden. With its glass-reinforced plastic hull, the *Bedok*-class minehunter produces a very low signature as it travels through the water, making it practically invisible to mines.

Today, the Navy's 194 Squadron operates four *Bedok*-class mine countermeasure vessels and two remote self-propelled acoustic and magnetic minesweepers.

The paradigm shift from minesweeping to minehunting did not happen overnight, recalled COL (RET) Philip Alvar, 54, who was the CO of the mine countermeasure squadron from 1999 to 2004. One challenge was to scale the steep learning curve for minehunting. This was achieved through overseas training (the crew of the first two ships was sent to Sweden), and through participation in bilateral exercises and exchanges with the US Navy, Royal Swedish Navy and Royal Australian Navy mine countermeasure forces.

After being trained, COL (RET) Alvar worked closely with the schoolhouses and 194 Squadron to develop the Minehunting Officer's Course, in synergy with the Minehunting Sonar and Mine Disposal Vehicle Course for specialists. Thus, he created the system for the RSN to train and sustain its own minehunting expertise.

COL (RET) Alvar said that the RSN's minehunting capability finally came of age with the planning and organising of the first and second editions of the Western Pacific Mine Countermeasure Exercise – a multilateral exercise involving Western Pacific Naval Symposium navies – in 2001 and 2004. The 2004 exercise was the largest multilateral sea exercise in the region then, involving 1,600 personnel and 20 ships from 18 navies worldwide.

As the Task Group Commander for both exercises, COL (RET) Alvar was responsible for leading the multilateral forces in their tactical execution. These exercises allowed the RSN to benchmark its mine countermeasure capabilities with the world's best, and more importantly, they set the stage for regional co-operation in this field, which has continued till this day, he said.

Partnering with the Indonesian Navy to clear the area around Tanjung Awar Awar of World War II mines in 1997 was "a high point because we sustained the deployment of two mine countermeasure vessels and the Task Group Headquarters for a month, and succeeded in stretching our operational limits", he recalled. The crew also acquired significant operational experience in clearing actual mines and completed the mission despite the challenging conditions. "This deployment gave us even greater confidence of our abilities, and validated our tactics, techniques and procedures," he mused.

"Minehunting requires immense patience and an eye for detail," he said, noting that the Navy's minehunters pride themselves in being thorough to a fault.

"The squadron's motto 'Safe in My Wake' is the ethos of the RSN's minehunting community – our assurance to all seafarers that the waters they traverse through are free of mines."

The longest-serving CO of the mine countermeasure squadron, COL (RET) Philip Alvar, on board a mine countermeasure vessel.

IN CONVERSATION WITH DEPUTY PRIME MINISTER TEO CHEE HEAN

"We want to be the Best Little Navy in the World. We're not like the US Navy – we don't have to do everything. We don't have to fight globally in the Seven Seas and be responsible for three-quarters of the world's surface – that doesn't bother us. But we know quite clearly the things we have to do in order to achieve the mission, and the capabilities that we have to build up. And in those areas we want to be the best. We want to be very, very, very good – world class. There is no reason why we can't be, and that in a sense is our vision: Whatever we choose to do, Number One!"

RADM Teo Chee Hean
The Vital Force, 1992

In 1992, Deputy Prime Minister Teo Chee Hean, who was then the Chief of Navy, articulated the aspiration to have the RSN become "the Best Little Navy in the World". He revealed the thinking behind this and other insights about the RSN's development during his time in the service.

WHAT DID YOU HAVE IN MIND WHEN YOU PUT FORTH THIS VISION?

When I articulated the vision of the "Best Little Navy in the World", some people were puzzled by what I meant. We are a small country with limited resources. We will never be a big Navy and therefore, we need to be focused and be very good, the best, at what we need to do. At the same time, while I had said "little", I meant it in the sense of when a Texan says "c'mon over and have a look at my lil' ol' truck", he actually means "come and see my big, shiny new truck". So it had a little bit of a double meaning. Over the years, I had several indicators that showed that we have done well and gained the respect of our peers.

When I visited the Royal New Zealand Navy as a minister a few years back, I was told that it listed the RSN as one of the navies that it benchmarked itself against. That spoke volumes, especially since we had started off in the 1970s learning from the New Zealanders and being trained by them. We have come a long way.

The second instance was when I visited the highly respected

Navy of one of our Northeast Asian friends. Over lunch, the Admiral recounted to me that he had asked a United States Pacific Fleet senior officer which among the Asian navies he thought had the best officers. He said that to his surprise, the American replied that it was the Singaporeans. Our host was probably being courteous when he told me this story, but the Northeast Asian navies are a high benchmark to be measured against, and we must try our best to remain among the best.

WHAT WERE THE RSN'S KEY CHALLENGES IN ITS EARLY YEARS?

In April 1975, we had to contend with the consequences of the fall of Saigon. This led to an influx of 'boat people'. The Navy was tasked to assist them and help them with their journey. For a good 10 years, from the mid-1970s to the mid-1980s, our Navy had to keep up a very high operational tempo. There was not much time for training and maintenance. I recall deploying for patrol on a missile gunboat with only two out of its four engines and two out of its three generators functional. The fire control system was not working. As long as the

NAVY NEWS

Republic of Singapore Navy — May '92

25 – Onward and upward we go

On 5 May, the RSN turned 25. We reproduce below an excerpt of the speech CNV gave at the Anniversary Parade held at Brani Naval Base that day.

CNV, CDRE Teo Chee Hean

'Today the Republic of Singapore Navy is 25 years old. As we look back over the past 25 years, we should remember the contributions and the hard work that have been put in by the pioneers of the Navy — our predecessors. Some of these men — and women — still serve with us today. We should remember their sense of purpose, their spirit of voluntarism and self-sacrifice that made them come forward to serve at a time when their country needed them most. They did not ask for much, and neither could the SAF nor the Navy offer them much. They got their reward and derived satisfaction from knowing that they were serving their country.

From their hard work and dedication we have the Navy of today. They can look with pride and we can look with pride — with great pride — at the Navy that we have today. Today, at 25, we have a Navy which is firmly on the way to becoming a balanced Navy, with a full set of capabilities, able to accomplish any task that we may be called upon to do to defend our country or in the defence of our sea lines of communications.

The hardware elements are in place. Our Missile Corvettes, our upgraded LSTs and MGBs, Fast Craft Squadron, our coastal patrol craft and other COSCOM assets. We are acquiring minehunters and maritime patrol aircraft, and replacing our Patrol Craft. These are well supported by an efficient and proficient logistics structure operating out of Brani and very soon, also out of Tuas Base. Our organisation has also been streamlined to take the development of the Navy into account. Today we have the major commands — Fleet, NALCOM, COSCOM and the two Flotillas in the Fleet.

But notwithstanding all these, the key element in our progress has always been, and will always be, our people.

New organisations, new ships and new equipment always bring with them changes in the way that things are done. This makes new demands on our people. Old ways of doing things may not be relevant any more. Old lines of responsibilities may have to be re-drawn in order that we become more operational and efficient, and so that we can derive the maximum advantage from what new technology offers us. But we should retain those aspects that have served us well, particularly our approach to getting the job done. Commitment, a willingness to work hard, flexibility and adaptability are all hallmarks of Navy men and women that will continue to serve us well in the future.

While new organisations and equipment bring new demands, they also provide more challenges and opportunities for Navy people to make use of their talents. Our technical and combat system specialists will have more opportunities to become skilled in working with some of the most modern equipment in the world; some of the tasks that were mundane and routine will be reduced. Those who are selected to the Warrant Officer Corps will have expanded job scopes and responsibilities, enabling both the Warrant Officers and the Navy to benefit from their specialist skills and leadership abilities.

The officer corps, too, faces new challenges as the complexity and scope of the Navy continue to increase.

I am confident that we, the men and women of the Singapore Navy, are capable of propelling the Navy forward towards achieving the goals that we have set out. We will build a Navy that all can be proud of, and each one will be proud to say that "I am from the Navy" whether it is for national service, one contract or a lifetime; whether as a private or as Chief.

Our predecessors have left us a solid foundation upon which we have built. We too in our turn must see to it that we leave to our successors a better Navy. If we do that, we too can be satisfied that we have made our contribution and have lived up to the spirit of those who came before us.'

Cover page of the May 1992 edition of *Navy News*, commemorating the 25th anniversary of the RSN.

navigation radar was working, the ship was considered adequate for the mission.

At that time, our Navy had a difficult time defining its strategic role. Consequently, we were not able to invest in capital to become a capable fighting force. Due to the high operational tempo, we also had little time and capacity to hone our war-fighting skills. We could not even maintain a proper tactical plot within our ships. This basic ability had eroded from the lack of training and practice; we had to learn how to do it all over again. Fortunately, enough good people stayed to help us get back on track.

HOW DID WE OVERCOME THESE CHALLENGES?

One key development was that the RSN was able to make the case that Singapore needed to protect our access to the sea lines of communication, which underpins Singapore's development as a maritime and air hub, and that a capable Navy was needed to do so. With clarity on the strategic mission of the RSN, our Navy proceeded with the upgrading of the missile gunboats, followed by the acquisition of six *Victory*-class missile corvettes and the *Bedok*-class mine countermeasure vessels. We also laid the foundations to build a capable submarine force, and an amphibious capability that could be adapted to a range of operations.

More importantly, we were able to match the hardware by the training of highly skilled men and women needed to run a modern Navy, and the development of tactics and doctrines necessary to make it all work. We established the Tactical Training Centre, which helped us learn to fight with the equipment we had. It also helped us to better appreciate the gaps in our existing capabilities, to decide what we needed to invest in. The motto of the centre was "Formulation, Perfection, Triumphant". This reflected the intent behind the centre – to enable the formulation of doctrines and tactics, hone them to perfection through countless simulations, and ultimately deliver decisive victory in battle. This motto continues to

The pioneer team of officers and men of the Tactical Training Centre at Brani Naval Base, which helped the RSN to develop war-fighting doctrines and tactics.

be used today at the Naval Wargaming and Simulation Centre at RSS *Panglima* – Changi Naval Training Base.

WHEN WAS THE TURNING POINT FOR THE RSN IN BECOMING A MODERN FIGHTING FORCE?

A major turning point in how we perceived ourselves as a fighting force was at the conclusion of a particular combined exercise in the 1980s with our friends in the region. COL (RET) Simon Hoon, who was then the commander of the missile gunboat squadron, reported that we had performed well in many aspects. During that exercise, our missile gunboats were able to build a sound tactical picture, and eluded and 'engaged' the opposing force before they could mount an effective challenge. We knew we had done well. This was a major boost to our self-confidence. At that point, we knew where we stood. Before that, we were not quite sure.

WHAT WILL IT TAKE FOR THE RSN TO CONTINUE TO SUCCEED?

We have been dealt a good hand in recent history, having had a period of relative prosperity and stability. But we cannot expect the current state of affairs to continue forever. For one, we must build our Navy not on the basis of having deep pockets, but by having the right qualities – in our organisation, in our people and in the way we employ our resources.

None of the RSN's capability and reputation have been preordained. The constant hard work, commitment and dedication of successive generations have enabled us to achieve what we have today. And this will continue to be so for each successive generation – working hard and having the correct focus will give the RSN the best possible chance to continue doing well.

Deputy Prime Minister Teo Chee Hean received his commission as an SAF officer in 1973. He served in the SAF where he held various command and staff appointments in the RSN and Joint Staff. In 1991, he was appointed Chief of Navy, and was promoted to the rank of Rear Admiral. In December 1992, he left the SAF to seek elected public office. He has served as the Minister for Home Affairs, Minister for Defence, Minister for Education and Minister for the Environment. He has also served as Minister of State in the Ministries of Finance, Communications and Defence. He was appointed Deputy Prime Minister on 1 April 2009, and since 21 May 2011, serves as Coordinating Minister for National Security. He is also Minister-in-charge of the Civil Service, oversees the Prime Minister's Office Strategy Group (including the National Population and Talent Division and the National Climate Change Secretariat), and is Chairman of the National Research Foundation.

The acquisition of the *Victory*-class missile corvettes in the late 1980s significantly expanded the RSN's strike capabilities.

The Navy's warships in a naval formation in the South China Sea during a RSN exercise in 2006. The *Endurance*-class landing ship tank (foreground) was flanked by the *Victory*-class missile corvettes. They were followed by *Sea Wolf*-class missile gunboats, decommissioned in 2008. Two *Formidable*-class frigates brought up the rear.

RSN's warships of different classes safeguard Singapore's waters and sea lines of communication. Leading this naval formation was the *Challenger*-class submarine, followed directly by two *Endurance*-class landing ships tank. On both flanks were the *Victory*-class missile corvettes, followed by the *Formidable*-class frigates.

SAFEGUARDING the MARITIME NATION

AT THE FRONT LINE

Singapore is the busiest transshipment port in the world, with more than 130,000 vessels calling into port annually and sailing through the Singapore Strait.

Singapore measures no more than 50km by 27km, with a short but porous 190km coastline bordered by the Singapore Strait to the south and the Johor Strait to the north. For centuries, maritime trade has been a key component of Singapore's economy and vital to its survival and prosperity. More than an entrepôt, Singapore also relies on the sea to import valuable cargo and energy, and to export goods it manufactures. Its port is one of the busiest in the world and its offshore islands along the Singapore Strait host some of the world's largest oil refineries. Its people's homes radiate from the heartland to its coasts, and Singaporeans live, work and play on every square inch of Singapore.

Threats to Singapore's waters – the borders of a small island-state with no geographic depth – are also threats to the nation and Singaporeans' livelihoods. The sea is Singapore's lifeline, its link to the world, and its first line of defence.

STANDING WATCH OVER SINGAPOREANS' HOME

Work at the front line is not straightforward. The Singapore Strait is one of the busiest waterways in the world – every day, close to a thousand ships ply it. Given its proximity to the country's city centre and critical industries, the RSN needs to detect anomalous behaviour, to achieve early warning of any possible terrorist activity.

The Navy maintains a 24/7 presence in Singapore waters with the *Fearless*-class patrol vessels, and their successors, the *Independence*-class littoral mission vessels. Equipped with advanced combat capabilities and technologies that are modularised and configurable, the littoral mission vessels are able to operate for extended periods at farther ranges and undertake a variety of roles: from low-intensity conflict operations, to humanitarian assistance and disaster relief, to conventional operations. The recently introduced specialised marine craft enhance the RSN's ability to intercept high-speed vessels before they have the opportunity to reach the shore, while the *Bedok*-class mine countermeasure vessels conduct regular

sweeps and surveys of Singapore's key waterways to ensure that they remain safe from mines. At the RSN's bases, the troopers of the base defence squadrons keep Singapore's gazetted waters free of intruders.

These assets do not operate alone. They are supported by surveillance and sense-making hubs ashore that operate networks of shore-based radars and electro-optics sensors and use smart sense-making technologies to detect 'weak signals' and anomalies to cue operational responses. The National Maritime Sense-making Group conducts predictive analytics to uncover anomalies amid complex patterns. Responses range from deploying Accompanying Sea Security Teams to merchant vessels for security checks, to ship-storming by special forces. Early warning and action at sea are crucial to prevent potential security threats from manifesting close to or in Singapore. The adage that "an ounce of prevention is worth a pound of cure" rings true.

At the national level, the Navy leads a whole-of-government response to maritime security threats under the ambit of the Maritime Security Task Force. Established in 2009, the task force works hand-in-hand with representatives from Singapore's law enforcement and maritime agencies, such as ICA, MPA, PCG and Singapore Customs, to forestall and interdict any potential maritime threats. Deliberate interagency coordination allows for synergy of resources and shared awareness at the national level from sea to land. Linkages are exercised regularly in scenarios ranging from the interdiction of hijacked vessels to responses to maritime emergencies. When called upon, the task force is capable of launching a collective and coordinated response to any maritime incident at sea.

Clockwise from top left: The RSN and PCG work hand-in-hand 24/7 in enforcing maritime security. A PCG vessel (foreground) and a *Fearless*-class patrol vessel (background) interdicted a 'rogue' sampan during Exercise Apex in 2009.

At any point in time, a *Fearless*-class patrol vessel patrols the Singapore Strait. Known as the "vanguards", these vessels are the first responders to any maritime threat or incident in Singapore's waters.

Singapore adopts a whole-of-government approach towards maritime security. Here, an MPA officer at the Port Operations Control Centre monitors and communicates with all vessels entering and leaving the Singapore Strait.

Armed with the K-STER Expendable Mine Disposal System and the Towed Synthetic Aperture Sonar, the *Bedok*-class mine countermeasure vessel keeps Singapore's underwater environment mine-free and safe for ships.

COOPERATING WITH REGIONAL PARTNERS

The geography of this maritime region adds to the complexity of work at the front line, as maritime threats today are, more often than not, transnational and cross-boundary in nature.

Singapore works with its neighbours to enhance maritime security through a regional framework for information sharing and practical cooperation.

The Malacca Straits Patrol is undertaken by Indonesia, Malaysia, Singapore and Thailand to ensure the security of the Straits of Malacca and Singapore. It started out as the coordinated Malacca Straits Sea Patrols in 2004, and has expanded to include aerial surveillance in the form of the 'Eyes-in-the-Sky' combined maritime air patrols in 2005, and intelligence sharing in 2006.

The initiative achieved early success when London insurance market Lloyd's Joint War Risk Committee dropped the classification of the Malacca Strait as a 'war-risk' area in 2006, following the launch of the sea and air patrols.

Ten years on, cooperation between the littoral states continues to be strong. Following a spate of oil siphoning incidents in 2015, the littoral states strengthened intelligence exchange and enforcement efforts, to drive the number of such incidents to near-zero in 2016.

Today, the Malacca Straits Patrol is a good example of how collaboration between littoral states has made a big difference to the security of the sea lanes in the Straits of Malacca and Singapore.

Beyond the region, the Navy contributes to information-sharing, builds shared awareness and encourages practical cooperation through its Information Fusion Centre (IFC). It is the Asia Pacific region's first multinational military operations centre with an active resident International Liaison Officer community.

Inaugurated in 2009, it has linkages with more than 70 military, maritime and law enforcement agencies from 38 countries and has seen more than 115 International Liaison Officers from 23 countries deployed to Singapore on a rotational basis.

A Royal Malaysian Air Force officer working with an RSN Tactical Aircraft Coordination Officer aboard the Fokker-50 maritime patrol aircraft on an 'Eyes-in-the-Sky' flight sortie in 2016. Typically, this involves a Combined Mission Patrol Team of officers from participating nations flying over the Malacca Strait.

The IFC is a unique platform where like-minded partners can share actionable information and collaborate closely with one another for timely and effective responses to maritime security incidents.

Over the years, information-sharing and collaboration within the IFC have targeted issues including the countering of weapons proliferation, maritime terrorism, contraband smuggling and illegal human migration.

Its services are also extended to the shipping community as a whole. Shared awareness meetings are opportunities for representatives of the shipping and maritime industry to come together with military, maritime and law agencies to share information and establish best practices for ships' security at sea. If ships at sea are safe, Singapore, its trade and its economic lifelines will also be secure.

Navy and Air Force officers from Indonesia, Malaysia, Singapore and Thailand participating in the Malacca Straits Patrol Information Sharing Exercise 2008, in the Changi Command and Control Centre. Cooperation between the nations has helped reduce the incidence of piracy and sea robbery in the Malacca Strait.

UNCHANGING COMMITMENT

Since 1967, the Navy has been at the front line of safeguarding the nation. As maritime threats evolve, how the Navy does so will continue to change: leveraging technology to work more smartly, working more closely with national agencies to ensure that Singapore's security remains well-coordinated, and finding new avenues for collaboration and cooperation with industry and international partners to keep the seas safe and secure for all.

What is unchanging is the commitment of the Navy to defend Singaporeans' every day and to safeguard their maritime nation, best explained by the Navy Song: "Our waters to guard to ensure they are safe. It's a great task only meant for the brave."

BRAVELY STANDING OUR GROUND

COL Saw Shi Tat, 41, the Head of Naval Personnel Department, was CO of RSS *Brave* when the *Fearless*-class patrol vessel was deployed to waters around the island of Pedra Branca, on the day that the International Court of Justice (ICJ) passed its verdict on the sovereignty of Pedra Branca.

A *Fearless*-class patrol vessel patrolling the waters around Pedra Branca. Picture: Singapore Press Holdings

The day, 23 May 2008, is etched in my memory. It was the day that the International Court of Justice (ICJ) passed its verdict on the territorial dispute between Malaysia and Singapore over the sovereignty of Pedra Branca.

In defending Singapore's sovereignty over Pedra Branca, the RSN conducts regular patrols and responds to maritime incidents in and around the waters surrounding it. On the day of the ICJ verdict, my ship, RSS *Brave*, a *Fearless*-class patrol vessel, was deployed to Pedra Branca waters together with a PCG vessel. From the onset, the situation was tense. The ship and crew were in the highest state of readiness, while exchanging verbal challenges via the marine VHF radio with three Malaysian warships that had been deployed nearby. The Malaysian ships were persistent, but my ship and my PCG compatriot stood our ground.

The verbal challenges and manoeuvres continued for hours, placing the team under tremendous stress. But we all knew that we had to maintain our calm. Faced with a volatile situation, I was mindful not to create an unintended skirmish that would escalate the situation. But we also knew we had to stand our ground, conducting ourselves in a principled and disciplined manner. I was glad that my crew was resolute and well trained to handle such a demanding operational scenario. Most importantly, every team member understood the significance of our mission. We knew that our tactical actions would potentially have ramifications at the highest level. After the ship had been at sea for close to 10 hours, the final verdict was out. The ICJ awarded Pedra Branca to Singapore, Middle Rocks to Malaysia and South Ledge, which was visible only at low tide, to the state in whose territorial waters it is located. Both governments accepted the judgement. Immediately following the verdict, the Malaysian warships duly left the waters surrounding the island.

Unbeknownst to many back home in Singapore, all of us on board bore witness to a milestone in our country's history. The RSN had staunchly defended Singapore's sovereignty. Throughout, I was impressed by the spirit and professionalism displayed by our people. For instance, a serviceman postponed his wedding day to focus on the operation, while three Full-time National Servicemen (NSFs) voluntarily extended their NS stints to participate in it.

We had played our part, like how many others before us had done. Nine years on, the RSN ships continue to patrol and keep watch over the waters around Pedra Branca.

On the day of the ICJ verdict on Pedra Branca, COL Saw Shi Tat, currently the Head of Naval Personnel Department, was in command of RSS *Brave*, seen here at Tuas Naval Base in 2016

SERVING THE NATION, DEFENDING ITS BASES

When Corporal (CPL) Sajit S/O Sesikumar received his posting order to be a Sea Soldier at Changi Naval Base, he was initially disappointed. He had wanted to serve as an Army Specialist, leading platoons for missions, but he soon realised that the opportunity to take on this unique role could be interesting.

Sea Soldiers are defence troopers who specialise in naval base defence. On top of receiving training on base defence common to all Regimental Police in the SAF, sea soldiers undergo further specialised training in handling threats from the sea. They play an important role in the landward and seaward defence of Singapore's naval bases to maintain the safety and security of all ships berthed in harbour.

Today, CPL Sajit, 22, is a Team Leader of the Quick Reaction Force, in charge of handling landward threats to Changi Naval Base. He leads a team of eight personnel who monitor personnel and vehicular movement at the gates of the base and react to any emergency or potential attack to the base.

He said: "It is not easy and we have to be very vigilant. For example, you never know if a cab that trespassed is a real intruder or genuinely lost. You never know what a terrorist will look like, and you just have to assume the worst. To ensure that our skill sets are kept sharp, we conduct regular realistic drills to test the deployment of our Quick Response Force to respond to various scenarios such as vehicle intrusions and base perimeter breaches."

"I feel that it is a privilege to serve as a Sea Soldier, because not everybody has the chance to serve in the navy, protect our naval base and navy warships. I will never forget this experience."

Another team in the Changi Defence Squadron defends the base from seaward threats. Some, like CPL Amirul Haziq bin Ismail, 21, patrol the gazetted waters outside Changi Naval Base in a rigid hull inflatable boat, while others, like CPL Raymond Lim, 22, man the guns at the command outpost overlooking the seas.

"Singapore is a busy port and there are many ships outside the base every day. As such, we have to be very vigilant to look out for suspicious activities," said CPL Lim.

Once in a while, curious onlookers in private boats or yachts would also approach the naval base to get a closer look at the warships berthed within.

This is when CPL Amirul and his team will be activated to intercept the boats and stop them from entering the gazetted waters. They undergo rigorous training that enables them to do this in double-quick time, day or night.

"It is important to drive home the message that we are serious in defending our base and our country," said CPL Amirul. The team's presence in the waters also serves as a strong deterrent to potential intruders, he noted. "This sense of pride in defending my country makes up for the tough and demanding routine."

Agreeing, CPL Sajit said that his NS experience has been unique and meaningful. "I feel that it is a privilege to serve as a Sea Soldier, because not everybody has the chance to serve in the navy, protect our naval bases and navy warships. I will never forget this experience."

CPL Amirul and his team patrol the gazetted waters around Changi Naval Base in a rigid hull inflatable boat.

BOARDING SHIPS TO SECURE SINGAPORE'S SEAS

About a thousand ships transit the Singapore Strait daily. Given Singapore's crowded maritime environment, and the proximity of the Singapore Strait to the country's city centre and critical industries, it is crucial that anomalies are picked up early, providing early warning of any possible terrorist activity before it is allowed to manifest. For this purpose, the RSN deploys its Accompanying Sea Security Teams on board merchant vessels that transit through the Singapore Strait to conduct security checks.

A naval diver by training, Third Warrant Officer (3WO) Edwin Pang, 37, has been with the Accompanying Sea Security Teams – comprising Navy and Police Coast Guard personnel who board and check merchant vessels for illicit activities – for four years. As Chief Team Leader of one of the boarding teams, he has eight men under his charge. During an operation, each team member has his own responsibilities – checking for illegal cargo, suspicious activities or unaccounted personnel – but all are trained to handle emergencies. 3WO Pang said: "We can expect situations involving shootouts and hostages to develop within seconds and the team members have to rely on one another to resolve these situations swiftly."

No major incidents have occurred in his course of duty, although he has had his fair share of grumpy and less-than-cooperative ship masters. He said: "It is important to stay calm, be firm and remind yourself of the professionalism that the RSN has long upheld. How we behave and react is not just a reflection of ourselves but also of Singapore and the RSN."

He also stresses the importance of a strong safety culture to his team members and checks in on them before every operation: "Check your ammo! Make sure you secure all your equipment, no loose ends! Everyone feeling ok?" Boarding vessels is no easy feat. One may have

Navy and PCG personnel boarding a merchant tanker to conduct security checks in the Singapore Strait in 2015.

CFC Tan Jing Hong (left) and 3WO Edwin Pang serve on Accompanying Sea Security Teams that check vessels for illicit activities.

to climb up a vertical rope ladder as high as a nine-storey building to board large vessels, or climb across railings and manoeuvre in cramped spaces in small vessels – all while carrying more than 20kg of equipment.

The combat fitness and stamina are built up through the demanding physical regimen that everyone follows, including the senior warrant officers. Every Tuesday, everyone gathers at the foyer of the squadron building, affectionately nicknamed the 'Kraken Pit'. It is named after the mythical giant sea monster that symbolises physical strength and might, reflecting the competencies displayed by the personnel of the teams who go out to sea for operations daily. They do at least 100 push-ups, 20 chin-ups, five sets of tyre flips with an 80kg tyre used on five-tonne trucks, and a 7.5km endurance run. Corporal First Class (CFC) Tan Jing Hong confessed: "Physical training is really quite tough. Our conducting officer, Master Warrant Officer Chan Mun Hong, is 47 years old and still completes his 2.4km run under 10 minutes. It's difficult to keep up with him." The camaraderie is strongest during physical training as everyone, regardless of rank, encourages and pushes one another through the tough training, he added.

He is proud of being part of a team that deters potential threats against Singapore's maritime security. The 20-year-old NSF said: "My NS experience feels very real and the fact that I am actually contributing to the front line of our nation's defence makes it particularly meaningful."

THE SHARP EDGE

"The economy and defence are closely interlinked. Without strong economic growth, we cannot keep up the kind of 3rd Generation SAF, one that every few years has to renew its equipment with new-generation missiles, ships, aircraft and submarines. We need the sea lanes to Singapore to be open; hence a capable navy is crucial," Singapore's founding Prime Minister, Mr Lee Kuan Yew, had penned in his foreword of the 2011 book, *Hard Truths to Keep Singapore Going*. He added: "Without a strong economy, there can be no strong defence. Without a strong defence, there will be no Singapore. It will become a satellite, cowed and intimidated by its neighbours."

PROWESS AT SEA

The Fleet is the sharp edge of the RSN. Working in concert with the rest of the SAF, the Fleet stands ready to strike the aggressor and secure a swift and decisive victory at sea. Today, the Fleet operates ships, aircraft, submarines and unmanned platforms. It is a lethal force on the surface, in the air and under water.

The six *Formidable*-class frigates in formation in the South China Sea during a naval exercise in 2014.

The *Formidable*-class frigates are the principal combatants of the RSN. Operating with the Sikorsky S-70B Seahawk naval helicopters, the frigates possess a potent suite of capabilities for anti-air, anti-surface and anti-submarine operations. Each of the six frigates is a capable command and control node and air defence umbrella, and can extend the RSN's influence far beyond the immediate approaches of the Singapore Strait.

The upgraded *Victory*-class missile corvettes are optimised for naval anti-air and anti-surface operations within a congested littoral environment. In addition to a capable sensor and weapon suite, they are equipped with the ScanEagle unmanned aerial vehicle (UAV) system, which provides organic surveillance, identification and targeting at extended distances. At sea, the frigates and missile corvettes operate seamlessly with the RSAF's Fokker-50 maritime patrol aircraft for wide-area maritime surveillance and search, and with its fighter aircraft for maritime strike operations.

Versatile and flexible, the *Endurance*-class landing ships tank provide sealift and ship-to-shore capabilities. They serve as efficient means of sea transportation and also support the SAF's overseas operations and training.

The *Independence*-class littoral mission vessels, with their 'plug-and-play' mission modules, can also be called upon to support operations beyond the Singapore Strait.

Under water, the *Challenger*- and *Archer*-class submarines operate stealthily in the deep. Armed with wire and acoustically guided heavyweight torpedoes and for the *Archer*-class submarines,

Left: A ScanEagle UAV launching from the upgraded *Victory*-class missile corvette during Exercise Kakadu 2016 in Northern Australia.

Right: The *Endurance*-class landing ships tank have been used in counter-piracy operations in the Gulf of Aden, reconstruction efforts in the waters of Iraq and disaster relief efforts. Here, RSS *Persistence* was deployed with two Super Puma helicopters for search and locate operations for AirAsia flight QZ 8501 in the Java Sea, in 2014.

The *Archer*-class submarines in a local exercise in 2013. Equipped with air-independent propulsion engines, they can stay underwater longer than conventional diesel-powered submarines.

now also equipped with air-independent propulsion engines, they are now better poised to deal a lethal blow to the enemy surface fleet. The *Challenger*-class will be replaced by new German-built Type 218SG submarines.

The RSN's ships are plugged into the larger SAF's Integrated Knowledge-based Command and Control network infrastructure. This network facilitates constant exchange of tactical information within and between services, enabling greater situational awareness in the battlefield.

For example, a ship at sea could instantaneously transmit information on a vessel of interest to a maritime patrol aircraft for threat verification. Should the aircraft identify the vessel as a threat, targeting information would be rapidly relayed to RSAF fighters for engagement.

HONING THE SHARP EDGE

The RSN conducts regular sea exercises to sharpen the skills and tactical acumen of its war-fighters. Exercises are often two-sided and mission-oriented, pitting forces against each other to hone tactical decision-making. These exercises may incorporate live weapon firings to assess system readiness and validate the effectiveness of the various weapons suites.

Bilateral and multilateral exercises provide the RSN with opportunities to train and benchmark itself against established navies around the world. The RSN has professional naval exchanges with Singapore's immediate neighbours such as Brunei, Indonesia, Malaysia and Thailand, as well as navies from Australia, France, Germany, India, New Zealand, Sweden, the United Kingdom and

Left to right: RSS *Steadfast* launching an Aster missile during the Rim of the Pacific (RIMPAC) Exercise 2016, in the Pacific Ocean, leaving a trail of smoke behind. RIMPAC is the world's largest multilateral exercise hosted by the US Navy. The RSN regularly validates its fighting systems during bilateral and multilateral exercises to ensure a high level of naval war-fighting competency.

RSN ships are equipped with the locally developed Combat Management System. It is designed with embedded intelligence for track management, identification and weapon allocation functions, which improves decision-making in tactical war-fighting situations.

the United States. In recent years, the RSN has also been engaging the navies from China and Japan.

Beyond training, the RSN keeps its edge sharp by leveraging on technology. Strategic planners work hand-in-hand with technology watchers, experimentation groups and partners in the defence technology community to devise new technologies to suit the RSN's present and future needs. These innovations are incorporated into new fighting concepts to enable the RSN to fight smarter and faster.

The RSN's ships are regularly upgraded to ensure that they possess the latest technologies. Moving ahead, the RSN is also exploring the use of both manned and unmanned systems in maritime security operations. This constant drive to leverage on technology to meet its operational demands has allowed the RSN to overcome manpower limitations.

MAKING MEANINGFUL CONTRIBUTIONS GLOBALLY

The RSN regularly hones and sharpens its capabilities during peacetime, and is ready to be deployed when called upon.

When the Boxing Day Tsunami hit in 2004, the RSN deployed three *Endurance*-class landing ships tank, together with fast craft, to Meulaboh, Indonesia. This was the SAF's largest humanitarian assistance and disaster relief operation. These ships were also deployed in support of international efforts for the reconstruction of Iraq between 2003 and 2008. Together with other coalition ships, they protected the Al-Basrah Oil Terminal, a vital source of Iraq's economic revenue, through conducting area patrols, security sweeps and selective boarding operations on ships.

Starting in 2009, the RSN has also deployed its ships and maritime patrol aircraft as part of SAF Task Groups, to support international counter-piracy efforts under the ambit of Combined Task Force 151 in the Gulf of Aden, located in the Arabian Sea between Yemen and

Two of the three deployed *Endurance*-class landing ships tank at anchor off Meulaboh, Indonesia. The ships were part of the SAF task group that assisted the Indonesian authorities in the disaster relief operations after the 2004 Boxing Day Tsunami.

Somalia. This is to safeguard shipping and freedom of navigation along this important maritime trade route. Though geographically distant from the Gulf of Aden, Singapore as a maritime nation understands that threats to maritime security affect all trading nations. The helicopter-equipped surface Task Groups conducted patrols and surveillance, and responded to calls for assistance from ships encountering pirate attacks. The RSN has also assumed four successful commands of CTF 151, the most recent being in 2016. On its watch, no piracy attacks have succeeded.

On the morning of 28 December 2014, AirAsia flight QZ 8501 lost contact with air traffic control and disappeared over the Java Sea. That very night, the RSN deployed a frigate and a missile corvette for search and locate operations. These were the first foreign ships to join the Indonesian ships in the search. Within the next few days, they were joined by a landing ship tank carrying two Super Puma helicopters, a mine countermeasure vessel, the submarine rescue vessel, MV *Swift Rescue*, and an autonomous underwater vehicle team. For close to three weeks, the RSN ships worked alongside Indonesian and other foreign aircraft and ships to search for the

Above: After two weeks of searching the Java Sea, MV *Swift Rescue* located the fuselage of AirAsia flight QZ 8501 (shown here on the camera of the remote operating vehicle deployed by MV *Swift Rescue*).

Below: Amid heavy rain and rough waves, the crew on the flight deck of landing ship tank RSS *Persistence* prepared the Super Puma helicopters for the search operations for AirAsia flight QZ 8501. Picture: Singapore Press Holdings

missing aircraft in rough seas, with swells reaching 4m high. Finally, MV *Swift Rescue* found the main fuselage of AirAsia flight QZ 8501, through the cameras of the ship's remotely operated vehicle.

SAFEGUARDING THE SEAS FOR SINGAPORE AND THE WORLD

Singapore sits astride the major sea lines of communication in the world. Cut off its access to them and Singapore will immediately be isolated. The RSN has an important role to play in maintaining access to sea lines of communication and deterring and dealing with threats to their closure. In peace, the RSN has to hone its war-fighting capabilities and build up its capabilities. It has to be ready at all times to answer the call of duty and work with friends and partners to protect the seas, which are global commons. Should deterrence and diplomacy fail, the RSN must secure a swift and decisive victory for Singapore.

THE FORMIDABLE CLASS

COL (RET) Wellman Wan, 55, former Commander First Flotilla, recalled his time as Operations Manager of the RSN's frigate project.

In the 1990s, the RSN saw a need for warships that were capable of sustained operations at sea. Given the evolving nature of its missions, it needed larger, more capable ships that could stay at sea for longer periods and would be less affected by environmental conditions, which in turn, would improve the crew's performance. The frigates would bring to the Navy new fighting, training and technological capabilities. It was an opportunity to make a difference for the Navy.

> "The frigates would bring to the Navy new fighting, training and technological capabilities. It was an opportunity to make a difference for the Navy."

When it began in 2000, the frigate project was the most complex defence acquisition by the Navy and Defence Science and Technology Agency (DSTA). The frigate would be the principal ship of the Navy and a command and control node of the networked 3rd Generation SAF. Designed to strengthen the Navy's capabilities to protect Singapore's sea lines of communication, the frigate would bring on board advanced sensors and guided weapons for area air defence, such as the phased array multifunction radar and Aster surface-to-air missiles, and also boost the Navy's anti-submarine warfare capabilities. It would also pioneer naval aviation.

All the acquired combat and platform systems were state-of-the-art and carefully selected for the Navy's operating environment. Software engineers from DSTA and DSO National Laboratories were called in to design the Combat Management System, develop smart tools for automated identification, threat evaluation and weapon allocation, and integrate systems within the ship and with the SAF.

Other established navies tended to operate ships of this size with much larger crews, but the Navy did not have the luxury of manpower. We had to design our frigates to be effective yet efficient. Not only did it mean leveraging on technological enablers, but also changing the paradigm of how people operated on ships. Sometimes, we had to help people break old habits and train them to operate the ship the way it was designed, so as to realise its full potential. At many junctures, I felt that I was making decisions that would change the way the Navy operated and I would ask myself: "Are these the right decisions? Are we ready to cope with these changes?" Looking back on how far the frigates have come and what they have achieved, the answer is yes.

On the RSN's 40th Anniversary on 5 May 2007, Minister for Defence Teo Chee Hean commissioned Singapore's first frigate, RSS *Formidable*. This was the culmination of more than a decade of hard work in planning, designing and learning to operate it from scratch. Since then, the six *Formidable*-class frigates have been operating in and beyond the region to secure Singapore's sea lines of communication and engage strategic partners in ways that Singapore could not do before. Today, I draw immense satisfaction from seeing how they still make waves in far-flung places, keeping pace with well-established navies. Even more fulfilling is seeing our people become more confident, knowing we have formidable ships capable of formidable tasks.

COL Wellman Wan talking to Commander Heedong Choi, CO of USS *Chaffee*, when the US Navy guided-missile destroyer called on Changi Naval Base in the Cooperation Afloat Readiness and Training exercise held in Singapore in 2009. Picture: Courtesy of the US Navy

The Sikorsky S-70B Seahawk naval helicopter landing on RSS *Tenacious*, a *Formidable*-class frigate, in the Gulf of Aden in 2014.

A SPECIAL BREED OF MEN

Often considered one of the most physically and mentally demanding courses in the United States military, the Basic Underwater Demolition and Sea, Air and Land (SEAL) course (which all US Navy SEAL team members have to pass) subjects its trainees to a punishing training regimen conducted amidst the bone-chilling waters off Coronado, San Diego. Few are shortlisted to attend the course and even fewer – fewer than 40 per cent of trainees – successfully complete it. Captain (CPT) Tay and 3WO Lim are combat divers from the RSN's Naval Diving Unit (NDU) who have earned the right to don the vaunted golden trident SEAL badge on their uniforms.

"The environmental conditions that we trained in were completely different from the warm waters of Singapore that we were used to," recalled CPT Tay. "The training was just as much about mental resilience as it was about physical stamina. I was proud to graduate but it wasn't so much about personal pride; I was proud to have been able to represent Singapore."

This training period was one of the most physically and mentally challenging times in his life, 3WO Lim revealed, but also one of the most memorable, as he was the only foreign student in his class to pass the course. "The Americans did not cut us any slack just because we were foreigners. The demands that we placed on ourselves were even higher because we were aware that we were there not just in a personal capacity, but as representatives of our country and Navy."

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Their tenacity, grit and inner steel are what define them as members of the elite Special Warfare Group, the Navy's equivalent of the Army's Special Operations Force. Together, both form the backbone of the Special Operations Task Force, formed to provide special operations capabilities, such as counterterrorism, for Singapore from land, sea and air. As part of their training, the divers put themselves through run, jump, callisthenics, swim, dive, climb and shoot routines every day, in various combinations, to hone and sharpen their skills. They are trained to board hostile vessels by either rappelling from helicopters or climbing up from rigid hull inflatable boats. They are deployed with the Special Operations Task Force and participate in joint exercises such as Exercise Highcrest, which tests national responses against maritime threats.

3WO Lim observed: "Our waters are nowhere as pristine and clear as the ones you get when you go overseas for diving trips. In fact, on a good day, you will probably be able to see only about 1m ahead of you. Under such circumstances, the confidence that our divers need to hone in training is very important. You have to be strong in your fundamentals and techniques, and you must be a strong team player because a lot of the things that we do are premised on solid teamwork."

CPT Tay declared: "Being a diver is being a special breed of men, and I don't mean that in an arrogant way. The deep sea is not a natural operating environment for humans. The training that you undergo to conduct the operations demands nothing but the best from you, in terms of your attitude and aptitude. It is not an easy path to tread but once you've embarked on the journey, you owe it to yourself and your team to ensure that 'Nothing Stands in Our Way', as the Naval Divers' motto goes. Hooya!"

The Navy's Special Warfare Group participates in multi-agency exercises as part of the Special Operations Task Force.

WARRIORS OF THE DEEP

HONOUR, INTEGRITY AND TEAM SPIRIT – THESE ARE THE CORE VALUES OF THE ELITE NAVAL DIVING UNIT OF THE RSN. ONLY THE BEST MAKE THE CUT TO BECOME NAVAL DIVERS, BECAUSE ONLY THE BEST, FIGHTING AS A TEAM, CAN DELIVER MISSION SUCCESS UNDER THE HARSHEST CONDITIONS.

COMRADES IN ARMS ON LAND AND SEA

Senior Lieutenant Colonel (SLTC) Chng Kim Chuan, 43, CO of 191 Squadron, traced the evolution of cross-service training between the Navy and the Army. The squadron, which operates the landing ships tank and the Fast Craft Training Unit, fronts most of the joint exercises involving both services.

Back when the Singapore Army first started training with the *County*-class landing ships tank, soldiers disembarked from the ships by climbing down scrambling nets – a rudimentary method dating from World War II. These days, our *Endurance*-class landing ships tank are capable of landing not just one but two medium-lift helicopters or one heavy-lift helicopter like the Chinook, and carrying a larger complement of fast craft. They also have well docks for smoother and faster ship-to-shore transfer operations. The acquisition of the landing ships tank marked a significant transformation in Navy-Army-Air Force cooperation and capabilities.

> "... educating our Army friends on the way of life on board and acquainting them with the various nautical terms – 'bunks' became 'cabins', 'kitchens' became 'galleys' and 'toilets' became 'heads'."

Technology and assets aside, what was equally important was to socialise each service to the way the other operated. This meant, for instance, educating our Army friends on the way of life on board and acquainting them with the various nautical terms – 'bunks' became 'cabins', 'kitchens' became 'galleys' and 'toilets' became 'heads'.

Once, a number of soldiers could not wait to get off the ship because they were seasick. However, after completing their land mission, they were ironically looking forward to returning to the ship because of the warm food and proper shower facilities on board. This was especially when most of them had gotten their pants, socks and boots wet when they were charging onto the beach from the fast craft, due to the significant wet gap resulting from the low tide.

The scale of joint operations has also grown – from coastal hook exercises conducted locally in Pulau Sudong to complex amphibious beach landing exercises conducted overseas in Australia, such as the one recently seen in Exercise Trident 2016. The level of planning required to execute a smooth ship-to-shore operation cannot be understated and it is made possible only through years of working alongside each other. Our Navy today is able to carry the Army where it needs to go, and to do what needs to be done, in ways that were not possible before.

Interoperability between the Army and Navy should go beyond being familiar with each other's operating procedures and lingo, and extend to interactions at various levels that range from operations development and training to even cohesion events. At the end of the day, we all understand that the services of the SAF do not fight in silos and must be able to work together to achieve mission success. Regardless of the colour of our uniforms, we are all comrades in arms working towards the common mission of keeping our country safe. This is well encapsulated in the third stanza of our Navy Song: "With our comrades in arms from the land and the air, together we stand in defence of our land."

SLTC Chng Kim Chuan commands 191 Squadron, which operates landing ships tank with well docks to facilitate ship-to-shore movement of Army vehicles and personnel.

FIGHTING AT SEA WITH THE AIR FORCE

LTC Auyong Kok Phai, 36, CO of the *Formidable*-class frigate, RSS *Tenacious*, reflected on how the partnership between the RSN and RSAF has strengthened.

The joint exercises that we conduct with the Air Force never fail to impress upon me just how far, and how well, our Navy has integrated with the RSAF in the area of naval warfare out at sea. During one such exercise, our force managed to hunt down and 'strike' at the opposition force within the first half of the exercise.

It started with the RSAF Fokker-50 maritime patrol aircraft conducting a wide area search ahead of our main force and cueing us on 'contacts of interest'. Our ship, RSS *Tenacious*, subsequently launched our Sikorsky S-70B Seahawk naval helicopter in tandem with the launching of the Scaneagle UAV from the missile corvette, RSS *Valour*. The radar-equipped helicopter and camera-equipped UAV flew far ahead of their parent warships in search of 'hostile' vessels. Both air assets confirmed the identity of the opposition forces. We orchestrated the final 'strike' by calling on RSAF fighters to conduct a synchronised attack, hitting the enemy with our missiles and their weapons simultaneously.

The Fokker-50 maritime patrol aircraft acts as the 'forward eye', vastly enhancing the awareness of ships at sea. It also gives the RSN the ability to conduct over-the-horizon-targeting.

LTC Auyong Kok Phai with his command cluster in the Combat Information Centre – the nerve centre of the frigate where naval battles are directed.

Maritime air operations make a huge difference. A ship operating alone can only influence the surrounding area within the range of our sensors. This is approximately 30 nautical miles, slightly longer than the length of Singapore and relatively small compared to the vast ocean. By leveraging on our air assets, we are able to extend our area of influence by up to three times.

Ten years ago, when I was a junior officer, the Navy had only the maritime patrol aircraft to act as the 'forward eye' at sea. There was also a limit to how much it could conduct maritime surveillance for the Navy, and the ships had to work on imperfect knowledge of the maritime situation.

Now, our Navy has made great leaps ahead. Surveillance by the maritime patrol aircraft is still a vital part of our fighting system, but just one of many more components. We operate as a networked force today and our ships are able to operate on a shared sea situation picture with inputs from not just the maritime patrol aircraft, but also the naval helicopters, the UAVs, our shore radars and even the Air Force's Gulfstream G550 airborne early warning aircraft. This comprehensive sea and air picture puts us in a better position to see further, decide faster and engage our enemies earlier and further. This means that we can detect hostile warships and fighters hundreds of nautical miles away, conduct targeting over the horizon, and take them out even before they reach our forces.

A strong maritime force comprises more than just the Navy. I am sure that in the years to come, both the Navy and the Air Force will grow even closer, and become a stronger, sharper and even more effective maritime force for our maritime nation.

OPERATION FLYING EAGLE TAKES WING

Left: During Operation Flying Eagle, ME6 Ben Tay (left) was a Section Head of the Operations Branch, overseeing the loading of supplies and equipment onto the landing ships tank. ME6 Goh Nai Chuan was a Section Head of the Operational Logistics Planning Branch, which was responsible for ensuring that the ships could sustain their operations for an extended period. **Right:** COL (NS) Li Lit Siew was the CO of RSS *Endurance* when the landing ship tank was deployed to Meulaboh.

It was 31 December 2004, New Year's Eve. Five days earlier, a mega earthquake off the western coast of Sumatra, Indonesia, had unleashed a massive tsunami – later named the 2004 Boxing Day Tsunami – that struck many parts of Asia. At 2pm, the landing ship tank, RSS *Endurance*, carrying 470 SAF personnel, set sail from Tuas Naval Base towards Meulaboh for Operation Flying Eagle. It was the first of three landing ships tank that were eventually deployed, together with numerous fast craft and helicopters. Operation Flying Eagle remains the largest humanitarian aid and disaster relief operation that the SAF has undertaken.

The Navy had only days, instead of the usual weeks it would take, to prepare for a deployment on the scale of Operation Flying Eagle. ME6 Goh Nai Chuan, 50, then a Section Head in the Naval Logistics Command's Operational Logistics Planning Branch, was the lead logistics planner for the operation. He confessed that the demands "stretched my physical and mental resources to the limit, working close to 18 hours a day for at least three weeks and returning home every day at midnight".

Loading RSS *Endurance* in such a short time was a huge challenge because of the large quantities of items involved, and the uncertainty of their arrival times at the wharf. ME6 Ben Tay, 43, then a Section Head in the Naval Logistics Command's Operations Branch, recalled: "We had our loading team and equipment on standby 24/7 by the wharf to support loading operations and adapt to the situation as it unfolded. It was mentally and physically taxing." Within 72 hours, 51 vehicles and 350 pallets of equipment and supplies that could fill a football field were loaded on board RSS *Endurance*, stretching along the entire length of the 141m-long ship. This would have normally taken weeks to accomplish.

Supplies and equipment were transferred to Meulaboh from the landing ships tank, anchored off its coast, via the fast craft. These helped the survivors cope with the aftermath of the 2004 Boxing Day Tsunami.

Besides food and medical supplies, heavy equipment, such as forklifts and bulldozers, were also loaded onto the landing ships tank, to assist in the relief efforts at the disaster zone.

The speed at which all three services planned and executed this large-scale operation together "was testament to our interoperability", said COL (NS) Li Lit Siew, 49, then CO of RSS *Endurance*. "At the onset, we didn't know exactly where in Indonesia we would be deployed to and for how long. All we knew was that we had a mission to carry out and we didn't have a lot of time to prepare for it. The crew never complained despite the hard work, fatigue and uncertainty. At some points, they were pulling close to 24-hour shifts but they persevered. This filled me with immense pride and respect for them."

He recounted: "Once we were deployed, we had to rely on the combined ingenuity of all three services to overcome the challenges that we faced." For instance, on arrival at Meulaboh, the naval divers and the Army's combat engineers worked immediately together to establish landing sites amid debris that left many parts of the shoreline impassable, so that the landing craft could deliver the cargo ashore. On days that the Navy could not launch the landing craft due to rough seas, the Air Force's helicopters stepped in to keep aid flowing.

COL (NS) Li reflected: "There was cooperation across the services and this seamless interoperability could only be attributed to our tough and realistic training together and unity of purpose. Above and beyond its sheer magnitude, Operation Flying Eagle will always be a reminder of the professionalism and tenacity of our people. When the call came, we rose to the occasion and delivered. We made it happen."

POWERING THE NAVY

Marine Systems Operators conducting routine checks on RSS *Steadfast*'s engine in the Engine Room. Engineering crews aboard RSN ships are crucial in maintaining the health of all engines and machinery.

The Navy has built up the ability to surge its forces at the front line and wield its sharp edge. It achieved this by building competency in logistics and engineering, and investing in innovation and people development. Through steady advancements in engineering, combat systems support, training and human capital, the Navy has put in place a robust capability support system.

HONING HARDWARE

Navy engineers work shoulder-to-shoulder with industry partners as an integrated workforce to maintain the Navy's war-fighting capabilities. Industry workers partner ground units to ensure that systems, platforms and infrastructure are well maintained, defects are rectified promptly and capabilities are maintained through their envisaged lifespan. Proper care of equipment ensures their availability and ability to deliver cutting-edge capabilities on time, on demand.

The strong partnership between logistics and operational units is fundamental to the success of all naval operations. Before every sailing, the Naval Logistics Organisation (NLO) works alongside the crew to ensure the ship is ready. Once the ship is deployed, the NLO provides reach-back and additional spares support for the entire deployment. These systems and processes are exercised and stress-tested in peace to ensure the Navy is prepared for war.

Submarine maintenance is an example of a tightly knit engineering and logistics ecosystem. Working with Singapore Technologies Marine, the Navy's Submarine Maintenance and Engineering Centre has built up a local submarine-support capability – a notable achievement as this area demands the highest of engineering standards. In addition, the Navy has also adopted the US Navy's SUBSAFE system, a rigorous framework of work procedures, documentation and material control processes, to ensure the highest safety standards for maintenance work conducted on the submarines.

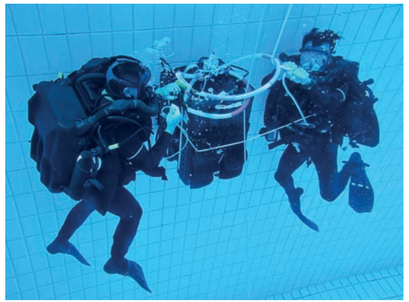
The NLO also spearheads innovation and the drive to infuse science and technology into the engineering and logistics system. At the systems level, the NLO recently introduced the concept of 'designing the support', which seeks to reduce support costs by designing support requirements into capability buys. On the littoral mission vessel, for example, systems were designed with open-architecture protocols to cater for easier integration of future capabilities. Decision-support systems with smart algorithms for data analytics assist the crew in responding swiftly when things go wrong. These make for smarter and more efficient logistics support.

Left: RSN personnel loading the Barak surface-to-air missile on board the *Victory*-class missile corvette, in preparation for a missile firing exercise in 2016. The NLO works closely with operational units in all deployments and exercises to ensure that all systems are in optimal condition to achieve mission success.

Below: An *Archer*-class submarine preparing for docking as part of its maintenance regime.

BUILDING UP HUMAN CAPITAL

The Navy's people are its most valuable assets. Each of its three professional corps anchors specific areas of expertise.



Naval officers are leaders groomed for command of the Navy's warships. Adaptable and dynamic, they are the Navy's strategists and war-fighting tacticians. Their development starts from Midshipman Wing and spans foundational knowledge of shipboard operations to the mastery of naval operations, leadership and warfare, to prepare them to take command and become future leaders of the Navy.

Military Experts pursue deep professional specialisation and expertise in their respective domains and comprise experts and engineers. Engineers begin their development at Midshipman Wing and drive capability design and system sustainability. They are future leaders of the Navy's engineering and logistics system. Experts are subject-matter experts of various domains. They undergo training at different points of their career at the Naval Military Experts Institute (NMI), the Navy's repository of domain knowledge and expertise, and become gurus of their respective domains.

Warrant officers are experts in tactical war-fighting and training, and form the backbone of the naval divers. Raised in the NDU, the naval divers are the Navy's elite force and undertake maritime special operations. They are highly trained, specialised and capable.

A professional corps that is relevant, innovative and good at

Left: Newly commissioned naval officers tossing their peak caps in the air during their commissioning parade, which concluded nine months of training.

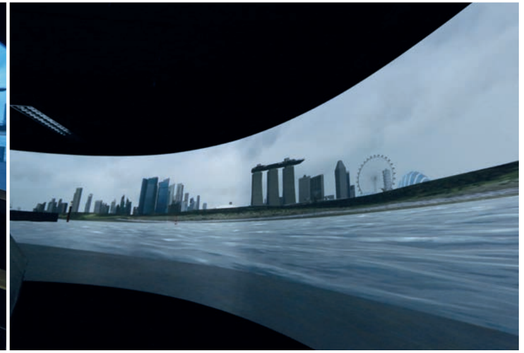
Top: Naval military expert trainees of the Weapon Systems vocation undergoing weapon-handling training during the Basic Specialisation Course in the NMI.

Above: NDU divers from the Clearance Diving Group conducting safety stops in the Sembawang Naval Base Dive Pool. Safety stops are part of deep diving drills that are critical for effective and safe diving operations at various depths.

Facing page: Graduands of a NDU Combat Diver Course during their underwater graduation parade. They would be posted to operational units such as the Underwater Demolition Group.

Right: Submariners undergoing helmsman training in the Submarine Training Centre, also known as RSS *Challenger*. Inaugurated in 2015, it provides a safe and realistic environment for submariners to train.

Below: ME3 To Yan Chern, deputy boat commander of a specialised marine craft, conducting navigation training at a simulator, which mimics the craft's cockpit. Here, the crew is able to train as a team to navigate and respond to emergencies.



Left: RSN personnel undergoing training at the Damage Control Trainer in Changi Naval Base. With over 20 training rooms, the trainer is able to simulate realistic scenarios of a ship in distress. It can roll a maximum of 15 degrees, replicating sea states of up to level four, where waves reach up to 2.5m high.

Above: RSN personnel undergoing helicopter firefighting training at the Singapore Aviation Academy. RSN personnel are put through realistic firefighting scenarios regularly to prepare them for any fire out at sea.

Left: RSN's naval medical personnel, trained in the field of hyperbaric medicine, demonstrating the functions of a recompression chamber on board MV *Swift Rescue*, during Exercise Pacific Reach 2010.

Right: RSN personnel participating in a run in Changi Naval Base before the end of the work day. The NMS has introduced a slew of initiatives to encourage RSN personnel to follow healthier diets and exercise regularly.

what it does is what gives the Navy its edge. Training establishes the strong foundations and professional grounding of the Navy's sailors. Training is geared towards accelerating the learning process, and enabling them to realise the full potential of the Navy's capabilities.

Individuals and teams achieve basic levels of shipboard competencies and bridge the gap between theory and reality when they undergo training in emulators, simulators and trainers. The set-ups provide rigorous training scenarios and can take the form of ship handling and submarine simulators and firefighting and damage control trainers for practical skills training, as well as naval warfare simulators to hone tactical acumen.

Once on the ships, the crew is put through a regular routine of readiness inspections and drills to put their training to the test. Making it through tough, rigorous and realistic training gives them the confidence to perform in operations.

Beyond training, the Navy encourages lifelong learning and offers upgrading opportunities in the form of courses and programmes at established civilian training institutions and agencies. Navy personnel are offered opportunities to pursue engineering diploma and degree programmes at local institutions. Knowledge acquired in the Navy also qualifies for professional accreditation, through professional institutions, such as the Institute of Maritime Engineering, Science and Technology.

The Navy depends on its people to chart the path ahead, and create knowledge and game changers. Investing in the education of the Navy's people is investing in the Navy's future.

CARE FOR THE SAILORS

Looking after the health and fitness of the Navy's people, and being able to provide comprehensive medical care for them are of the highest priority. The Navy Medical Service (NMS) has a comprehensive suite of medical capabilities, and improves the fitness and operational readiness of crew members through shipboard exercises, fatigue management and optimal work-rest cycles. At the front line, shipboard medical teams, comprising medics and a medical officer (or an Independent Duty Corpsman), provide medical care for sailors at sea. In cases requiring enhanced medical care, maritime medical support allows for the rapid evacuation of casualties by sea or air. For prolonged operations and where higher levels of medical support are required onsite, the NMS developed the Rapidly Deployable Maritime Container, a modular ISO-standard container with hospital-grade features.

The NMS also spearheads Singapore's underwater medicine research and development. In 2009, the NMS collaborated with the national healthcare system to open the Singapore General Hospital's Hyperbaric and Diving Medicine Centre to bring 24/7 diving and hyperbaric support to the region. These advances in underwater medicine allow the Navy to provide the necessary medical coverage and care for its divers and submariners.

The comprehensive care and the assurance the Navy provides to its men and women give them the confidence to operate at sea.

STRENGTH BEHIND THE SCENES

The full might of the Navy lies not only in its units at sea, but in the entire cadre of men and women, uniformed and non-uniformed, that looks after the readiness and sustainability of its platforms, and the training, development, safety and health of its people. They sustain the Navy's operations, buttress its foundations and strengthen its core. Together they power the Navy, allowing for sustained and prolonged operations at sea, and providing deadly firepower when called upon to do so.

Midshipmen conducting physical training on board RSS *Formidable* in the Indian Ocean in 2016. This was the first Midshipman Sea Training Deployment on a *Formidable*-class frigate.

THE IMPORTANCE OF BEING PREPARED

ME6 Toh Hai Liang, 45, currently the Head of the Integrated Operational Logistics Centre, outlined his experience in logistics planning when he was Head of the Fleet Logistics Branch in 2012.

In July 2012, when my team heard that the two Harpoon missiles launched from RSS *Formidable* hit their target in the Rim of the Pacific (RIMPAC) Exercise, we were just as exhilarated as those in the ship's Combat Information Centre. While the missile firing took all of a few seconds, my team of engineers and logisticians had taken months to prepare for it – devising a robust maintenance schedule for the frigate, and loading aviation spares for its S-70B naval helicopter on board.

A well-designed logistics plan is critical for achieving mission success and safety. You do not want the ship and helicopter to develop a critical defect in the middle of the Pacific Ocean, without the necessary engineering spares for rectification. In order for us to develop a robust logistics sustenance plan for our deployments, it is important for us to have an intimate understanding of the operational requirements of the ship and the mission. These high engineering standards and proper planning have enabled the successful and safe completion of all the Navy's deployments.

> "For a small Navy, these back-to-back deployments were no mean feat. It necessitated the development of a support system to prepare three different task groups for three different operations in three very different parts of the world."

The constant challenge for the Naval Logistics Command (NALCOM) is to ensure logistical readiness of all ships given finite resources. In fact, soon after RSS *Formidable* fired the missiles, RSS *Stalwart* sailed to Australia and New Zealand in August and RSS *Intrepid* was deployed for counter-piracy operations in the Gulf of Aden in September. For a small Navy, these back-to-back deployments were no mean feat. It necessitated the development of a support system to prepare three different task groups for three different operations in three very different parts of the world. In particular, modifying RSS *Intrepid* – a frigate designed for conventional naval warfare – to conduct counter-piracy operations was something that was unprecedented for our engineers from the Fleet and NALCOM. These modifications required us to fit additional cradles for additional rigid hull inflatable boats and their launch and recovery system, and more bunks for more crew members. This necessitated a return to the original blueprints to see how best these changes could be incorporated into the original design.

A warship at sea can have its essential machinery, such as engines, radars and electricity generators, running 24 hours a day, for days on end, as it journeys from one port to another. In the past, once the ships left harbour, they would be left to fend for themselves in terms of engineering support. Now, there is always a team of engineers and logisticians back at home, ready to answer to the ship's call 24 hours a day, 7 days a week. This gives confidence to the ships that they are well taken care of, wherever they are in the world. The safe return of the ship after a successful mission gives my team of engineers and myself great satisfaction, knowing that while most of our work is behind the scenes, we have played a key role in supporting the RSN's deployed force.

Enabling the ships to achieve mission success gives ME6 Toh Hai Liang and his team of engineers great satisfaction.

MAKING FAILURE WORK FOR SUCCESS

ME3 Kumaran Naidu, 42, Engineer in the Systems Readiness Engineering Centre (Weapons), shed light on its work in keeping the Navy operationally ready.

On one occasion, my team was given only 72 hours to rectify a faulty 76mm OTO Melara main gun before the ship had to sail for a multilateral exercise. Within a few hours, we discovered that a critical component, the loading tray re-cocking transmission, was malfunctioning. We would have to disassemble the main assembly from the gun and remove the component for repairs, before reassembling all the parts and running the functional tests – no easy feat when the gun comprises 10,000 components.

The ship's Operations Officer asked sceptically: "Is it even possible to fix it within 72 hours?" I smiled and got to work with the team. The first attempt failed, as did the second, but each failure made us more determined to find a solution. We finally did, and in time too.

Times like these put us to the test. Every defect presents a new challenge. Every major rectification becomes a defining moment.

Our work does not end when the ships leave harbour. Our Forward Engineering Support Teams accompany ships on major exercises to provide technical support to ensure that the critical systems on board continue to function optimally.

We do what we do because we take pride in the readiness of our ships and the capabilities of our systems. In times of war, we may have only one shot to get things right and so we must maintain a high state of readiness during peacetime. As the defenders of our seas, we owe it to Singaporeans to get it right – every time, any time, all the time.

ME3 Kumaran Naidu with a 25mm Typhoon gun under maintenance in the Ordnance System Branch, NALCOM, in Changi Naval Base. He is the Subject Matter Expert of the RSN's 76mm and 25mm Naval Guns.

ME2 Michelle Mok conducting a system check on one of the main switchboards on board the littoral mission vessel, *Sovereignty*, expected to be commissioned in 2017.The engineering systems on board the littoral mission vessels are automated.

HARNESSING THE PIONEERING SPIRIT

ME2 Michelle Mok, 37, Electrical Control Systems Supervisor on board the littoral mission vessel, *Sovereignty*, recollected her experience as a pioneer engineer for two types of ships.

When I first reported to the frigate, RSS *Intrepid*, as an Electrical Control Systems Operator in 2004, we were both new to the Navy. As the pioneer engineers of the frigate and its advanced systems, we not only had to learn how to 'power' the ship, we also had to lay the foundation for frigate operations, and develop enduring processes by which future crew members could operate the ship safely and efficiently. RSS *Intrepid* went on to accomplish many firsts for the Navy – including the inaugural firing of the Aster missile in 2008 and being the first RSN frigate to participate in counter-piracy operations in the Gulf of Aden in 2012.

Four years later, the Navy took delivery of another new ship – the littoral mission vessel. I sought to stir the pioneering spirit of RSS *Intrepid* in my team on board *Sovereignty*. The littoral mission vessels were designed to be game changers in maritime security operations, not just in the Singapore Strait but also farther afield, so as to protect Singapore's sea lines of communications. My team spent long hours tracing every wire and cable on board, and poring over manuals to establish safe operating procedures for the ship's engineering systems, not just for our generation but for many more to come.

I am honoured to have served on the pioneer crew of not one, but two ships. I believe that all sailors should continue to look ahead, breaking new ground so that the Navy can continue to grow from strength to strength.

FIRST SAILORS, THEN MEDICS

The Army and Air Force have combat medics, but only the Navy has Independent Duty Corpsmen. These Medical Military Experts are trained to diagnose medical conditions and prescribe appropriate medication. They manage cardiac arrest and trauma, and even perform basic surgical procedures on board ships, and they are able to do so independently, in the absence of a Medical Officer at sea.

They are also sailors in their own right. ME2 Jimmy Woo, 31, who served as a submarine Independent Duty Corpsman from 2010 to 2013, had to undergo the same rigorous training as every budding submariner.

He said: "We have the kind of experience that no other medics in the SAF would have. Being a submarine Independent Duty Corpsman is a tough job. Everyone on board is expected to know every nook and cranny of the submarine and how everything works. We are also trained to move around the boat blindfolded because we need to be confident how to find our way in the submarine if the lights go out. On board a submarine that moves underwater in congested sea lanes, we need to be alert and vigilant at all times to ensure a safe voyage for all."

During his deployments, he has had to perform many minor procedures independently. One of his most challenging cases was to remove an abscess on a crew member. The abscess was so painful that it affected the crew member's ability to perform his shipboard duties. In addition, the abscess, if left untreated, could have worsened and spread. Despite being restricted by the tight compartment space, ME2 Woo managed to successfully drain the abscess and the crew member was able to return to full duty.

As the only medical care provider at sea with the nearest medical facility miles away, Independent Duty Corpsmen often have to think on their feet and make split-second decisions to provide the most appropriate diagnosis and treatment during emergencies. ME2 Klaries Chua, 29, who has been sailing as an Independent Duty Corpsman on board the Navy's ships for more than four years, was put to the test during the search and locate operation for AirAsia flight QZ 8501, which crashed into the Java Sea en route from Surabaya to Singapore in December 2014. A crew member on board the landing ship tank, RSS *Persistence*, who had been on standby for fire-fighting following a helicopter sortie, felt giddy and breathless.

"The patient's blood pressure was low and his pulse rate was high; his skin was hot and sweaty. It was a tricky situation as a patient suffering from breathing difficulties would often panic, and compounded by stress, possibly even hyperventilate and lose consciousness," said ME2 Chua, who stressed the importance of administering appropriate treatment promptly to prevent complications.

"It was an intense experience. I was constantly running through scenarios in my head and how I would react to each of them, in case the patient's condition took a turn for the worse and required advanced medical care, which I might not be able to provide on board."

Hence, she always makes contingency plans, such as arrangements for medical evacuation, before each sail. "We have no room for mistakes."

Far left: ME2 Klaries Chua in the medical centre of a *Formidable*-class frigate. The frigates' medical centres possess the facilities of a small operating theatre and are capable of supporting surgical operations at sea.

Left: ME2 Jimmy Woo checking on a glucose drip in the Changi Naval Medical Centre. He is currently a Medical Operations Expert (Independent Duty Corpsman) at the Naval Medical Operations Centre.

NOT IN UNIFORM

Most people think of Navy personnel as uniformed officers. However, more than 400 non-uniformed personnel play equally important roles in the Navy. Equipped with skills in diverse disciplines, such as human resource, public relations or logistics, these Defence Executive Officers work alongside their uniformed counterparts in various departments. Four of them explained how they do their part for the Navy.

Helping sailors achieve their aspirations gives Ms Jeraine Toh the greatest satisfaction.

Ms Jeraine Toh, 31, Career Manager in Naval Personnel Department

After six years in the corporate sector, I wanted a change of environment and decided to join the public service. I applied for a job in the RSN, as I was drawn to its strong focus on family and its people.

I oversee our sailors' professional development from the day they join the Navy Family, charting their career paths and facilitating their postings with vocation experts.

Helping them achieve their aspirations gives me the greatest satisfaction. This ability to make a difference in their lives gives my job meaning and purpose.

Ms Korin He enjoyed travelling and working with foreign navies.

Ms Korin He, 41, Formation Finance Manager for Maritime Security Task Force and NDU

Previously, as the former Logistics Section Head in the *Formidable*-class frigate squadron, I ensured that our ships got the necessary logistics support ashore and at sea. Once, when I was the Liaison Naval Officer for RIMPAC, the deployed ship, RSS *Steadfast*, logged an urgent requirement for two spare parts, past midnight in the US. I arranged for the replacements to be flown there, and asked my American counterpart on board an aircraft carrier to loan the parts to the ship so it could still operate in the meantime. Working closely, we ensured that it was operationally ready by daybreak. This has shown me the importance of close friendships and working relationships. We can get even seemingly impossible things done.

Ms Yong Shu Fui finds sharing the Navy's stories with the public meaningful.

Ms Yong Shu Fui, 29, Head, New Media Engagement, Navy Information Centre

The Navy often operates out of the public eye, so most people do not quite understand how the Navy's work out at sea affects them back home.

My job is to tell stories about the Navy's operations and exercises using social media and I find it meaningful. Through these stories, hopefully more people will understand and appreciate the Navy's work in defending Singapore.

What makes my job particularly interesting is that I get to sail for operations and exercises and get a taste of the action myself, so that I can better tell these stories.

Helping the Navy grow via prudent expenditure is rewarding for Mr Gilbert Lin

Mr Gilbert Lin, 59, Head Financial Management Account Branch, Naval Logistics Department

Many call me 'The AOR Guy' as my signature and identity card number are required on most Approval of Requirement forms for all expenditures. My signature is not that easy to obtain – you must convince me that you have done the necessary checks and followed the right processes! I manage the operations cost budget and do management accounting. This involves putting in place a robust financial process to optimise the RSN's budget, ensuring budget sufficiency, sustainability and resilience. What I find most rewarding: helping to safeguard the use of resources, while enabling the RSN to grow and maintain its operational readiness, via its prudent expenditure in the appropriate areas.

SOUL FOOD, SO GOOD

His National Service stint as a gunner on a patrol vessel and his love for cooking prompted ME2 Winston Nah, 39, to re-enlist as a Naval Chef in 2003. Inspired by his mother, he started cooking at the age of eight. He took on several jobs in the food and beverage and retail industries, but none gave him the satisfaction he experienced in the Navy.

He observed: "On board ships, everyone, regardless of rank and position, lives and fights together. None are less important than the others. The chefs play a crucial role in keeping up the crew's morale. Good food not only fills the stomachs of hungry crew members but also helps to bring the team together. As strange as it may sound, I also relish the unique challenge of cooking at sea even as the ship pitches and rolls!"

Once, a whole tray of food spilled on the floor after the ship lurched and had to be discarded. On another occasion, he had to cook alone for five days as the other chef was unwell. Despite the challenging conditions, he spares no effort in whipping up meals that the crew look forward to after a day's hard work.

"On board ships, everyone, regardless of rank and position, live and fight together. None are less important than the others. The chefs play a crucial role in shaping the crew's morale. Good food not only fills hungry crew members but helps to bring the team together."

In his experience, homesick sailors crave local dishes such as *Hokkien mee*, *laksa* and *nasi lemak*, while his fish porridge, noodle soup and seafood *hor fun* are welcome respite for a young seafarer still getting accustomed to the seas. As the right ingredients may not always be available in foreign ports, he and his team have to be creative and make the most of what is available to replicate these local delicacies.

In 2014, he sailed on a three-month counter-piracy operation as the Chief Chef on the frigate, RSS *Tenacious*, preparing four meals a day for approximately 150 personnel. The ship planned to call into port after 17 days, but had to delay this by 12 days due to security concerns ashore. ME2 Nah recalled being worried by the depleting supply of fresh ingredients. The team came up with creative ways to prepare tasty dishes with mostly frozen ingredients, such as French toast made from frozen bread and frozen meat patties with different sauces. He declared: "We felt a sense of accomplishment at pulling through the 29 days at sea!"

His culinary standards do not come by chance. Besides attending the Navy-sponsored formal culinary courses, he studies online cooking videos and recipes for fresh ideas and techniques in his own time. Undeterred by the complexity and long preparation time of up to four hours, he occasionally prepares his signature dishes – chilli crab, braised duck rice and roast chicken rice.

ME3 Cindy Lam, Marine Systems Cluster Chief on RSS *Tenacious*, noted: "Winston's food tastes as good as that of the restaurants, but what really touches me is that he cooks with his heart and soul and he genuinely cares for us."

ME2 Nah's passion is fuelled by the happiness his food brings to the crew, who would exclaim: "This is good, you should take more!" and "What is it that you are cooking, Chef? It smells so nice!" He mused: "When I hear them saying these things, and when I see the big smiles and empty plates, I feel motivated to continue to cook my best."

A little taste of home goes a long way in keeping the morale strong. Everyone matters on board the ship, including the chefs.

ME2 Winston Nah is motivated by the happiness that his food brings to the crew of RSS *Tenacious*, seen here in October 2016.

MUCH MORE THAN A SCHOOL

Unlike a conventional classroom with overhead projectors, rows of tables and chairs and a whiteboard, the Platform Systems Emulator Centre in the Naval Military Expert Institute (NMI) has computer terminals lining its walls, a huge instructor's console in the middle and a big screen hanging at each side. This is where 10 trainees were learning to be Marine Systems Operators on board the landing ships tank.

The lesson for the day was learning how to get the ship's engines ready for sea and the trainees were busy getting hands-on training on the various switchboards that controlled the engines of the 141m-long vessel. On board the real ship, NMI alumni would be moving a warship that could carry dozens of military vehicles, several hundred troops, fast landing craft and even helicopters. The responsibility is heavy, and the trainees take their lessons seriously.

The instructor, ME2 Mark Pyne Pennefather, 30, who served as a Marine Systems Supervisor on board RSS *Resolution* before he joined NMI in November 2015, nodded approvingly as the trainees compared notes. In NMI, self-directed learning is key and the instructors act as facilitators rather than lecturers who download knowledge to their students.

ME1 Ng Cheng Rong, 22, had graduated with a diploma in a field unrelated to marine engineering and was confronted with a steep learning curve. He said: "Instructor Mark is a very patient teacher. Whenever I am in doubt, he would go through all the processes and systems with me and answer any queries I have."

Agreeing, ME1 Kyle Lee, 21, said that instructors like ME2 Pennefather have made a difference in their learning. "Whenever we have queries, our instructors here in NMI make it a point not to simply 'spoon-feed' us with the answers, but to actively guide us towards the solutions to our questions instead."

"Whenever we have queries, our instructors here in NMI make it a point not to simply 'spoon-feed' us with the answers, but to actively guide us towards the solutions to our questions instead."

For these new sailors, who have yet to experience shipboard life, these instructors are mentors who impart essential 'survival skills' that will come in useful after they graduate from the course. Even as ME2 Pennefather busies himself with this batch of trainees, he regularly heads over to the landing ships tank to interact with his earlier batches of trainees, to ensure that they are adjusting well to life on board ship.

To trainees like ME1 Arunkumar s/o Elangkovan, 23, the dedication and professionalism of NMI instructors like ME2 Pennefather extend beyond their scope of work. When the trainee's grandmother was critically ill in hospital, ME2 Pennefather wasted no time in granting him compassionate leave. "Instructor Mark told me to just go and see my grandmother. He said that family was important and that really touched me," recalled ME1 Arunkumar.

For ME2 Pennefather, nothing could be more satisfying than receiving a handmade "Thank You Board" from the class during Instructors' Day. The trainees had put together group photos of themselves with him on the board, and written heartfelt words of appreciation for him. He said: "Receiving it was a nice surprise and really filled me with pride. I am happy that I have been able to make a difference in the training and lives of these junior sailors and hopefully, they will carry this training that they have received here in NMI with them, and pass it on to the next generation."

The Navy Family forming the words "I Heart Navy" at the parade square of RSS *Panglima* - Changi Naval Training Base during the RSN's 46th anniversary on 5 May 2013.

SIGNIFICANT MOMENTS OF THE RSN

1960s

5 MAY 1967: The new white-and-red naval ensign was raised for the first time at Telok Ayer Basin by the Singapore Naval Volunteer Force. It had its headquarters on board RSS *Singapura*. It had two seaworthy craft, RSS *Pangilma* and RSS *Bedok*, and was run by 89 mobilised personnel and 278 volunteer officers and men. Picture: Singapore Press Holdings

SEPTEMBER 1968: The Singapore Naval Volunteer Force assumed the name Sea Defence Command and moved from Telok Ayer Basin to Pulau Blakang Mati (now Sentosa).

DECEMBER 1968: The Sea Defence Command was renamed the Maritime Command.

2 JANUARY 1969: The School of Maritime Training was set up with the assistance of the Royal New Zealand Navy to train prospective seamen.

NOVEMBER 1969: The first batch of National Servicemen join the Navy.

1970s

19 DECEMBER 1970: RSS *Independence*, the first of six patrol craft, was commissioned.

1 JANUARY 1971: RSS *Endurance*, the first of five former United States (US) Navy *County*-class landing ships tank, was commissioned.

12 DECEMBER 1971: The SAF Diving Centre was formed with a small group of 16 local divers in Senior Camp in Sembawang. In 1975, it was renamed the Naval Diving Unit.

26 JANUARY 1974: Brani Naval Base was opened by Singapore's founding Prime Minister, Mr Lee Kuan Yew.

31 JANUARY 1974: The Independence-class patrol craft were scrambled to intercept the terrorists-hijacked the ferry, *Laju*. The Maritime Command ships and the Marine Police boats successfully intercepted *Laju* and forced it to a stop at Eastern Anchorage.

3 MARCH 1974: RSS *Sea Wolf* successfully conducted the first Gabriel missile firing. With this, the Maritime Command became the first Navy in this region to successfully fire an anti-ship missile.

1 APRIL 1974: The Midshipman School enrolled its first batch of naval officers consisting 12 regulars and 30 national servicemen.

SEPTEMBER 1974: The Maritime Command conducted Exercise Eagle – the SAF's first bilateral exercise with a foreign counterpart.

22 JANUARY 1975: RSS *Sea Wolf*, RSS *Sea Lion* and RSS *Sea Dragon*, the first three of six *Sea Wolf*-class missile gunboats, were commissioned.

1 APRIL 1975: The Maritime Command was accorded the status of a full service and renamed the Republic of Singapore Navy (RSN).

APRIL 1975: The RSAF Skyvan of 121 Squadron flew its first maritime air surveillance (MAS) mission after the concept of MAS was developed. Its six-man crew included an Action Information Co-ordinator and a radar operator from the Navy.

2 MAY 1975: The RSN ships sailed out to render assistance to Vietnamese 'boat people' during Operation Thunderstorm.

25 MAY 1976: RSS *Mercury* and RSS *Jupiter*, two former US Navy *Bluebird*-class minesweepers, arrived in Singapore from San Francisco after battling three super typhoons en route and completing a 13,000km voyage.

1980s

EARLY 1980s: The RSN articulated its strategic role in the protection of Singapore's sea lines of communication.

24 MARCH 1980: The RSN's first Tactical Training Centre was opened in Brani Naval Base.

20 OCTOBER 1981: Twelve Swift-class coastal patrol craft were commissioned.

29 JANUARY 1983: The naval divers were activated to assist in the search and recovery operation of two cable cars that had fallen into the waters off Jardine Steps after an oil rig caught on the cables.

25 AUGUST 1984: A new two-compartment walk-in hyperbaric chamber was commissioned at the Naval Diving Unit. It was Singapore's main centre for treating decompression sickness.

26 SEPTEMBER 1984: The Naval Logistics Computer Centre was opened at Brani Naval Base to computerise the logistics support in the RSN.

MARCH 1985: The RSN embarked on a Joint Technician Diploma Training Scheme with Singapore Polytechnic to meet the need for more highly skilled personnel.

JANUARY 1986: The Naval Logistics Command (NALCOM) was established to orchestrate logistics support for the RSN's ships and shore installations.

JANUARY 1987: The Coastal Command (COSCOM) was established to ensure the safety and security of the Singapore Strait and its approaches.

APRIL 1987: The RSN implemented the Non-Uniformed SAF Scheme alongside the rest of the SAF.

15 OCTOBER 1987: RSS *Sea Hawk* conducted the RSN's first successful Harpoon missile firing.

1 APRIL 1988: The Computer Recall Information Monitoring System was implemented to administer and monitor the recall status of active personnel.

1 APRIL 1989: The RSN embarked on the commercialisation programme to optimise resources and save costs.

21 SEPTEMBER 1989: RSS *Victory* conducted the RSN's first successful torpedo firing.

1990s

29 JULY 1990: RSS *Victory* conducted the missile corvette's first Harpoon missile firing.

9 AUGUST 1990: The RSN held the first National Day Presidential Sea Review. Picture: Ministry of Information and the Arts Collection, courtesy of National Archives of Singapore

18 AUG 1990: RSS *Victory*, RSS *Valour* and RSS *Vigilance*, the first three of six Victory-class missile corvettes, were commissioned.

25 MARCH 1991: The first Macintosh-equipped Computer-Aided Instruction Centre at the School of Naval Training was opened.

22 AUGUST 1991: Two *Victory*-class missile corvettes set sail for the missile corvettes' longest and farthest sea deployment then for Exercise Southern Friendship. It was a 10-week deployment that covered 22,000km and culminated in the Royal New Zealand Navy's 50th Anniversary International Naval Review in Auckland.

4 JANUARY 1992: The RSN's first female Naval Officers were commissioned.

23 MARCH 1992: The RSN crest was unveiled on the RSAF's Skyvan and its Maritime wing was declared operational.

16 MAY 1992: The missile corvette Substation Centre at Tuas Naval Base was inaugurated.

8 JULY 1992: The Indo-Sin Coordinated Patrols, a collaborative effort by the RSN, Police Coast Guard, Indonesian Navy and Indonesian National Police, was established to deter sea robberies in the Singapore Strait and Phillip Channel.

9 JUNE 1994: RSS *Sea Lion* conducted the RSN's first Mistral missile firing.

18 JULY 1994: The RSN completed its organisational restructuring with the inauguration of the Training Command (TRACOM). With this, the RSN comprised Fleet, COSCOM, TRACOM, NALCOM and six departments at its Headquarters.

2 SEPTEMBER 1994: Tuas Naval Base was opened by Prime Minister Mr Goh Chok Tong.

23 MAY 1995: The Automated Warehouse with the associated Automated Storage and Retrieval System was commissioned in Tuas Naval Base.

7 SEPTEMBER 1995: The first Damage Control Trainer at Sembawang Camp was inaugurated.

7 OCTOBER 1995: Four *Bedok*-class mine countermeasure vessels were commissioned.

8 APRIL 1996: The pioneer batch of RSN submariners departed for submarine training in Sweden.

5 OCTOBER 1996: RSS *Fearless*, RSS *Brave* and RSS *Courageous*, the first three of twelve locally designed and built *Fearless*-class patrol vessels, were commissioned.

1 FEBRUARY 1997: The Combat-Technician scheme was implemented. Naval specialists were trained as systems operators and technicians and perform systems maintenance in addition to their war-fighting roles. →

19 FEBRUARY 1997: The Fokker-50 maritime patrol aircraft attained full operational capability.

30 MAY 1997: A new Sembawang training camp for the Naval Diving Unit was opened by Deputy Prime Minister and Minister for Defence, Dr Tony Tan.

6 MAY 1997: The RSN supported the conduct of the inaugural International Maritime Defence Exhibition and Conference (IMDEX) Asia.

10 SEPTEMBER 1997: RSS *Valour* conducted the RSN's first Barak missile firing.

DECEMBER 1997: The RSN deployed its ships and naval divers to the Musi River near Palembang to assist the Indonesian Armed Forces in its search and locate operations for SilkAir flight MI 185.

29 APRIL 1999: The Fokker-50 maritime patrol aircraft conducted the RSN's first air-launched Harpoon missile firing.

17 SEPTEMBER 1999: The Institute of Naval Technology and Operations (INTO) and Institute of Marine Systems (IMS) were inaugurated to meet the training needs of the Combat-Technician scheme.

11 SEPTEMBER 1999: The RSN deployed to Timor Leste for the United Nations-sanctioned peacekeeping operation code-named Blue Heron. Between 1999 to 2003, the RSN's landing ships tank brought medical aid and relief supplies to Timor Leste.

2000s

18 MAR 2000: RSS *Endurance* and RSS *Resolution*, the first two of four locally designed and built *Endurance*-class landing ships tank, were commissioned.

APRIL 2000: The Integrated Workforce, comprising civilians from Singapore Technologies Engineering and engineers and logisticians from NALCOM, was implemented.

5 MAY 2000: RSS *Endurance* set sail for the RSN's first round-the-world voyage in Sail Navy 2000. The ship sailed over 25,000 nautical miles, visited nine ports and sailed through the Panama and Suez canals during the four-month deployment.

22 JULY 2000: RSS *Conqueror* was the first of four Challenger-class submarines to be commissioned.

19 SEPTEMBER 2000: RSS *Resolution* conducted the landing ship tank's first Mistral missile firing.

2 OCTOBER 2000: The RSN hosted the first multilateral submarine rescue exercise in the Western Pacific region code-named Pacific Reach involving four submarines, four support ships and their submarine rescue systems.

22 MARCH 2001: Changi Naval Base hosted its first aircraft carrier, the USS *Kitty Hawk*.

11 JUNE 2001: The RSN hosted the 1st Western Pacific Mine Countermeasure Exercise and the 1st Western Pacific DIVEX involving 16 countries, 15 ships and 1,500 personnel.

19 DECEMBER 2002: The Integrated Training Workforce, a collaboration between the RSN and ST Education and Training Pte Ltd to improve the quality of training in the RSN, was inaugurated.

27 OCTOBER 2003: The RSN deployed to the Northern Arabian Gulf to join multinational counter-terrorism efforts in Iraq in an operation code-named Blue Orchid. Between 2003 and 2008, five *Endurance*-class landing ships tank deployments protected the Al-Basrah Oil Terminal, trained Iraqi personnel and provided medical assistance to locals.

5 MARCH 2004: The Tuas PERS Hub, a one-stop, customer-centric centre to provide personnel and career management services, was launched.

21 MAY 2004: Changi Naval Base was opened by Prime Minister Mr Goh Chok Tong.

20 JULY 2004: The Malacca Straits Sea Patrol to enhance the security in the Straits of Malacca and Singapore by Indonesia, Malaysia and Singapore was launched. In 2008, Thailand became a full member of the Malacca Straits Patrol.

31 DECEMBER 2004: The RSN deployed three landing ships tank to Medan, Banda Aceh and Meulaboh in Indonesia, and Phuket in Thailand, for the humanitarian assistance and disaster relief operation code-named Operation Flying Eagle, in response to the 2004 Boxing Day Tsunami.

1 APRIL 2005: The Enterprise System, used to manage support and logistics requirements, was introduced.

21 MAY 2005: The RSN organised the inaugural Western Pacific Naval Symposium Multilateral Sea Exercise.

27 JANUARY 2006: The RSS *Pangilma* - Changi Naval Training Base, the new premises of the TRACOM and the RSN's training schools, facilities and infrastructure, was opened.

10 MARCH 2007: The groundbreaking ceremony of the Changi Command and Control Centre in Changi Naval Base took place.,

5 MAY 2007: RSS *Formidable*, the first of six *Formidable*-class frigates, was commissioned.

2 APRIL 2008: RSS *Intrepid* conducted the inaugural firing of the Aster Missile system in France.

11 JUNE 2008: RSS *Steadfast* participated for the first time in the Rim of the Pacific (RIMPAC) Exercise in Hawaii, the world's largest multilateral exercise.

1 OCTOBER 2008: The RSN and the Singapore General Hospital signed a Memorandum of Understanding to jointly develop hyperbaric medicine and provide recompression treatment to divers in Singapore.

19 JANUARY 2009: The Maritime Security Task Force was established.

19 APRIL 2009: The RSN deployed to the Gulf of Aden to join international counterpiracy operations under the ambit of multinational Combined Task Force 151 (CTF 151). Since then, the SAF has deployed five task groups and a maritime patrol aircraft detachment to the Gulf of Aden.

27 APRIL 2009: The Information Fusion Centre, a regional maritime security information-sharing centre set-up, was inaugurated. On 12 May, it hosted the inaugural Maritime Information Sharing Exercise.

13 MAY 2009: The RSN hosted the inaugural International Maritime Security Conference themed "Safe and Secure Seas for All" held in conjunction with IMDEX Asia.

2010s

JANUARY 2010: The RSN assumed command of multinational CTF 151 for the first time. To date, the RSN has assumed Command of CTF 151 on four occasions.

1 APRIL 2010: Military Domain Experts Scheme (MDES), the Enhanced Officers Scheme and the Enhanced Warrant Officers Scheme were introduced.

19 APRIL 2010: The first Military Domain Experts Course 1 (MDEC 1) was conducted for future Naval Warfare System Engineers in conjunction with the 64th Midshipman Course.

17 AUGUST 2010: MV *Swift Rescue* participated in the submarine escape and rescue exercise code-named Pacific Reach for the first time.

15 MARCH 2011: The first batch of 19 Military Experts graduated from the inaugural Naval Warfare Specialisation Course, which trains Military Experts to undertake the roles of Cluster Chiefs on board ships.

11 OCTOBER 2011: TRACOM introduced Mobile Learning to facilitate self-directed learning.

2 DECEMBER 2011: RSS *Archer*, the first *Archer*-class submarine, was commissioned.

23 JANUARY 2012: The RSN-Institute of Maritime Engineering, Science and Technology (MarES) Streamlined Accreditation Programme was launched.

15 MAY 2012: The Sikorsky S-70B Seahawk naval helicopter squadron attained full operational capability.

16 MAY 2013: The RSN supported the inaugural International Naval Engineering Conference held in conjunction with IMDEX Asia.

12 JULY 2013: The Maritime Training and Doctrine Command (MTDC), comprising the Naval Military Experts Institute, Doctrine and Readiness Group, and Headquarters MTDC, was established.

29 OCTOBER 2013: The RSN led the international response to maritime counterterrorism in the first Exercise Highcrest, an exercise jointly organised by the MINDEF and Ministry of Home Affairs.

28 DECEMBER 2014: The RSN deployed its ships with RSAF helicopters in support to assist the Indonesian authorities in search and locate operations for the missing AirAsia flight QZ 8501 in the Java Sea.

MARCH 2015: The RSN launched its strategic redesign to become sharper, smarter and stronger for the future.

11 MARCH 2015: The RSS *Challenger* - Submarine Training Centre was officially opened.

AUGUST 2015: The RSN fired the K-STER Expendable Mine Disposal System at the 6th Western Pacific Mine Countermeasure Exercise for the first time.

15 SEPTEMBER 2015: The Navy Medical Service deployed the Rapidly Deployable Maritime Containers for surgeries for the first time on board RSS Endeavour during Operation Surya Bhaskara Jaya.

29 MAY 2016: The RSN co-hosted the 2nd Submarine Operational Safety Conference with the Republic of Korea Navy in South Korea.

18 JUNE 2016: RSS *Steadfast* was the first non-US ship to lead a multinational group sail.

NOVEMBER 2016: The RSN commenced operational testing and evaluation of unmanned surface vehicles for mine countermeasure operations.

11 JANUARY 2017: The Victory-class missile corvette's ScanEagle Unmanned Aerial Vehicle attained full operational capability

JANUARY 2017: The RSN received approval to acquire unmanned surface vehicles for maritime security operations.

5 MAY 2017: RSS *Independence*, the first littoral mission vessel, was commissioned.

15 MAY 2017: The RSN will host the International Maritime Review as part of its Golden Jubilee celebrations.

Picture: Straits Times Press for the RSN

The *Formidable*-class frigate, RSS *Tenacious*, in the Gulf of Aden for counter-piracy operations during Operation Blue Sapphire in 2014.

CONTRIBUTING to the REGION AND BEYOND

BUILDING RELATIONSHIPS AT SEA

The RSN contributes to the expansion of Singapore's policy space by making friends and sustaining strong relationships with fellow navies in the region and beyond. In today's environment, security threats are increasingly complex and transnational and countries need to work together to deal with them effectively. Building relationships with friends and partners improves trust and interoperability and makes it easier to tackle maritime concerns and security challenges together.

TRAINING WITH FRIENDS

The RSN's first bilateral exercise was with the Indonesian Navy in 1974. Exercise Eagle Indopura, conducted annually till today, is also the SAF's longest-standing bilateral exercise. The bilateral efforts between both navies have increased to include Exercise Pandu, involving divers from both navies, and joint socio-civic activities, such as the Surya Bhaskara Jaya operations. The RSN has also established long-standing bilateral exercises with the Royal Brunei Navy since the late 1970s, and with the Royal Malaysian Navy and the Royal Thai Navy since the early 1980s. The RSN has also conducted combined missile firings with the Royal Thai Navy in 2002 and 2009. In 2016, the RSN's landing ship tank became the first foreign warship to call into Vietnam's Cam Rahn Bay in 14 years.

The RSN also engages partners outside the region, such as the Royal Australian Navy, People's Liberation Army (Navy), French Navy, German Navy, Indian Navy, Japanese Maritime Self-Defence Force, Royal New Zealand Navy, Royal Swedish Navy, Royal Navy and US Navy. The RSN's relationships and interoperability with these countries have strengthened through the years. For example, exercises with the Indian Navy, which have taken place annually since 1994, have evolved from simple anti-submarine warfare exercises to weapon firings and complex naval war-fighting exercises. Similarly, the annual Singapore-US Cooperation Afloat Readiness and Training exercise has grown in scope and complexity, regularly featuring combined weapon firings, anti-submarine and anti-air exercises. The RSN has also been calling on the ports in China, such as Shanghai and Qingdao, and in 2015, initiated Exercise Maritime

RSN ships receiving a warm welcome from the Indonesian Navy during Exercise Eagle in 1974.

Top left: The Chief of Navy of the RSN, RADM Ng Chee Peng (third from right), the Chief of Navy of the Royal Malaysian Navy, Admiral Tan Sri Abdul Aziz (third from left), and senior commanders from both navies posing for a photo, after unveiling the Exercise Malapura logo at the Fleet Command Building in Changi Naval Base in 2014. The unveiling marked the 30th anniversary of the exercise.

Top right: RSN and Royal Brunei Navy officers at a shore simulator training session in Changi Naval Base during Exercise Pelican in 2010.

Above: His Thai Majesty's Ship (HTMS) *Naresuan* (foreground) and RSS *Intrepid* conducting naval drills in the Andaman Sea during Exercise Singsiam 2015.

Right: SLTC Jerica Goh, Head Naval Training, receiving a bouquet on behalf of the RSN delegation from a senior commander of the Vietnam People's Navy, at Cam Ranh International Port in March 2016. RSS *Endurance*, an *Endurance*-class landing ship tank, was the first foreign warship to visit the port after its official reopening on 8 March 2016.

Top left: An RSAF CH-47SD Chinook helicopter airlifting an army light strike vehicle from the deck of the RSN's *Endurance*-class landing ship tank off Shoalwater Bay, Australia, during Exercise Trident 2016. The exercise was inaugurated in 2013, and involves personnel and units from all three services of the SAF and Australian Defence Force.

Above: RSN and Indian Navy ships in a naval formation in the Singapore-India Maritime Bilateral Exercise 2015 in the South China Sea. The RSN's *Archer*-class submarine, RSS *Archer*, led the formation, followed by (left to right) INS *Satpura*, RSS *Supreme* and INS *Kamorta*. This was the first time an *Archer*-class submarine exercised with the Indian Navy.

Left: Sailors from the RSN's *Formidable-class* frigate, RSS *Intrepid*, bidding farewell to the People's Liberation Army (Navy)'s *Jiangkai* II-class frigate, *Yulin*, after the success of the inaugural Exercise Maritime Cooperation 2015 in the South China Sea. The four-day exercise involved both warships and the RSN's *Victory*-class missile corvette, RSS *Valiant*.

Cooperation – the RSN's first bilateral exercise with the People's Liberation Army (Navy). In addition, the RSN regularly conducts Passage Exercises with navies whose ships transit through the region, such as the Japanese Maritime Self-Defence Force and French Navy, to build interoperability and strengthen friendships at sea.

The RSN also actively participates in multilateral exercises in the region, which are opportunities for navies to collectively address broader security issues. For instance, it has taken part in exercises held under the 1971 Five Power Defence Arrangements between Australia, Malaysia, New Zealand, Singapore and the United Kingdom – the world's second oldest military partnership. These exercises have gone beyond honing conventional war-fighting capabilities to dealing with contemporary security threats.

The RSN also deploys beyond the region for multilateral engagements. These provide good training value and are opportunities for the RSN to benchmark itself against other established navies. Since 2008, the RSN has participated in the RIMPAC Exercise, the world's largest multilateral exercise hosted by the US Navy. In RIMPAC, the RSN's frigates not only conduct live missile firings, but have taken on a range of leadership appointments, including Commander Task Unit and the first non-US Navy Commander Task Group to lead the multinational group sail from Okinawa, Japan, to Hawaii, where RIMPAC is held. The RSN is also a regular participant in the Royal Australian Navy-hosted Exercise Kakadu, often undertaking warfare commander duties.

Through these regular interactions and exercises, the RSN has built a network of friends and partners in the region and beyond.

Officers from Australia, Malaysia, New Zealand, Singapore and the United Kingdom planning the operations for Exercise Bersama Lima in Singapore in 2009. The exercise is a major Five Power Defence Arrangements joint exercise involving air, land and maritime forces from the member countries.

CONTRIBUTING TO REGIONAL SECURITY

The RSN actively advocates practical cooperation and operational arrangements to strengthen the regional security architecture. The RSN sees these efforts as sustainable and effective means to address the region's growing maritime security challenges, which range from piracy and sea robbery to maritime terrorism and long-standing maritime and territorial disputes. These varied and complex issues cannot be addressed by a single country or navy and will require the collective effort of global stakeholders to ensure that the seas remain safe and secure for all.

An active participant in the Western Pacific Naval Symposium (WPNS), the RSN regularly hosts the WPNS Multilateral Sea Exercise and co-hosts the Western Pacific Mine Countermeasures Exercise (after hosting the inaugural exercise in 2001) to foster greater collaboration among regional navies. The RSN also supported the adoption of the Code for Unplanned Encounters at Sea (CUES) by the WPNS in 2014, and incorporated the use of CUES in the 2015 edition of the symposium's sea exercise to build confidence and foster better communication between navies.

The RSN also plays an active role in the Association of Southeast Asian Nations (ASEAN) Defence Ministers' Meeting-Plus (ADMM-Plus). In 2016, the RSN and the Royal Brunei Navy co-hosted a combined ADMM-Plus Maritime Security and Counter-Terrorism

Left: Fleet Commander, COL Chew Men Leong (seventh from right), with senior commanders on board the *Endurance*-class landing ship tank, RSS *Persistence*, during the inaugural WPNS Multilateral Sea Exercise during 2005. Sailing behind were warships of other nations.

Right: Naval vessels screening a 'hijacked' merchant vessel, as boats carrying special forces close in for boarding, during the ADMM-Plus exercise in the South China Sea in 2016. The exercise to strengthen interoperability against maritime terrorism involved 18 countries.

Exercise at sea, to build interoperability and sharpen operational responses when dealing with maritime security threats. The combined exercise, which also included a land phase, involved more than 3,500 personnel, 18 naval vessels and special-forces teams from 18 countries. Singapore will co-chair the ADMM-Plus Experts' Working Group on Maritime Security with South Korea from 2017 to 2020.

Timely information sharing is a key enabler in tackling trans-boundary maritime security threats. In 2009, the RSN established the Information Fusion Centre (IFC) to provide a platform for navies, law enforcement and maritime agencies, as well as shipping companies, to share information and collaborate closely in the event of maritime security incidents. Today, navies and coast guards from 23 countries have attached international liaison officers to the IFC, which has also established linkages with more than 70 operational centres globally.

The RSN has also sought to provide thought leadership on common maritime security issues. The International Maritime Security Conference, co-hosted by the RSN and the S. Rajaratnam School of International Studies once every two years, provides a platform for navy leaders from around the world to meet and share perspectives on ways to strengthen regional peace and stability, as well as develop frameworks for cooperation and collaboration. Topics discussed have included the importance of ensuring the safety, security and success of the international maritime system, and the need to embrace a cooperative security approach to build

Second Minister for Defence, Dr Ng Eng Hen, giving his opening address at the inaugural International Maritime Security Conference hosted by the RSN. Held every two years since 2009, it draws navy and air force chiefs, coast guard senior officers and maritime academics.

capacity to address a widening array of threats. Such dialogues have paved the way for greater cooperation among navies, particularly in areas such as maritime security, counterterrorism, and humanitarian assistance and disaster relief.

COLLABORATING IN UNDERWATER SAFETY

Currently, nearly 300 submarines operate in the Asia Pacific region and the number will only increase. The congested shipping environment, coupled with the shallow waters in South China Sea and Malacca Strait, increases the risk of underwater accidents involving submarines, which are almost always catastrophic. Furthermore, the consequences go beyond the loss of lives and platforms. Underwater accidents can fuel regional tensions and lead to miscalculations at sea. The RSN has developed a niche submarine rescue capability since the early 2000s and strives to enhance submarine safety for the region. The RSN operates MV *Swift Rescue*, a specially designed vessel that is capable of conducting underwater submarine rescue, and has entered into submarine rescue arrangements to offer its services, when required, to other navies, including those from Australia, Indonesia, South Korea, the US and Vietnam. The RSN is working with the navies from India, Malaysia and Thailand to establish similar agreements.

In 2000, the RSN hosted the first multilateral submarine rescue exercise in the Pacific, Exercise Pacific Reach, to strengthen interoperability in submarine rescue operations among the submarine-operating navies. MV *Swift Rescue* deployed to South Korea for the 2016 edition of this exercise, where its rescue

Foreign military observers and participants on board MV *Swift Rescue*, watching the launch of the submersible rescue vehicle, Deep Search and Rescue Six, in a submarine rescue and escape exercise, Pacific Reach, in 2010. The RSN is the first in Southeast Asia to acquire such capabilities.

submersible conducted mating exercises with submarines from Australia and South Korea.

As submarine rescue is reactive in nature and a race against time, the RSN is a strong advocate of measures to prevent underwater accidents. To this end, it has embarked on three initiatives.

First, it has been encouraging the sharing of submarining experiences and best practices. The 2nd Submarine Operational Safety Conference co-hosted by the RSN and ROKN in 2016 was attended by flag officers from 19 submarine operating countries, making it the largest gathering of flag-rank submariners in the Asia Pacific region to date.

Second, the RSN has been encouraging the sharing of non-sensitive information, such as the location of fishing concentrations, mobile oil rigs and oil tankers, via a Submarine Safety Information Portal, to enhance the safety of submerged navigation.

Lastly, the RSN proposes to establish an Underwater CUES – a set of non-binding guidelines that both submarines and ships can follow independently to prevent an underwater accident.

ACHIEVING SAFE AND SECURE SEAS TOGETHER

In an increasingly complex security environment, nurturing good relationships and building strong interoperability with other navies are important. A network of friends and partners that cooperate and collaborate well together will sharpen the region's collective edge against the growing spectrum of threats. Through mutual trust, understanding and cooperation, the RSN and its friends and partners can achieve safe and secure seas for all.

OPERATIONS FAR AWAY FROM HOME

COL Richard Lim, 41, Commander 3rd Flotilla, reflected on his experience in five operations to keep the peace far beyond Singapore's shores.

I am often asked why the RSN deploys its ships for far-flung operations that do not seem relevant to Singapore, such as Operation Blue Orchid to reconstruct postwar Iraq, and Operation Blue Sapphire against piracy in the Gulf of Aden. Transnational threats have emerged in our interconnected world. Securing the sea lanes in a part of the world far away directly affects Singapore, a maritime and trade-dependent nation. Doing our part to help others and working with like-minded partners place Singapore in good stead to advance the culture of collaboration, much needed in dealing with the challenges of the changing security environment.

In my first such operation, the first Operation Blue Orchid deployment in 2003, I served as the task group Operation Officer on RSS *Endurance*. Deploying to a postwar environment for some three to four months and working with coalition forces some 4,000 nautical miles away from Singapore was unimaginable before we had the *Endurance*-class landing ships tank, which had a new suite of capabilities. Previously, under Operation Blue Heron in East Timor in 1999, the *County*-class landing ship tank, RSS *Excellence*, served only as a transport platform doing 'milk runs' for military vehicles and equipment. So the excitement for Operation Blue Orchid was palpable.

One of our tasks was to patrol and conduct security sweep operations in the Northern Arabian Gulf, specifically in the vicinity of the Al-Basrah Oil Terminal – Iraq's lifeline in the export of oil to the world. We knew that the threat there was real and we could never be certain

Since 2003, COL Lim has participated in several peace support and counter-piracy operations, contributing to security beyond the region.

the ships being screened did not have hostile elements aboard. We worked out detailed responses to unfamiliar scenarios, developed sensible rules of engagement and tested them through rigorous table-top exercises. Training was extensive and tough, but we learned a lot fast.

The operational experience honed our tactics, techniques and procedures. At the strategic level, we learned to deploy for extended periods and at extended ranges from Singapore. We also learned from working alongside other navies that were experienced in peace support operations. The more times we deployed, the better we became.

Around 2009, the spike in piracy in the Gulf of Aden meant an urgent need to contribute to counter-piracy operations to protect global maritime commerce. Ships that pass through the Suez Canal in Egypt – a vital sea lane between ports in Europe and Asia – sail through this area and the concentration of unprotected shipping there made it a lucrative target for sea pirates. Under a UN Security Council Resolution, the SAF deployed a Task Force for Operation Blue Sapphire, for which I was the Commander Task Group. Since then, the SAF has deployed five ships and a maritime patrol aircraft and also assumed four successful commands of Combined Task Force 151, the multinational naval force established to disrupt piracy and armed robbery at sea. On a deployment under Operation Blue Sapphire in 2011, RSS *Endeavour* foiled an attempt by pirates to board a merchant vessel. The Navy ship subsequently ordered the pirates back to their mother ship and destroyed the abandoned skiff that they had used in their boarding attempt.

Going for such operations has made me more confident because I am compelled to adapt and respond quickly to unexpected situations. If the RSN could do well in a fluid environment, not bound by exercise constructs, we would similarly succeed in a different setting. I'm proud to have represented my country and the RSN in such operations, knowing that I've played a part towards safe and secure seas for all.

STAYING SHARP, BREAKING WAVES

Senior Lieutenant Colonel (SLTC) Ooi Tjin Kai, 39, CO of RSS *Steadfast*, recounted his 2016 experience of sailing the *Formidable*-class frigate to the RIMPAC Exercise, the world's largest maritime exercise held by the US Navy off the coast of Hawaii every two years.

For the RSN, RIMPAC presents the opportunity for high-end warfare training that is not replicated anywhere else. COL Seah Poh Yeen, who had commanded RSS *Steadfast* when the RSN first participated in RIMPAC in 2008, had earlier spoken to me about the pressure of keeping pace with the bigger ships from the more established navies in such a complex exercise, and the challenges of operating in the harsh conditions of the Pacific Ocean. Inspired, I was determined to ensure that the RSN would do well at RIMPAC again – a taller order than I had anticipated.

In 2016, the RSN assumed Task Group and Warfare Commander roles for the first time. These were huge responsibilities. En route to Hawaii, I took charge of US and Japanese destroyers for interoperability training as we crossed the Western Pacific. I had not crossed the Pacific before. I had only heard stories from my dad, MAJ (RET) Ooi Teik Chai, the Navigating Officer aboard RSS *Mercury,* one of two former US Navy minesweepers that made the RSN's first Pacific crossing when they sailed home from the US. And here I was taking charge of experienced destroyer captains who did this sort of thing every other week. During another phase of the exercise, I was given tactical command over more anti-submarine assets than the entire RSN order of battle. It was daunting, but my team and I trusted our training, did the Singaporean thing and planned to the n^{th} detail, leaving nothing to chance. In the end, our mission was a success. Like COL Seah's team in 2008, we had to quickly earn our spurs doing unfamiliar things under demanding conditions, such as underway replenishment (the taking of fuel from another ship at sea). Imagine trying to pump petrol into your car from a truck while both vehicles are being driven at 30km/h. Then imagine doing that for two hours continuously on a road that goes up and down by 3m to 4m every few seconds while 60km/h to 80km/h winds blow seawater into your face. One mistake could cost a limb or even a life. It was exciting stuff.

> "When we volunteer for command roles, nobody asks us: 'are you sure?' or 'would you like some of our planners to sail with you?' They trust that if the RSN raises our hand, we will deliver, because we always have."

Why did the US Navy entrust us with such heavy responsibilities? Our partners see the RSN as a capable navy and value our contributions, even though we are small and cannot commit the same amount of manpower and assets that other countries can. Our professionalism, commitment to operational excellence, and drive to learn and improve have enabled us to continually push boundaries at RIMPAC. When we volunteer for command roles, nobody asks us: "are you sure?" or "would you like some of our planners to sail with you?" They trust that if the RSN raises our hand, we will deliver, because we always have. Over 20,000 miles, 102 days and eight typhoons later (yes, eight, I believe that is a RSN record; my dad was chased by only three super typhoons in his voyage across the Pacific), the team returned home to our loved ones, safe and successful. After catching our collective breaths, my officers and I reflected and realised this: the RSN's reputation as a sharp and credible fighting force has been hard-earned by generations of sailors and cannot be taken for granted. We need to continually work at upholding it, with determination, teamwork and focus.

SLTC Ooi Tjin Kai with Admiral Harry Harris, Commander US Pacific Command, at RIMPAC 2016.

THE RSN'S DEPLOYMENTS OVER 50 YEARS

The RSN has deployed around the world for exercises and operations, forging friendships and strengthening interoperability with other navies.

In 2000, RSS *Endurance* made history by becoming the first RSN ship to circumnavigate the globe. The four-month deployment themed "making waves, forging global friendships" covered 25,000 nautical miles and brought RSS *Endurance* to nine ports and through the Suez and Panama canals. RSS *Endurance* also conducted exercises with many of the host countries that it visited and participated in the US Navy's International Naval Review in New York City on 4 July 2000.

As the RSN turns 50, it will continue to widen its network of friends and partners and welcome greater cooperation and collaboration. Together, navies can make the seas safe and secure for all.

Picture: Straits Times Press for the RSN

A HAND OF HOPE

For more than a decade, LTC (DR) (NS) Andrew Wong, 47, Chief of Surgery and Senior Consultant of the Department of Surgery at Changi General Hospital, has performed minor surgery to remove abnormal growths and repair hernias in various villages in Indonesia.

He has been participating in Surya Bhaskara Jaya as part of In-Camp Training for Operationally Ready NSmen with the RSN.

Since 1997, the Indonesian Navy and the RSN have been working together on socio-civic missions in remote communities in the Indonesian archipelago.

The RSN's deployment often comprises a landing ship tank with a medical and surgical detachment on board, as this ship can carry the required medical and logistics support, and landing craft that can reach remote coastal communities independently.

> "Given our accessibility to good health and medical care facilities and practitioners in Singapore, we sometimes take these things for granted."

Both navies work jointly to provide primary health care, dental care, basic surgery and essential food items such as rice, sugar and salt, as well as education materials to the villagers.

They also carry out repair and restoration efforts where necessary.

Many of these locations, such as Belutong, Labuan Bajo and Tomini, can be quite remote.

For instance, in the northern Sulawesi coastal village of Tinombo, he encountered residents who had been putting up with easily treatable conditions, such as cleft lip, simply because they lived too far away – more than 200km – from the nearest hospital.

He said: "Given our accessibility to good health and medical care facilities and practitioners in Singapore, we sometimes take these things for granted. I find it particularly meaningful to provide others beyond our shores with the medical care that they would otherwise not have access to. Whilst these medical conditions are usually not life-threatening, they affect the patients' quality of life."

The advances in the Navy's medical capabilities have helped facilitate such missions. Indeed, the landing ships tank can be outfitted as floating hospitals when required. In 2015, the RSN began using the modular Rapidly Deployable Maritime Containers, which replicate the operating theatre and intensive care unit environment on board ships.

LTC (DR) (NS) Wong said: "These containers are sufficiently well-equipped, so working in them is almost similar to working in a hospital environment. Such advancements in technology and capabilities help to raise the level of surgical care and patient safety that we can provide. This is a significant improvement from previous deployments before the introduction of the Rapidly Deployable Maritime Container as a dedicated surgical platform."

He added: "Surya Bhaskara Jaya will always hold a special place in my NS journey. I'm very proud that I can represent Singapore and the RSN overseas to make a visible difference to improve the lives of those less fortunate than us."

As part of his In-Camp Training, LTC (DR) (NS) Andrew Wong, together with his medical team, provides primary health care and basic surgery to remote communities in Indonesia.

SAVIOURS OF THE DEEP

MV *Swift Rescue* preparing to launch its rescue submersible for a submarine rescue demonstration during Exercise Pacific Reach 2010.

MAJ (RET) Lim Eng Hong, 58, pioneer Officer Commanding of MV *Swift Rescue*, reflected on how the RSN first started in submarine rescue operations.

Unlike ships that can be reached easily by others to render assistance, a distressed submarine underwater requires special assistance from those trained in the specialised art of submarine rescue. The waters of Southeast and East Asia are expected to become more crowded in the future, with more Asia-Pacific navies operating submarines. Thus, it is important to ensure not only safe submarine operations, but also timely response to underwater emergencies, in which MV *Swift Rescue* plays an important role.

Our journey in the area of submarine rescue started when the first *Challenger*-class submarine arrived back from Sweden. The service was then provided by three key parties – MV *Kendrick*, a commercially chartered vessel that was able to conduct surveys of the distressed submarine, the *Endurance*-class landing ships tank that provided medical support and a submarine rescue bell, which was then provided by the US Navy under a Memorandum of Understanding. The acquisition of the locally designed and built MV *Swift Rescue* in 2008 marked a major milestone in our journey. Singapore became the first country in Southeast Asia to have a fully integrated rescue vessel that was able to singly conduct all the activities that previously required three separate parties.

We learnt from many other established navies such as those from France, Norway, Sweden, the United Kingdom and the US, which had experience in submarine escape and rescue. MV *Swift Rescue* is not a commissioned RSN vessel but rather, operates on a public-private partnership, with specialist commercial crew working alongside RSN personnel on board. This model is also something that is uniquely Singaporean. Over the years, several Memorandums of Agreement on submarine rescue have been signed between the RSN and various nations such as Australia, Indonesia, South Korea, the US and Vietnam. MV *Swift Rescue* has also regularly participated in Exercise Pacific Reach, a multilateral submarine escape and rescue exercise that was first started in 2000 with the aim of helping to develop regional capabilities in this field and strengthen interoperability in submarine rescue operations. In the most recent exercise, MV *Swift Rescue* deployed to South Korea, the furthest port that the ship has sailed to date, where its rescue submersible successfully mated with the rescue hatches of submerged Australian and South Korean submarines.

Being able to achieve interoperability with submarines operated by other countries is testament to our professionalism and the strong cooperation that we have built up over the years with other navies. In slightly less than a decade, the RSN has evolved from a submarine operating nation that had to rely on foreign assistance in submarine rescue, to one that not only has an independent, full-fledged rescue capability, but is also able to provide this capability to other like-minded navies. At the end of the day, we also give our submariners peace of mind – while what they do carries with it an inherent risk, we are always here, ready to render assistance should they require it.

MAJ (RET) Lim Eng Hong, the pioneer Officer Commanding of MV *Swift Rescue*, with its rescue submersible, the Deep Search and Rescue Six.

PAVING THE INFORMATION FUSION HIGHWAY

Barely a few months after its inauguration on 27 April 2009, the Information Fusion Centre (IFC) was tested and emerged triumphant. It heard from its US counterpart that a North Korean registered merchant ship, the *Kang Nam 1*, suspected of carrying illegal cargo, was likely to sail down the Singapore Strait to the South China Sea. The centre found out as much as possible about the ship and its movement, and rapidly disseminated this information to Singapore's neighbours so that they could better track it and determine their own course of action. "It was the first litmus test for the IFC, which passed with flying colours," said its first Head, SLTC Nicholas Lim, 43.

He had the daunting task of building up the IFC from "a small room comprising a few small cubicles, tucked away on the second level of the Tuas Naval Base Command Building" into "the Asia-Pacific region's first multinational 24/7 military operations centre with an active resident International Liaison Officer community". He recalled: "The IFC started as an experiment and we didn't know if it would succeed. Some wondered about its utility but history would soon prove them wrong."

Eight years on, the centre has established linkages with more than 70 military, maritime and law enforcement agencies in 38 countries. As its connectivity and linkages grow, so does the richness of the information that it can provide, making it even more useful and relevant to its partners. SLTC Raymond Ong, 45, who currently heads the centre, noted: "Our interactions with the larger shipping and maritime community also help build strong relationships, which can come in useful when dealing with issues pertaining to maritime security."

Just a report of a sighting of a suspicious vessel, when fused with other data sets, enables the IFC and its partners to build a more comprehensive sea situation picture. Take,

SLTC Nicholas Lim (left) headed the IFC from its inauguration in 2009 to 2014. SLTC Raymond Ong (right) is its current head.

SLTC Raymond Ong holds weekly meetings with International Liaison Officers. The IFC has hosted over 115 such officers from 23 countries.

for instance, the case of the FV *Viking*. The last of the 'Bandit 6', a fleet of fishing vessels that had been on the INTERPOL's Purple Notice for illegal fishing, it had evaded capture and its whereabouts had been unknown for some time. One day in 2016, the IFC received a tip-off from the Voluntary Community Reporting system – through which merchant ships can report suspicious vessels or activities – about a darkened ship anchored in regional waters near Singapore. Upon conducting further checks and investigations through its network of agencies, the centre identified this as FV *Viking* and informed its Indonesian counterpart, which then swiftly took the ship into custody.

SLTC Lim added: "Given the changing nature of maritime threats, we realised that information is key to facilitate decision-making and response-development. Establishing the IFC was thus a bold, but necessary, move. I'm proud that the IFC has flown the Singapore flag high in the international community and allowed us to punch above our weight by leveraging on our strengths in information collation and analysis to help our partners."

SLTC Ong believes that the centre will continue to grow from strength to strength and hopes that it will continue to uphold its motto: 'Safe and Secure Seas for All'.

PEACE AT SEA

Professor Tommy Koh

INTRODUCTION

Singapore is an island nation. However, most Singaporeans take the sea for granted. On weekends, more Singaporeans can be found in the shopping malls than on the beaches.

I would therefore like to begin my essay by reminding Singaporeans that modern Singapore was founded in 1819 because of its deep natural harbour, its strategic location at the southern end of the Malacca Strait and the need to service international shipping and maritime trade.

Today, 198 years later, the sea continues to be of great salience to Singapore. It is the world's busiest port. The Singapore flag is carried by the fifth largest merchant fleet in the world. Singapore has become an important international maritime centre. The maritime sector contributes 7 per cent to Singapore's GDP and provides 170,000 jobs in the nation.

CHAOTIC VERSUS ORDERLY WORLD

No country, big or small, benefits from a chaotic world, a world without laws, rules and conventions. Every country, including the major powers, prefers a world governed by universally accepted rules. International law fulfils this need.

For many centuries, the world's oceans were governed by customary international law. For example, customary international law prescribed that a coastal state may claim a territorial sea of 3 miles in width.

Customary international law came under challenge in the 1950s and 1960s. Several coastal states in Latin America challenged the 3-mile territorial sea rule and made claims of between 12 and 200 miles. Other newly independent countries in Asia and Africa emulated them.

What ensued was a period of chaos. Countries used to quarrel and, sometimes, even fight over the width of the territorial sea, fishing rights and so on. I recall that a dispute over fishing rights led to a brief shooting war between Iceland and the United Kingdom.

THE UNITED NATIONS AND THE RULE OF LAW

It took the Third United Nations Conference on the Law of the Sea nine arduous years of negotiations, to arrive at a consensus on all the contentious issues, such as the width of the territorial sea, the width of the contiguous zone and the limits of the continental shelf. The conference also created new concepts of international law, such as the exclusive economic zone, archipelagic sea lanes passage, transit passage and the common heritage of mankind. I served as the President of the conference in its final two years.

The UN Convention on the Law of the Sea (UNCLOS) is a comprehensive and authoritative statement of the modern law of the sea. This is why I have called it a constitution for the world's oceans.

The convention has 168 states parties including the European Union. Although the United States is not a party, it recognises most of the convention as customary international law. It seeks to conform to the convention and expects other countries to do the same. Many of the convention's provisions have been accepted by tribunals and courts as customary international law.

Professor Tommy Koh at the signing of the Final Act of UNCLOS at the Hague, on 10 December 1982. Picture: Courtesy of Professor Tommy Koh

UNCLOS AND PEACE AT SEA

How does UNCLOS promote peace at sea? It does so in three ways: first, by establishing a new, fair and equitable world order for the oceans; second, by promoting the rule of law; and third, by promoting the peaceful settlement of disputes. A unique feature of the convention is that the settlement of disputes is mandatory and not optional. In other words, a state party cannot opt out of the dispute settlement system contained in the convention.

UNCLOS AND DISPUTE SETTLEMENT

UNCLOS has promoted peace through the peaceful settlement of disputes. When negotiations fail to resolve differences, it is better for the parties involved to try to settle the dispute through conciliation, arbitration or adjudication than to let the dispute fester and contaminate the overall health of the bilateral relationship.

Singapore and Malaysia have resolved several of their disputes peacefully and in accordance with international law. In the case of Pedra Branca, an island that sits at the eastern entrance of the Singapore Strait, the two countries agreed to refer their dispute over its ownership to the International Court of Justice. In the case of the dispute over Singapore's land reclamation activities near the Johor Strait, the legal process involved arbitration, adjudication and fact-finding by a group of independent experts and negotiations.

The dispute between Indonesia and Malaysia over two islands, Sipadan and Ligitan, was referred to the International Court of Justice. The dispute between Bangladesh and Myanmar over their

Left: Pedra Branca is located about 46km to the east of Changi on the Singapore mainland, and is the easternmost point of Singapore.

Below: Singapore and Malaysia signed an agreement in 2003 to refer the dispute over Pedra Branca to the International Court of Justice. They were represented by their respective Foreign Ministers, S. Jayakumar (seated, left) and Datuk Seri Syed Hamid Albar at the ceremony in Malaysia's Foreign Ministry office in Putrajaya.

Pictures: Singapore Press Holdings

maritime boundaries was referred to the International Tribunal for the Law of the Sea. The dispute between Bangladesh and India over their maritime boundaries was referred to arbitration. All of them were resolved peacefully and the results accepted by the parties.

THREATS TO PEACE AT SEA

What are the threats to peace at sea?
I can think of the following four threats:

(i) Piracy and other international crimes against shipping;
(ii) Unfaithful interpretation and application of UNCLOS;
(iii) Resorting to force or unilateral action to enforce one's claims instead of relying on the UNCLOS system of compulsory dispute settlement; and
(iv) Illegal, unreported and unregulated fishing.

PIRACY AND ARMED ROBBERY

Piracy and armed robbery of ships pose a serious threat to international shipping and to peace at sea. Until a few years ago, the biggest threat to international shipping was posed by Somali pirates. In 2011, they were responsible for 237 out of a total of 439 attacks against ships worldwide. In 2015, out of 246 attacks against ships worldwide, none were carried out by Somali pirates.

Instead, the largest number of attacks took place in Indonesian waters. Over half of the attacks, 178, took place in Southeast Asia. This is a stain on the good name of ASEAN. It is incumbent upon Southeast Asia to clean up its act or it will be known as the piracy capital of the world.

I am happy to report that the number of attacks has dropped remarkably this year as a result of enhanced vigilance and cooperation. Singapore is a founder member of the Regional Co-operation Agreement on Combating Piracy and Armed Robbery against ships in Asia, or ReCAAP, the first regional government-to-government agreement to enhance counter-piracy cooperation. Singapore also hosts the ReCAAP Information Sharing Centre, an intergovernmental network for the prompt sharing of alerts and information on piracy incidents, and a platform for broader cooperation and capacity-building.

ROLE OF THE SINGAPORE NAVY

The Singapore Navy has played three roles. The first role is to defend Singapore against any seaborne attack. The second is to protect international shipping and the sea lines of communication. The third is to foster practical cooperation on issues of common concern between navies at sea in support of a rules-based international order.

In contributing to protect international shipping and the sea lines of communication, the Singapore Navy has deployed forces to the Gulf of Aden, in support of the international anti-piracy operations since 2009.

Singapore is also a signatory to regional cooperation initiatives to deal with piracy and armed robbery of ships in our region. The Information Fusion Centre in the Changi Command and Control Centre was established in 2009 to facilitate the exchange of information and cooperation, to enhance maritime security. It has contributed to effective regional responses to numerous maritime security threats, a recent example being the successful apprehension in February 2016 of FV *Viking*, a vessel on Interpol's Purple Notice and wanted by 13 countries for illegal fishing.

To keep the Straits of Malacca and Singapore safe, the four littoral states, Indonesia, Malaysia, Singapore and Thailand, conduct coordinated sea and combined air patrols. The Singapore Navy has participated actively in such patrols. Known as the Malacca Straits Patrol, it has been highly effective in reducing the incidence of piracy and armed robbery, and has been cited as a successful model of collaboration among states.

The Singapore Navy and other regional navies regularly conduct joint exercises for the interdiction of suspicious vessels, under the UN-inspired Proliferation Security Initiative. In 2014, the Singapore Navy, together with 20 other regional navies, adopted a Code for Unplanned Encounters at Sea or CUES. Under the auspices of the ASEAN Defence Ministers' Meeting Plus, the RSN and Royal Brunei Navy co-hosted an 11-day multilateral maritime security and counterterrorism exercise involving 18 countries in May 2016.

These are some examples of how the Singapore Navy contributes to peace at sea and to upholding the rule of law at sea.

UNFAITHFUL INTERPRETATION

The second threat is posed by the unfaithful interpretation and application of UNCLOS. The tendency to cheat is a failing of states as well as of humans. There are many examples of states that have made claims or asserted rights which are not consistent with the convention. There is a proliferation of excessive claims by coastal states. In my view, such claims should be challenged and, if possible, the courts or arbitral tribunals should be asked to rule on them.

ACTING UNILATERALLY

The third threat is posed by the behaviour of some states that seem to have rejected the UNCLOS system of compulsory dispute settlement in favour of acting unilaterally. In the case of maritime disputes, states are obliged to settle their disputes in accordance with international law, including UNCLOS. Under UNCLOS, disputes could be resolved through negotiations, conciliation, arbitration and adjudication.

Parties to a dispute may also wish to put aside their competing sovereignty claims and enter into a win-win arrangement to jointly develop the resources in the disputed area and share in their benefits. Given goodwill on both sides, there are many ways in which a dispute can be resolved or managed peacefully.

ILLEGAL, UNREPORTED AND UNREGULATED FISHING

The fourth threat is posed by illegal, unreported and unregulated fishing. The UN's Food and Agriculture Organization (FAO) has repeatedly warned that the world's fisheries are in a state of crisis. This crisis is caused by such illegal fishing activities as well as overfishing and the use of destructive and unsustainable methods of fishing. The FAO's code of conduct for responsible fisheries should be strengthened. In the case of the South China Sea, regional countries urgently need to establish a regional fishery management organisation. In the absence of such a mechanism, no one is looking after the marine environment and the biodiversity of the South China Sea.

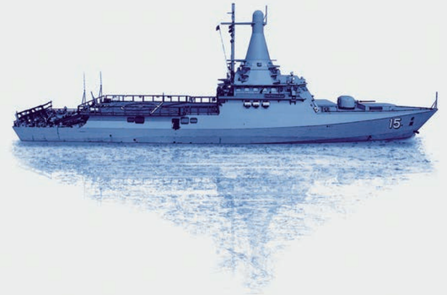
CONCLUSION

The quest for peace at sea is achievable, provided everyone is prepared to do the following three things. First, all should uphold the rule of law. This means abiding by international law, including UNCLOS, the IMO and FAO Conventions. Second, all should settle disputes peacefully and in accordance with recognised international diplomatic and legal processes. Third, political will and a spirit of give and take are needed. Without political will, nothing can be achieved. With political will, almost every problem has a solution.

Professor Tommy Koh is an Ambassador-At-Large with the Ministry of Foreign Affairs and Chairman of the Board of Governors of the Centre for International Law at National University of Singapore. He was the President of the United Nations Conference on the Law of the Sea from 1981 to 1982.

The first-of-class littoral mission vessel, RSS *Independence*, conducting its operational trials in the Singapore Strait.

SECURING the FUTURE



THE EVOLVING ENVIRONMENT AND IMPLICATIONS FOR THE RSN

Barry Desker

Singapore is the world's busiest transshipment port, served by four container terminals, including this terminal at Tanjong Pagar. Picture: MPA

Singapore's economic success has been due largely to its development as an entrepot and global transshipment hub, in tandem with a strong manufacturing base. This has been underpinned by its free and safe access to the sea lines of communication. The RSN has played a vital role in safeguarding Singapore's maritime interests.

Being a small country with an open economy, Singapore is highly susceptible to both regional and international events. The contours of its regional maritime environment are rapidly changing, shaped by geopolitical contests over the maritime commons, as well as the proliferation of non-conventional threats. These changes pose important questions for the RSN. Not only will it have to adapt to the changing context, it will have to play an active role in shaping that context to secure Singapore's survival and prosperity.

A MORE CONGESTED AND CONTESTED MARITIME SPACE

The Asia Pacific region is home to 46 countries with millions dependent on the sea for trade, connectivity and resources. The maritime region has become more 'contested', with countries asserting competing claims over territory and resources as they become more developed. In the East and South China Sea, there are ongoing disputes that impinge on the territorial seas, exclusive economic zones and attendant rights to the exploitation of resources of coastal states. These issues will increasingly become core to the national policies of coastal states in the region, leading to changing strategic priorities.

Defence spending in the Asia Pacific countries is expected to grow in tandem with rapid regional economic growth. According to the Stockholm International Peace Research Institute, total defence spending in the Asia Pacific is forecast to hit US$533 billion per year, with the region accounting for one in every three dollars spent on defence worldwide by the early 2020s. A large part of defence spending by coastal states is channelled towards building naval capabilities, reflecting their growing interest in the maritime domain.

As the maritime space becomes more congested and contested, it is imperative for coastal states and their navies to put differences aside and find new ways to keep the risks of conflict in check. This is important for Singapore, which has a vital interest in the free and orderly use of the seas based on international law. In this context, the RSN has both the duty and opportunity to promote a stable maritime order. It is incumbent on the RSN and regional navies to develop operational arrangements and protocols to govern actions at sea, prevent miscalculations and promote mutual trust. The Code for Unplanned Encounters at Sea, endorsed in 2014 by 21 navies in the Asia Pacific region, is one good example.

NON-CONVENTIONAL MARITIME SECURITY THREATS

Maritime terrorism and criminal activities transcend national boundaries. The phenomena of self-radicalisation and terrorist attacks in global cities present a growing threat to Singapore's security. In 2014, Al-Qaeda in its online magazine, *Resurgence*, urged jihadist militants to attack economically sensitive Western targets, such as oil tankers, along the Malacca Strait, and singled out Sembawang as a logistical node for the US Navy's Seventh Fleet, and a viable target for attack. Apart from sabotage at sea, terrorist elements could exploit the porous maritime borders to smuggle perpetrators and arms ashore. In addition, sea robbery and piracy will continue to threaten the flow of maritime commerce along Singapore's shipping lanes. These issues are part of a growing set of transnational problems, which require collaborative solutions between countries.

These challenges present opportunities for states and navies to find common ground for cooperation. The Malacca Straits Patrol between Singapore, Malaysia, Indonesia and Thailand has been largely successful in eliminating piracy in the immediate region. Moving forward, emerging security issues such as maritime counterterrorism will provide greater scope for the RSN and regional navies to strengthen collaboration and further expand the common security space.

SATURDAY AUGUST 6, 2016 SINCE 1845

THE STRAITS TIMES

Plot to attack Marina Bay with rocket from Batam foiled

Six terror cell members nabbed; leader was planning attack on Singapore

Arlina Arshad
Indonesia Correspondent
In Jakarta

The terror threat facing Singapore took on a more menacing face yesterday after six militants were arrested in Batam.

Police said their leader had been planning a rocket attack on Marina Bay together with a Syrian-based Indonesian ISIS militant. The six men in Batam had been kept under watch for a while before they were arrested by Indonesian police in an early-morning raid.

Singapore Deputy Prime Minister Teo Chee Hean said on Facebook: "Our security agencies have been coordinating closely with the Indonesian authorities to monitor the activities of this group and to apprehend those involved.

"We are grateful for the good co-operation by the Indonesian authorities and their actions to apprehend the group."

In response to this threat and the prevailing security situation, police and other agencies have been stepping up inland and border security measures, said Mr Teo. "This development highlights the seri-

He drew a parallel with Molenbeek, the Belgian town from which terrorists planned their assault on Paris last November and, in a series of coordinated attacks, killed 130 people. "There are several possible Molenbeeks around us from which attacks can be launched on Singapore. These include the Riau Islands," he said.

"The islands are a short boat ride

electronics factories and one at a bank. They are between 19 and 46 years old. Their leader, Gigih Rahmat Dewa, 31, was nabbed at his house, where he lived with his wife and baby.

Indonesia's national police spokesman Boy Rafli Amar told reporters in Jakarta that Gigih "had planned to launch a rocket from Batam to Marina Bay Singapore".

The two men were also part of the larger terror narrative unfolding in Indonesia. The cell was suspected of harbouring Uighurs, the Muslim ethnic group from China, some of whose members have joined extremists in Indonesia. It had also received funds to send fighters to Syria.

Mr Shanmugam said that in addition to lone wolves and radicalised

cells on the lookout for ways, and new munitions to penetrate our defences. Terrorism is a global problem and no country is immune."

aarlina@sph.com.sg

SEE TOP OF THE NEWS A4&6
& OPINION A49

Indonesia's elite counter-terrorism unit Densus 88 carrying out a raid in Batam. Six members of a little-known terror cell called Katibah GR, or Cell GR, were arrested yesterday. PHOTO FACEBOOK PAGE OF RALIF UTAMI

A plot to attack Marina Bay with a rocket from Batam was foiled in August 2016, after six militants affiliated to the Islamic State of Iraq and Syria (ISIS) were arrested by the Indonesian police. Picture: Singapore Press Holdings

IMPACT OF CHANGING DEMOGRAPHICS

In navigating the future environment, the RSN will face two sets of challenges. The first will be in responding effectively to the evolving set of security challenges in the maritime domain; the second will be in doing so sustainably in a resource-constrained context. The issue of demographic decline is endemic to developed countries and Singapore is no exception. With children of baby-boomers reaching enlistment age in the 2000s, the enlistment number peaked in 2011, with 21,000 men conscripted for national service. This is projected to decline to levels in the 1990s of about 15,000 men by 2030.

Constraints in manpower will impose a need for the RSN to further leverage on automation to increase manpower efficiency, and prioritise investments in human capital to enhance combat productivity in line with the parallel development in capabilities. An increasingly competitive manpower landscape will also encourage the RSN to diversify its sources of manpower beyond men from their NS years and tap on a wider demography.

Graduands of the 27th Specialist Cadet Course at the graduation parade, 26 May 2016. Many of them are NSFs who go on to contribute to different areas of the RSN.

IMPACT OF A MATURING ECONOMY

Investment into advanced technologies for Singapore's defence capabilities and training systems is necessary, but requires a large and long-term financial commitment. Singapore has been able to make significant investments in defence over the last few decades, within the favourable context of high economic growth and sustained increases in budget revenue. As its economy matures, Singaporeans will have to become accustomed to periods of slower growth. Prudence in defence spending will become increasingly important, particularly as demographic changes, lower economic growth and increased social spending impose competing budgetary demands.

In the context of the RSN's future transformation, budget constraints will necessitate targeted investments in identified 'game-changers' to maximise the defence dollar. Emerging technology domains, such as data analytics and robotics, present opportunities where the RSN can forge a sustainable edge moving forward.

CONCLUSION

The future maritime environment will be dynamic, and the RSN will have to anticipate changes and act boldly to address them. And it cannot go it alone. The RSN will need to work with its friends and partners, at home and abroad. An effective response will ensure that the RSN plays a critical role in securing Singapore in the years ahead.

Barry Desker is a Distinguished Fellow at the S. Rajaratnam School of International Studies, Nanyang Technological University. He is also Singapore's Representative to the ASEAN Intergovernmental Commission on Human Rights and the Non-Resident Ambassador of Singapore to the Holy See and Spain.

SHAPING THE FUTURE NAVY

Protecting Singapore and its sea lines of communication – that has been the RSN's core mission. But the operational requirements of this mission have evolved with the changing security landscape, and will continue to do so in the future.

The maritime environment is dynamic, and the character of seaborne threats changes constantly. The RSN has to contend with an ever-expanding set of security issues, including piracy, transnational terrorism, trafficking and other forms of maritime crime. Singapore's regional waters have become more congested and contested, and have become a more likely arena for conflict. At the same time, changing demographic and economic trends compel the RSN to find new ways to remain a relevant and effective fighting force that can keep pace with the changing operating context.

Left to right:
Unmanned systems will strengthen the RSN's capability to meet an expanding set of tasks. They include the Venus 16 Unmanned Surface Vessel, currently under development to support maritime security operations; and the ScanEagle Unmanned Aerial Vehicle, which has been in service since 2012.

Since 2011, the REMUS Autonomous Underwater Vehicle has been deployed for exercises and operations, such as the search for AirAsia flight QZ 8501.

As part of the SAF's 3rd Generation Transformation that began in the mid-2000s, the RSN has matured into a strong and integrated fighting force capable of full-spectrum operations. Moving ahead, it will build on this foundation to become a Navy that is sharper, smarter and stronger.

A SHARPER NAVY

A blade needs to be continually honed to remain effective, as does the RSN. To better secure Singapore's maritime lifelines, the RSN will need to sharpen its capabilities, operations and organisation.

To ensure that its capabilities and competencies remain cutting-edge, it will continue to deploy for exercises and operations with key partners within and beyond the region. High-end exercises, such as RIMPAC, have allowed the RSN to develop its operating concepts and benchmark its capabilities against the best navies in the world. They will continue to be a mainstay of its peacetime deployments.

The RSN also has to adapt its capabilities to ensure that they remain relevant. To address the expanding range of maritime security issues, the RSN has to tailor its platforms and capabilities towards greater mission flexibility and sustainability.

Technologies such as unmanned systems, modular capabilities and advanced engineering will enable the RSN to better fulfil its range of security tasks across the operational spectrum. The littoral mission vessel, designed to undertake both maritime security operations and high-end war-fighting, is a prime example of the RSN's future mission-flexible platforms.

The adaptation applies to its operational profile and organisational structures as well. The RSN will maintain a deployed posture to safeguard Singapore against maritime threats 24/7, and expand its operational footprint farther in the region to ensure the security of the nation's maritime lifelines.

To support this, the RSN will redesign its organisational structures and support systems, such as in engineering, logistics and training, to allow it to sustain its presence at sea and deploy wherever it is needed to preserve Singapore's maritime interests.

Beyond its conventional role, the RSN is at the same time a force for stability in the maritime region. Over the years, it has taken the lead in building strategic trust among regional and international partners.

From confidence-building arrangements, such as the Code for Unplanned Encounters at Sea to reduce the risk of miscalculation between ships at sea, to practical cooperation in sea exercises, such as in the ASEAN Defence Ministers' Meeting Plus sea exercises, the RSN has contributed considerably in expanding the common security space among regional and international players.

With its coming of age as a respected player on the international stage, the RSN aims to play a more active role in shaping a regional security architecture that is robust and inclusive.

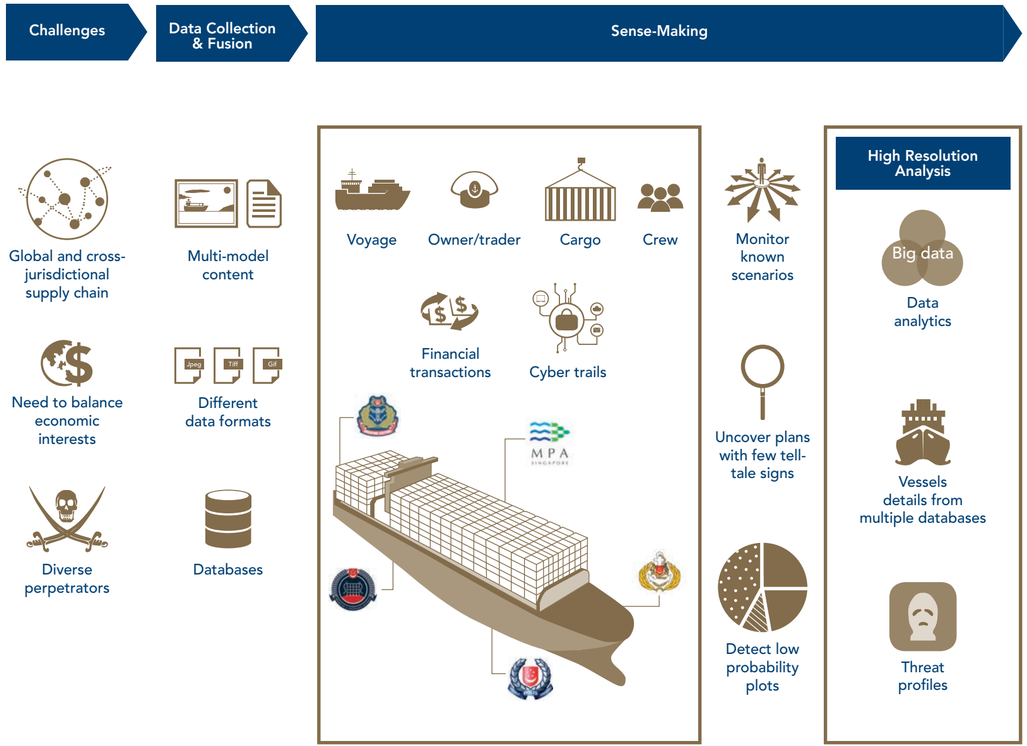
Commander of CTF 151, L/RADM Cheong Kwok Chien, during a routine operations brief. The RSN has assumed command of the multinational naval task force four times since it was established in 2009 to disrupt piracy and armed robbery at sea in the Gulf of Aden.

A SMARTER NAVY

As the RSN faces an evolving set of security issues, it needs to be able to adapt to the changes. In such a context, it is not merely a matter of how sharp the RSN's tools are, but also how these tools are used. To deal with accelerating change, the RSN will need to be smarter in its capabilities, operating concepts, and how it approaches new operational challenges.

In developing smarter capabilities, technology will continue to feature as a key enabler in the future. The RSN will apply its experience with emerging capabilities in robotics to develop fighting concepts that integrate manned and unmanned systems. It will also exploit the possibilities presented by information and communications technology, and big data, to enhance information-sharing, sense-making and decision-making in the maritime domain. But these technological possibilities can thrive only in a wider ecosystem that is supportive of it. For the RSN, STEEL – short for science, technology, enterprise, engineering and logistics – represents its commitment to nurture a complete system that supports the development of cutting-edge solutions, together with its partners in defence technology.

The RSN's transformation can be effective and enduring only if advances in technology are coupled with mindset changes of its people to take full advantage of the technological possibilities. The Smart Nation initiative represents Singapore's drive at the national level to harness emerging technology to support communities and encourage experimentation. In the same way, the RSN seeks to infuse smart ideas into its systems and processes. This entails embedding a culture of innovation that strives towards better ways to deliver the required outcomes. That requires a mindset that



The National Maritime Sense-Making Group at the Singapore Maritime Crisis Centre draws on its data and information-sharing linkages with national agencies and regional partners to identify maritime security threats. Through the system, the RSN leverages on their capacities and utilises cutting-edge technology to enhance operational effectiveness. Picture: Straits Times Press for the RSN

challenges assumptions and overcomes risk-aversion, which has been demonstrated in the RSN's journey to develop the littoral mission vessel, and more recently, in the crowdsourcing approach in seeding innovative ideas for its future bases. These instances provide glimpses of the RSN's approach to organisational problem-solving in the future.

A STRONGER NAVY

What does it mean to be strong as a Navy? Part of the answer lies with the realisation that the RSN does not exist on its own, nor does it have the ability to take on all its tasks alone. To effectively address the wide-ranging threats in the maritime domain, the RSN has to leverage on the capacities of partner agencies in national security. To this end, the RSN has had breakthroughs in establishing the National Maritime Security System that harnesses the full potential of a whole-of-government approach to maritime security. At the same time, the RSN also recognises that Singapore exists in an increasingly interdependent world, and many issues in the maritime domain are transnational and require regional solutions. The Information Fusion Centre, established in 2009, has created a platform for information sharing among maritime security agencies around the world, and enhanced maritime domain awareness for effective regional responses against piracy and other forms of maritime crime. Moving ahead, the RSN will continue to advance collaboration in the common interest of maritime security, nationally and internationally.

The second part of the answer lies with the recognition that the people of the RSN are the source of its strength. This has been so since its inception, and will continue to be so in the future. The RSN recognises not just the constraints of a greying population, but the potential of a more educated and adaptable workforce. The RSN will continue to attract and integrate people from diverse backgrounds – including women and mid-career professionals – to harness the strength of diversity as an open organisation. These efforts are founded on the conviction that anyone with the right values and skills can bring value to the RSN.

RSN and PCG units participating in Exercise Highcrest, an exercise that tests whole-of-government and land responses against maritime security threats.

At the same time, the RSN will focus on strengthening its frameworks to develop its people to their fullest potential. Much like the SkillsFuture movement at the national level, the RSN will redesign its jobs and training opportunities to adapt to the changing workforce. The RSN will support continuous learning and professional mastery in its regular corps through strengthening training regimes for officers, military domain experts, warrant officers and specialists. It will also create jobs that are "NS-by-Design" – in areas such as unmanned systems – to fully optimise the contributions of its NSmen, who are a large part of the RSN's strength.

As the RSN continues in its future transformation, it will need to continually adapt and innovate to address the evolving challenges. In this process, the RSN will draw inspiration and heart from its past, and remain clear-eyed on future challenges and opportunities, while effecting changes on the ground. That is how the RSN intends to become sharper, smarter and stronger.

Left: The RSN looks to recruit more women – such as (from left to right) ME4A Ang Chiu Lee, 2LT Charis Tay and ME1 Jeyasri Asokan who serve on board the *Formidable*-class frigate, RSS *Stalwart*, seen here at Changi Naval Base – into its ranks.

Right: The RSN will maximise the contributions of its NSmen, such as (from left to right) 3SG Gabriel Teo, 3SG Isaiah Zhuang and 3SG Teo Boon Kai, the inaugural batch of NSFs to be qualified as Unmanned Aerial Vehicle (UAV) operators at 188 Squadron. The UAVs are based on the *Victory*-class missile corvette, RSS *Vigour*, seen here at Tuas Naval Base.

A SMART SHIP

LTC Chew Chun Chau, 40, recounted his experience in leading the development of the *Independence*-class littoral mission vessel, which will replace the existing *Fearless*-class patrol vessels. The first-of-class littoral mission vessel, RSS *Independence*, was commissioned on Navy Day, 5 May 2017.

RSS *Independence* under construction at the Singapore Technologies Marine shipyard.

The littoral mission vessel was inspired by the iPad. One evening, I watched a YouTube video of Apple founder Steve Jobs introducing the hybrid of a cellphone and laptop, which was flexible enough to do many different tasks, easy to use and affordable. It struck me that these were also the desired attributes of the littoral mission vessel that my team and I had been tasked to develop. The key to Apple's success had not been invention, but adaptation; it had taken proven technology, customised and integrated it into accessible and cheap hardware, and in the process, revolutionised the way people used and thought about smart devices. So similarly, the littoral mission vessel would not be just a warship or patrol boat – but a blend of both. And instead of investing in costly technologies, my team would focus on adapting and integrating proven ones to our needs.

We had to build the platform from scratch, as no suitable alternatives were available in the market. Armed with the vision of a class of lean, flexible and effective ships, and a desire to improve the lives of future sailors and help them fight and carry out their missions better, we got to work. We had begun the project in earnest in 2010. After close to seven years of dreaming, thinking, testing and building, we have achieved our vision – a ship that is evolutionary in technology, but revolutionary in design.

Just as smart gadgets can be tailored for different uses with apps, 'plug-and-play' mission modules allow the vessel to meet different demands – from hunting mines and patrolling the seas, to conducting lethal strikes. With the locally developed combat management system, superior sense-making and decision-support functions allow the crew to develop a real-time picture of friendly, unknown and hostile contacts in the sea and airspace around the ship. The ship is also packed with smart features – such as automated systems, multi-touch and gesture-based console interfaces – to make it as easy to operate as possible by a lean crew. We realised that what was important was not just the technologies we used, but also how we applied them in operations. To speed up sense-making, decision-making and response, which are critical in littoral operations, we combined the Bridge, Combat Information Centre and Machinery Control Room into a single location. The ship has also been designed for easy and cost-effective maintenance. For instance, the iconic stacked mast is expected to reduce maintenance downtime for mast-related defects by up to 80 per cent, by allowing the crew to easily access more than 90 per cent of the components within the mast without the need for docking.

A car typically has a few hundred systems; an aircraft, a few thousand. The littoral mission vessel involved the integration of a few hundred thousand systems supplied by more than 15 different countries, with cables in excess of 270km running across an 80m vessel. I cite these figures not as trivia, but to emphasise the arduous process that the team went through to translate ideas to implementation, supported by the RSN's partners in defence technology and industry – the DSTA, DSO and the diverse group of contractors that they assembled. The littoral mission vessel bears testament to the extent that our people are willing to push boundaries to make dreams a reality.

LTC Chew Chun Chau, RSN Operations Manager, and Ms Tessa Gan, DSTA Programme Manager, led the development of the littoral mission vessels, including *Sovereignty*, seen here at Tuas Naval Base in December 2016.

The decommissioning of the first *Fearless*-class patrol vessel, RSS *Independence*, on 8 March 2017 marked the RSN's transition to the new and more capable littoral mission vessel. Picture: Courtesy of Mr Chen Chuanren

SINGAPORE NAVY
ORDER OF BATTLE

Picture: Straits Times Press for the RSN

SEEDING SMART IDEAS FOR THE FUTURE

ME6 Khoo Koh Giok, 39, joined the RSN in 1996 as a Naval Engineer. He is the CO of the Force Readiness Squadron, which is responsible for the engineering readiness of the RSN's High Readiness Core.

In the mid-1990s, when I was the Base Duty Officer at the Brani Naval Base, I would have to physically account for the armaments and ammunition at the armouries and ammunition depots, which were inconveniently dispersed across the naval base. To travel around the base, my team and I relied on the old general purpose vehicle, or a no-frills bicycle shared by base residents. The manual checking of the serial number of every lock and box against hard-copy records was a daily ritual for the Duty Officer that could take up to an hour each day. In those days, when a fire, flood or intrusion occurred, the only alarm would be the lighting up of a tiny little light bulb – representing the site – on a remote panel. This site could be identified only by checking the light bulb against a complex table. Responding quickly to incidents was a huge challenge.

Fast-forward to the 2000s, when I witnessed the operationalisation of the Changi Naval Base, which was the first RSN facility built on reclaimed land. The new base was built with the world's first High Performance Magazine, a highly automated munition storage and withdrawal facility; the warehouses have also been equipped with an automated storage and retrieval system for supplies and equipment. Both facilities are highly automated and require minimal manpower to operate the machines for all loading, unloading and storage activities. It saved considerable time and manpower and made work processes more efficient

Changi Naval Base Warehouse was under ME6 Khoo Koh Giok's charge when he was Commander of the Force Support Squadron from 2015 to 2017.

and safer, allowing naval logisticians to rapidly restock warships to get them ready for sea. It was a marked difference from before as it improved the operational readiness of the Fleet.

But what seems cutting-edge today will not be so tomorrow. The RSN understands this, and has started to think about smarter naval bases for the future, armed with the experience of developing Changi Naval Base and Tuas Naval Base from greenfield sites.

I had the opportunity to be right in the thick of the action. We posed the question: "What do you want to see in our future bases?" to as many people as we could, and then we encouraged as much discussion as possible about the responses. And we were surprised by the number and quality of ideas that emerged from the conversation.

Take, for example, the idea of driverless vehicles, smart enough to transport equipment and people around the bases using the fastest routes, or an all-in-one docking system that could help ships berth, refuel and replenish supplies. Some of these ideas have gone from casual speculation to serious experimentation and we are working with our partners in MINDEF, the defence technology community and the industry to make them reality in our future bases.

This process is not just about reinventing our bases – it is also about rethinking the way we generate solutions to problems in the RSN, which could be applied to many other issues in the future. My experience has shown that many people want to improve the organisation, and have good ideas about how to do that. And with an innovative mindset, a dare-to-do spirit, and a willingness to embrace change, we can.

DARING TO CHANGE, STAYING EXCEPTIONAL

Rear Admiral Lew Chuen Hong

The Navy is an integral component of the SAF. The SAF, in turn, is an indispensable part of Singapore. The journey of the Navy has been paralleled by that of the SAF, and ultimately has been underpinned by Singapore's transformation from Third World to First.

We are familiar with what the Navy has achieved. It is based on the belief that we are relentless in the search for what is needed, to put us on top in the next bound. Past achievements are no guarantees of long-term future success. This belief is also what drives the SAF and Singapore.

From time to time, we have the chance to serve outside of the Navy, and be a small part of that wider team. I thought I'd share a few of my experiences.

SHAPING THE FUTURE

My first bite of life outside the navy was when I was a junior officer in the Force Transformation Office, which had just been set up as part of the revamped Joint Plans and Transformation Department of the SAF. The SAF was then taking its first steps in its 3rd Generation Transformation – leveraging on precision strike, networks and unmanned systems to make a quantum leap in capability.

It was an exhilarating experience. I enjoyed exploring new concepts and technology, and it was thrilling to bounce ideas (well, at times argue heatedly) with like-minded colleagues at the office. We got to see what the SAF could already do.

We were then given the challenge to push the boundaries of what could be achieved. Not in the next one to two years, but in the next 15 years – and to articulate those long-term plans. It is with some satisfaction that I see that several of these investments are bearing fruit, including the 3rd Generation Navy we know today.

I next came back to Joint Staff as Head of its Joint Manpower Department. That the SAF's strength is in its people is immutably true. At that time, the strategic decision to create a new Military Domain Experts Scheme had just been taken. We also strengthened the Enhanced

Clockwise from top left: Many new technologies today are products of ideas sowed many years ago. For instance, the new aerostat system complements the SAF's existing sensor suite to identify potential aerial and maritime threats. Picture: Singapore Press Holdings.

The specialised marine craft combines sophisticated sensor and weapon suites with speed and agility on water to improve the RSN's response to maritime security threats.

The SAF will commission the next generation Armoured Fighting Vehicle in 2019. The new vehicle will provide the Army's armoured forces with enhanced firepower, protection, mobility and situational awareness.

The Military Domain Experts Scheme was introduced in 2010. ME4 Teng Han Leng (left) and ME4 Kirsten Yuan were among the pioneer batch of graduands from the Military Domain Experts Course. ME4 Teng was the top graduate, and has gone on to serve as a Combat Systems Engineer with the submarine squadron.

Officer Scheme and Enhanced Warrant Officer/Specialist Schemes. One key thrust was to tap on the full potential of our well-educated people. So, we gave our Officers broader grounding in strategic issues, by expanding the Command and Staff Course to include an Executive Programme; expanded the leadership and trainer roles of our Warrant Officers, by appointing them to command positions in training institutes; and created mechanisms to let Military Experts deepen their expertise and be recognised for it.

This allowed us to transcend traditional mindsets, reshape the relationship between the three corps into a unique partnership, and maximise the potential of the collective team. Looking back, I consider this one of my most important tours.

There was definitely a sense of déjà vu when I returned as Head Joint Plans and Transformation. Some things had changed – it was especially sobering rereading what was written 10 years ago! Its core role, however, had not changed. It remained a dynamic outfit, with the mandate to chart long-term development for the SAF.

When we took stock of the 3rd Generation SAF, we noted that we were in a position of strength. We had grown in terms of how we fight collectively, the whole greater than its parts. That did not, however, mean resting on our laurels. There was a need to strengthen our capabilities, pursue new secret-edged capabilities, and manage finite resources wisely - to give the SAF maximum "bang for the buck" and set the stage for our next leap forward.

LIFE ON THE OUTSIDE

By a quirk of fortune, I had the chance to serve outside the SAF. For two years, I lived "life out of uniform" as Director of the Research and Enterprise Division, Ministry of Trade and Industry (MTI).

In the Navy, we are often thrust into unfamiliar tasks. We simply step up to the plate and start climbing the learning curve. This though, was more like a cliff. The division works with SPRING Singapore to nurture small and medium enterprises (SMEs), including the then-nascent start-up ecosystem. Singapore's approximately 190,000 SMEs account for close to 50 per cent of GDP, and two-thirds of national employment today.

Just two months after I joined MTI, Lehman Brothers, then the fourth largest investment bank in the US, collapsed. It triggered an international banking crisis of unprecedented scale. As credit dried up, Singapore's SMEs started to be in serious trouble.

It wasn't completely clear what could be done, and I had no in-depth knowledge. The team rallied, looked at the problem in a hard-nosed manner, and tested and adapted possible solutions.

Credit measures were eventually rolled out to keep the companies afloat. More importantly, Singapore invested heavily in training, not just to keep workers employed, but also to sharpen their skills in order to exploit the eventual economic upturn.

The economic measures proposed were a small part of the eventual government package rolled out. It helped Singapore weather the recession relatively unscathed. For me, it was a reminder that resilience comes from the accumulated strength of our fundamentals.

STAYING EXCEPTIONAL

Looking back, I'm humbled by the opportunities given. I've worked with some of the most brilliant people, and I have taken away far more than I have contributed. A few lessons have been especially enduring.

First, we have to dare to do and change, even if it is uncomfortable. Unless we achieve what others can't, we are irrelevant. As a small country, survival and success are inseparable – there is no choice other than to be exceptional.

Second, the real world moves quickly and in unexpected ways, and we cannot be lulled into thinking that the security/defence realm is an exception. Move quickly or be left behind.

Finally, being in Joint Staff, and for that matter MTI, meant that I was working with people from diverse backgrounds. What I consistently saw, and what mattered ultimately, was not what we knew. What mattered was that we were all driven by a larger purpose – the good of Singapore. As long as we continue to work tirelessly for the future of Singapore, it gives me optimism that we will remain exceptional – for many years to come.

Rear Admiral Lew Chuen Hong was the Fleet Commander before being appointed as the Chief of Staff – Naval Staff in September 2016. He spent his early years in the RSN aboard the missile corvettes, eventually assuming command of RSS *Vengeance*. He has also served in various staff positions in the SAF, including as Head Joint Manpower and Head Joint Plans and Transformation. He was previously Director of the Research & Enterprise Division at the Ministry of Trade and Industry.

ME2 Joe Huang pausing to take in the view as his ship, RSS *Stalwart*, entered Pearl Harbour, Hawaii, in October 2009.

The RSN guard of honour marching at the SAF Day Parade held at the SAFTI Military Institute on 1 July 2013. Picture: Singapore Press Holdings

STRENGTH of the RSN

CONVERSATIONS WITH THE CHIEFS

"No matter how sophisticated fighting ships in the Navy of the future may become and how highly specialised their training, two factors will remain unchanged – the sailors and the sea."

The *Ensign*, the journal of the Singapore Naval Volunteer Force, 1968

In the year of the RSN's Golden Jubilee, the former Chiefs of Navy were asked to share their thoughts on what makes them proud of the Navy and what makes the Navy special.

WHAT MAKES YOU PROUD OF THE NAVY?

RADM (RET) James Leo: My first exposure to the Navy was two lines of barracks in Pulau Blakang Mati and the few ships that were moored in Selat Sengkir. The Navy's transformation within 50 years into the strong and flexible force of today has certainly been very impressive. We have come a long way in everything. Today, the Navy's strategic role of defending the sea as Singapore's lifeline is clear. But this has not always been so. After Operation Thunderstorm, the Navy's role was in question. MINDEF did not see the operational utility of the Navy beyond patrolling the Singapore Strait. During one workplan seminar, the then-Minister for Defence told the Navy that we could just put guns on the barges.

President Wee Kim Wee at the sea review of the National Day Parade 1990, with the Chief of Navy, Commodore James Leo (centre), and Fleet Commander, COL Kwek Siew Jin (left). Picture: Ministry of Information and the Arts Collection, courtesy of National Archives of Singapore

RADM (RET) Kwek Siew Jin: Our people have always remained true to the cause and were professional in the execution of all their tasks. One of our first big 'tests' came with Operation Thunderstorm in 1975. Officially, it lasted only 13 days. The Navy, however, was tasked to continue surveillance patrols right through to the early 1980s. With only 14 ships to prevent more than 8,000 'boat people' from entering Singapore, a ship could end up patrolling for half of the month. There was no time for training and no time for maintenance. Many shipboard systems were not functioning well. Furthermore, the crew had to deal with many difficult situations. Some have described it as a "mind-numbing experience". It was a trying period for the Navy, but this and other trying periods allowed us to rally around, not to assign blame, but to seek solutions to overcome our problems. The Navy we are so proud of today was built slowly, by generation after generation of officers, men and women, working together for a common purpose and mission.

Chief of Navy, RADM Kwek Siew Jin (seated, centre) with members of Naval Staff – including Chief of Staff - Naval Staff and Head Naval Operations, COL Richard Lim (seated, rightmost) – in 1993.

RADM (RET) Richard Lim: There were many proud moments. For instance, when we won the SAFSA inter-formation sports – we were second for a long time – and beat the Commandos in rugby. When our Chefs delivered hot food however rough the seas were, and catered for Navy functions, including making pastries from scratch. When our young officers stood resolutely on board coastal patrol craft off Horsburgh Lighthouse and told crews of larger ships: "You are in Singapore territorial waters." When the minister challenged our anti-air firing results, we doubled our efforts and showed we could do better by consistently shooting down aerial targets.

RADM (RET) Lui Tuck Yew: Our people. Always. Even now. There was no occasion when I had to feel ashamed of our people or the fact that they have not given their utmost.

I remembered doing an exercise with the US Navy on the missile gunboats when the sea state was really bad. They kept asking us on the radio: "How is it going?" We found out later that half the time, they could not see us because we were buried by the waves, and they were really worried for us. They told us that they have had exercises with bigger ships in less harsh conditions, where people would want to call the exercise off or finish it as soon as possible; whereas we were prepared to let things run its course. Later on, these joint exercises evolved to "unscripted exercises" as we wanted more realistic training. There was this one other exercise we did with them again over a 24-hour period where they flew about 120 air sorties and stayed outside of 400 nautical miles so that they could find us before they came in. Later they said that it was among the best exercises that they have ever had.

From recognising the human spirit, the toughness, the resilience of our people, to their capability of executing very high-end exercises, there are many things to be proud of.

RADM (RET) Ronnie Tay: We have never had the luxury of being big [in numbers]. However, in terms of achievements for the small numbers that we have had, we have always delivered a lot – in terms of the operations we have undertaken, capabilities we have built and events we have organised.

We were a relatively small group of people who were able to accomplish a lot because of our spirit and enthusiasm. Our people were very capable of working well together and with others in the SAF and other navies.

I remember the time in the late 1990s, when we were tasked

Above: CO of the *Sea Wolf*-class missile gunboat squadron, COL Richard Lim, celebrating the RSN football team's win in the Maritime International Seaman Sports week in September 1991. Picture: Courtesy of RADM (RET) Richard Lim

Right: CO of RSS *Sea Hawk*, MAJ Lui Tuck Yew (foreground), with his men on board the missile gunboat in June 1990. Picture: Singapore Press Holdings

Far right: Chief of Navy, RADM Ronnie Tay, aboard RSS *Endurance* with its command team, on a visit during Operation Blue Orchid I to help reconstruct postwar Iraq. The landing ship tank was Singapore's first to be deployed there in October 2003.

to organise a number of significant large scale exercises – Barak missile firing, Five Power Defence Arrangements Exercise Flying Fish, Exercise Pacific Reach for submarine rescue, peace support operations and so on.

They were activities that the Navy was doing for the first time, and we counted on one another to pull them off, while having to perform lots of other tasks at the same time.

In the Navy, it always felt you were doing and achieving many things together, whether it was in operations, during exercises and especially when on deployments.

RADM (NS) Chew Men Leong: Beyond capability building, there were many momentous occasions that have enabled us to stand proud and tall as a Navy that put us on the map: setting up the Maritime Security Task Force; safeguarding Pedra Branca and the waters around it; taking command of CTF 151; sending our frigate to France for the first Aster surface-to-air missile firing; our people topping the United States International Special Forces course – one of the best special courses in the world; and one of ours becoming the first international student awarded the Australian Defence Force Commander-in-Chief medal. All this was possible because of the quality and capabilities of our people.

Chief of Navy, RADM Chew Men Leong (second from left), at the change-of-command ceremony where L/RADM Bernard Miranda (first from right) assumed command over the multinational counter-piracy task force, CTF 151, on 20 January 2010. It was the first time a Singaporean naval officer led CTF 151.

RADM (NS) Ng Chee Peng: In 2013, we brought the Navy to the public through Navy@Vivo, as part of our outreach to Singaporeans. It was inspiring to see our people volunteering beyond the call of duty at all the stations and working tirelessly over the nights and weekends to bring the public around our ships and exhibits.

As our people stood at the deck of our ship during the sunset ceremonies and saw the enthralled public connecting with our Navy, we were reminded that we were here to defend our nation, our loved ones and our home. We had little kids with their parents coming up to our people saying thank you for serving the country, and writing little "thank you" notes. You could see the immense pride brimming in the faces of our people – they were very proud of themselves, of the Navy and of what they were doing. Witnessing that made me proud.

Chief of Navy, RADM Ng Chee Peng, engaging the public at the flight deck of RSS *Intrepid*, in Navy@Vivo in March 2013. Picture: Courtesy of RADM (NS) Ng Chee Peng

WHAT MAKES THE NAVY SPECIAL?

RADM (RET) James Leo: Ask any sailor today about something that is special about the Navy and almost all will single out the Navy Family. Yet, the Navy Family did not come easy.

In the early days, there was tension between the combat, logistics and engineering vocations. We decided to overcome that by combining the logistics and engineering functions into one unit called Logistics. We took the decision that all engineering-logistics officers would go through the full Midshipman course and go to sea. And that really eroded the "you and I" and "us and them" mentality.

We were also very honest with our officers and our non-commissioned officers, of the problems we were having and what we were going to do. This built openness and trust within the RSN.

RADM (RET) Kwek Siew Jin: It is our courage to challenge the status quo and look at problems differently. After our crisis of confidence [Operation Thunderstorm], what created a big change was that we started thinking strategically, operationally and tactically, rather than just driving ships from point A to point B. We should have the basic capabilities and skills, but what was beyond that? So, we started thinking about our own needs; about what the Navy would require to operate in our region, rather than copying other navies. From there, we conceptualised our needs and customised our requirements to suit these needs.

We applied this adaptive perspective with human resource too. One day, we took a look and saw that there were a growing number of female graduates, who could contribute to the Navy. So, we recruited women into the Navy and inducted them into combat roles. They were sent on the coastal patrol craft for training towards their bridge watch-keeping certificate. When they passed, we wanted to put them into the Midshipman School as training officers.

One morning when I arrived at my office (I went to work quite early), these two female officers were waiting for me at the door,

Former Chiefs of Navy – (from left to right) RADM (RET) James Leo, Deputy Prime Minister Teo Chee Hean, RADM (RET) Kwek Siew Jin, RADM (RET) Richard Lim, RADM (RET) Lui Tuck Yew, RADM (RET) Ronnie Tay, RADM (NS) Chew Men Leong, RADM (NS) Ng Chee Peng – and Chief of Navy, RADM Lai Chung Han, at a Chinese New Year gathering on 4 February 2017. Picture: Kevin Lim for the RSN

without an appointment. They asked me: "Sir, may we speak with you?" Surprised, I said: "Sure! Come in." They asked me: "We want to ask you only one question, and it is this: Do you think women officers can become COs of RSN ships?" I said: "Why not? If you show yourself to be better than other officers, you will be selected as CO." They said, "In that case, may we make a request?" I asked, "What is your request?" They said: "We want to remain at sea." So, I left them at sea and they eventually became COs of ships.

RADM (RET) Richard Lim: A feature of serving at sea is that you are very much on your own once you are deployed. For example, when a system breaks down when you are at sea, nobody can call the contractor. At the same time, you cannot just sit around and do nothing. You cannot abort the mission. This means you need a very comprehensive knowledge of the systems that you have, the ability to improvise, and the ability to anticipate and to plan meticulously because you need to know what critical spares you need to have on board ship in case something goes wrong.

Due to the nature of our work in the Navy and the period of adversity we went through together, we developed a rigour in the way we thought about operations, controlled our operations, wrote our staff papers, made technology investments and conceptualised our future force structure and concept of operations. The small size of the Navy meant that it was more like a family. We had a shared vision and we played and worked hard together.

RADM (RET) Lui Tuck Yew: The RSS *Courageous* incident [in which the patrol vessel collided with a merchant ship on 3 January 2003, killing four female RSN sailors] was a huge setback for the organisation, but also one where we saw people come together to respond very positively. It was not just about getting back on our feet, going back out to sea and all that. For a long time, the Navy's servicewomen continued to keep in touch and visit the families, and extend the love from the Navy. We are family after all. Through all these, I know that we can count on our people, our Navy Family.

RADM (RET) Ronnie Tay: It is a bit of a cliché – the Navy Family – but it is true. We have a strong sense of belonging and identity. Even now, many years later on, we have kept in touch and still meet one another. And it is because of the nature of our work and how we depend on one another to do our part. When we are on watch, on duty, we keep at it, even when the sea is very rough – until we cannot "*tahan*", and someone offers to take over from us.

It is not just the war fighters but also the personnel ashore providing logistical support. They have to do a lot to prepare the ships for sailings and even after the ships sail, they are on standby in case some system does not work at sea.

Everyone has a deep sense of responsibility to the Navy Family; that we each have our part to play in order for us to achieve the mission together. So it is a Navy that all of us, who are associated with it and have spent some time in it, are all very proud of.

RADM (NS) Chew Men Leong: The Navy stands out because we need to put a lot of trust in one another. Being up close and personal with real-life situations out at sea make us realise that our lives depend on others. It is ingrained in us that if we do not get our act together, we are in trouble, and we know it. This builds a lot of trust within the Navy. We trust that the leadership will make the right decision and that we are headed in the right direction. We trust that our people will pull together to overcome the most difficult of challenges, and that kind of trust is not easy to find elsewhere.

RADM (NS) Ng Chee Peng: The response to ME2 Jason Chee's accident was most telling of the mettle, the strength and the character of our Navy. When I had a meeting with all the Navy's commanders the day after the accident, the first question I was asked was not about what happened, but a genuine "Sir, how can we help?" It is a gesture that truly touched me, and still touches me

even today. All across the Navy, people wanted to chip in, whether it was in helping Jason's family, or in donating blood, or in sprucing up Jason's hospital room. Jason himself was tremendously strong. It was a very difficult period but I saw the whole Navy Family coming together and becoming even stronger in the midst of the crisis. The alternative could easily have happened; people could have blamed each other, run apart in very different directions. Instead we bonded together as one, overcame the crisis and became stronger as an organisation, as a family. This is the spirit of our Navy Family.

IN CLOSING

The Navy's people and the Navy Spirit were recurring themes that emerged from what the former Chiefs of Navy said. As the RSN celebrates its Golden Jubilee, it salutes the men and women whose toil and devotion have brought the Navy to where it is today. The Navy Spirit, akin to precious metal forged out of refiners' fire, has emerged stronger and purer with each challenge that the Navy has had to overcome. The many crucible moments only served to bring the Navy Family closer.

As the Chief of Navy, RADM Lai Chung Han, said when he assumed his position in 2014: "At the end of it all, let others judge us not by mission success alone, but by the character of our efforts and endeavour."

RADM (RET) James Leo spent 22 years in the RSN, serving first as its Commander and then as the Chief of Navy between November 1985 and May 1991. After leaving the service, he worked as Executive Director of PSA, Chairman of Chartered Industries of Singapore and later, of Singapore Technologies Shipbuilding and Engineering.

RADM (RET) Kwek Siew Jin spent 27 years in the RSN, serving as the Chief of Navy between December 1992 and June 1996. After leaving the service, he worked as the Managing Director of SMRT and the President of Singapore Power. He was also the President of the National Council of Social Services, Chairman of the National Volunteer and Philanthropy Council and Chairman of the Students Care Service. He currently serves on the board of directors of the Singapore Anglican Community Services and NTUC FoodFare Cooperative.

RADM (RET) Richard Lim spent 23 years in the RSN, serving as the Chief of Navy between July 1996 and June 1999. After leaving the service, he worked as Chief Information Officer and later, Deputy Secretary (Technology) at MINDEF, and Chief Executive Officer (CEO) of DSTA. He is Chairman of Singapore Technologies Logistics, and serves on the board of directors of Singapore Technologies Marine, Land Transport Authority and National University Health System. He is also Adjunct Professor at the School of Mechanical & Aerospace Engineering, College of Engineering, Nanyang Technological University.

RADM (RET) Lui Tuck Yew spent 24 years in the RSN, serving as the Chief of Navy between July 1999 and March 2003. After leaving the service, he worked as CEO of MPA, Deputy Secretary (Land) at Ministry of Transport and CEO of HDB. He has served as Minister of State and Senior Minister of State for Education, and Senior Minister of State and Minister for Information, Communications and the Arts. In May 2011, he became the Minister for Transport, and held a second portfolio as Second Minister for Foreign Affairs and later, Second Minister for Defence. He retired from politics in September 2015.

RADM (RET) Ronnie Tay spent 26 years in the RSN, serving as the Chief of Navy between April 2003 and August 2007. After leaving the service, he worked as CEO of the Infocomm Development Authority of Singapore. He is currently CEO of the National Environmental Agency.

RADM (NS) Chew Men Leong spent 26 years in the RSN, serving as the Chief of Navy between August 2007 and March 2011. After leaving the service, he worked as CEO of national water agency PUB, and later, of Land Transport Authority. He is currently Deputy President & President (Defence Business) at Singapore Technologies Marine.

RADM (NS) Ng Chee Peng spent 26 years in the RSN, serving as the Chief of Navy between March 2011 and July 2014. After leaving the service, he is currently serving as the CEO of the Central Provident Fund Board.

AGAINST ALL ODDS TO REACH NEW FRONTIERS

Two classes of ships in two different eras, but with one thing in common: their pioneer crew overcame all odds to bring new capabilities to the Navy. In 2005, Singapore's first frigate, RSS *Formidable*, departed France for its 39-day journey across the Atlantic Ocean, heralding the Third Generation transformation of the Navy. Similarly, almost 30 years before that, RSS *Mercury* and RSS *Jupiter* slipped off San Francisco for their tumultuous 63-day journey across the Pacific Ocean to Singapore, to add minesweeping capabilities to the then-fledgling Navy.

RADM (NS) Jackson Chia, 48, pioneer CO of RSS *Formidable*, shared that there was great excitement, but also trepidation. "Although we had a good 15-year experience running the missile corvettes, the frigates necessitated new operating concepts and procedures. The ships were also designed for a lean crew, aided by technology and automation. The pioneer crew would have to translate that vision into reality."

Although RSS *Formidable* could have taken the shorter route through the Suez Canal, the crew settled on the longer Atlantic route to put the ship through a rigourous test of rough seas, learning from the accompanying team of commercial ship-builders. The crew also had to mount security watches due to concerns of piracy and terrorism. Some personnel even forwent their liberty runs at the ports-of-call. Back home, they continued practising, spending at least a third of each month at sea for trials, without any complaints. They knew that they could not fail.

The crew of RSS *Formidable* underwent training and carried out trials at the shipyard in L'Orient, France, before returning in 2005.

Back in 1976, the journey home for the minesweepers, which were designed for coastal waters, was the first sailing across the Pacific Ocean for the Navy and crew. It was also the crew's first sailing halfway across the world, and both ships dealt with the fiery forces of not one, but three super typhoons. LTC (RET) Tan Peng Yong, 68, then-CO of RSS *Mercury*, decided to forgo a scheduled inspection on the ship's engines so that it could leave Guam five days ahead of schedule. "A super typhoon was closing in on Guam, which was not a typhoon shelter. Then-CO of RSS *Jupiter*, LTA Kwek Siew Jin, and I agreed that we had to leave immediately. Typhoon *Pamela* ripped through Guam two days later and sank all the ships that had been tied up in harbour."

The 120km/h winds, waves up to 6m in height, and countless mechanical and technical problems did little to blunt the resolve of the crew to bring the ships home. RADM (RET) Kwek, 67, recounted: "Typhoon *Olga* kept us in the US Naval Base at Subic Bay for nearly two weeks instead of our scheduled four days. As soon as the weather cleared somewhat, we decided to brave the rough seas and set sail for home. The next morning, the US Navy sent a P-3 Orion aircraft to see if we were still afloat." With a smile of satisfaction, he added: "When it found us, it flew very low, down to bridge height, and the pilot saluted."

He said: "This journey bears testimony that we can accomplish seemingly impossible missions through careful planning, determination and courage." Both minesweepers provided the foundations on which the RSN built a strong minehunting capability. In honour of their service, timber from RSS *Mercury* now lines the deck of the Wardroom in Tuas Naval Base.

Similarly, RADM (NS) Chia said that the operationalisation of the frigates was a culmination of hard work, commitment and 'can-do' spirit from the Navy. "I am immensely proud of these ships, the crew and their achievements. Beyond deterrence, these much-needed capabilities ensure that we remain a credible maritime force in our maritime region."

Left to right: RADM (RET) Kwek Siew Jin, pioneer CO of RSS *Jupiter*; LTC (RET) Tan Peng Yong, pioneer CO of RSS *Mercury*, and RADM Jackson Chia, pioneer CO of RSS *Formidable*, reminiscing about their days at the helm of their ships at Changi Naval Base in November 2016.

Left: COL Jackson Chia, CO of RSS *Formidable*, at the frigate's commissioning on 5 May 2007. **Above:** CPT Tan Peng Yong (left), CO of RSS *Mercury*, and LTA Kwek Siew Jin, CO of RSS *Jupiter*, at the homecoming ceremony for both ships on 4 June 1976, which was officiated by the Commander of the RSN, COL Khoo Eng An. Picture: Courtesy of RADM (RET) Kwek Siew Jin

YOU'LL NEVER WALK ALONE

Lance Corporal (LCP) Kenneth Tan (third from right) completing NDU Hell Week in August 2007. Picture: Courtesy of CPT (NS) Kenneth Tan

A former naval diver who enjoyed competing in adventure races and riding his mountain bike, CPT (NS) Kenneth Tan, 28, was devastated when he was diagnosed with a debilitating disease. But he was determined to complete one last race, and succeeded – with the help of his NS mates.

In 2014, he discovered that he suffered from Strumpell Lorrain Disease, which reduces one's control over and sensation in the legs, after failing his 2.4km run during the Individual Physical Proficiency Test, the standard physical fitness test in the Singapore Armed Forces. "I knew that something was wrong when I couldn't even pass. When the medical officer told me about my condition, I couldn't believe my ears. I was so depressed and wanted to give up on everything."

Instead of giving up, CPT (NS) Tan, with the support of his buddy, Third Sergeant (NS) Nicholas Yeo, also 28, decided to participate in a 10km race together during the Army Half Marathon in August that year – one last race "before calling it quits", he said. At 7.10am on the race day, the duo were waiting at the starting line when they heard a group of men singing the NDU song from a distance away. CPT (NS) Tan thought that the men, dressed in the same lime green T-shirt, "must be some regulars from NDU", until they approached him and he recognised them – all the 62 others in his 27th batch of naval divers.

His buddies had spent months gathering everyone, including those overseas, for this race. They even pooled money to fund the airfare for one of them who was studying in Australia. Although it had been five years since their NS days, they all wanted to do something to encourage Kenneth not only during the race, but also in his life. One of them, CPL (NS) Koh Long Cheng, 28, a research and development engineer, said: "It didn't take much to get everyone together as we were all very willing to do something for Kenneth. He is very strong and definitely an inspiration for many of us."

Touched beyond words, CPT (NS) Tan told himself that giving up was definitely not an option. "I knew that they would drag me through to the finishing line if I couldn't walk." Singing the NDU song with gusto, pride and camaraderie, the 63 former naval divers crossed the finishing line at 10.12am.

More than a year later, CPT (NS) Tan, who sometimes has trouble balancing when he walks, said: "If so many people bothered to turn up to support me, I cannot give up. This is our spirit as naval divers – we will never leave our buddy behind, we don't give up on one another. Actually, it is beyond the race. Many of my batch boys still visit me frequently to do walks with me. It's a lot of effort and a clear sign that they have not given up on me."

In keeping with this spirit, he and his buddies plan to take part in a 10km walk in the Army Half Marathon again in 2017 – the 10th anniversary of their enlistment – although he will need a mobility aid to do so. "I want to do something back for my batch boys because they have done so much for me."

CPT (NS) Kenneth Tan (centre) and his batch of naval divers crossing the finishing line of the 10km race in the Army Half Marathon in 2014. Picture: Courtesy of CPT (NS) Kenneth Tan

THE NAVY FAMILY WAS THERE FOR ME

ME2 Jason Chee (centre), who lost three of his limbs in an accident on 9 December 2012, returned to the RSN as a training supervisor at the Changi Naval Base on 3 June 2014.

ME2 Jason Chee, 34, lost both legs, his left arm and three fingers on his right hand in an accident on board a ship. He recalled his road to recovery, which led him to win an ASEAN Para Games gold medal in men's team table tennis in 2015.

Joining the Navy was my childhood dream. Watching its contingent march in the National Day Parade, I told my late mum that I wanted to join it to protect my country and travel to many places. After enlisting in 2004, I served on patrol vessels and landing ships tank, and took part in the counter-piracy operation in the Gulf of Aden.

On 9 December 2012, I was caught between the motorised winch and berthing rope on board RSS *Endeavour* by accident. I could not breathe and thought I was going to die. My officer, CPT Kok Yi Ling, shouted: "Do not give up. We will get you to the hospital soon!" Those words pushed me to stay alive. I remained conscious until I was wheeled into the operating theatre.

ME2 Jason Chee in action at the men's singles – class 2 match at the ASEAN Para Games in 2015. He eventually won a gold medal in men's team table tennis. Picture: Singapore Press Holdings

It was Christmas Eve when I finally woke up and saw my father, relatives and ship mates. I was happy to be alive. I was deeply touched that many had stood by me. I cried. I eventually learned how the entire Navy had rallied behind me. CPT (NS) Chua Chengyu and CPT (NS) Bryan Tan, the Navy doctors at the scene, made the tough call to extricate me despite the risk of excessive bleeding. My ship mates furiously slashed through the ropes to free me because every second counted. The officers and Navy doctors were rostered to monitor me 24/7. Navy mates organised a blood drive to collect blood donations for me. Each day, they visited me, decorated my hospital room with photos, cards and balloons, and took my dad to and from our home and the hospital.

After the last of many painful operations, I was finally able to breathe independently. But I was still so weak that I could not grab a glass or sit up. I was craving food. Knowing this, my Flotilla Commander, COL Tan Kai Cheong, packed fishball soup for me every day.

The Navy tapped on the expertise of Tan Tock Seng Hospital and Walter Reed National Military Centre in the US, and suggested that I do sports for rehabilitation. I chose table tennis and swimming. The Navy was supportive of my sports sessions. My squadron mates even set up a support group and encouraged me when I felt down. With the Navy Family behind me, I regained my fighting spirit and self-esteem. Initially, I was simply content with representing Singapore in table tennis. Winning a historic gold was a bonus. It was not until my accident that I realised what the Navy Family meant to me. It stuck with me in good and bad times, and helped me overcome this crisis. I dare say I came out stronger.

When I started rehabilitation, I aimed to walk again and continue serving in the Navy. I started walking with artificial limbs and returned to work as a training supervisor in my squadron in June 2014. It widened the office doorway and installed grip bars and ramps to help me do my work comfortably. Though I cannot march in the Navy contingent or travel overseas with it, I am proud that I can still contribute to the Navy in my own way.

REMEMBERING *COURAGEOUS*

COL Ong Chee Wei, 44, Commander First Flotilla and CO of the *Victory*-class missile corvette squadron, was Executive Officer of RSS *Valiant* in 2003. The missile corvette was one of the first few ships to arrive at the scene after a merchant ship collided with patrol vessel RSS *Courageous*, killing four servicewomen.

It was almost midnight on 3 January 2003 when RSS *Valiant* was activated. Within two hours, the crew was assembled and we set sail from Tuas Naval Base. All we knew was that one of our own, RSS *Courageous*, had been involved in a collision off Pedra Branca and we had to get to it as soon as possible.

When we arrived at the scene, we were shocked by what we saw. RSS *Courageous* was a pile of mangled steel floating on the water. Its straight mast had toppled and its aft had been shorn off and crumpled.

We knew that we had to look for the four missing servicewomen fast. Soon, it started to rain heavily. Visibility dropped and the already rough monsoon conditions deteriorated. Despite the weather, we stationed off-watch crew and even the engineering department crew as extra lookouts on the bridge wings, to scan the sea surface with signal lanterns. Everyone wanted to chip in. My Coxswain and I had to enforce the crew's rest cycles so that we could sustain our 24/7 routine.

> "The organisation that succeeds is not the one which holds back, fearing failure, nor the one which never fails. Rather, it is the one which moves on in spite of failure."

Many of us in the Navy, who were friends of or had served with the missing servicewomen, were shaken and in grief after the incident. I remember then-Chief of Navy, RADM Lui Tuck Yew, saying that we had to find them – they were our own people. The Navy Family rallied together and closed ranks. We leaned on one another for strength and encouragement, and contributed in whatever way we could towards helping the servicewomen's families and the ongoing operations. Through this darkest period, the Navy Spirit shone through.

RSS *Valiant* stayed on for a few days until we were relieved by another ship. The search and rescue operations lasted for 10 days. All but one of the missing servicewomen were found.

The experience has shaped me as a commander. I saw members of the Navy Family put everything aside and give their utmost to help their comrades in need – no questions asked. I witnessed first-hand the RSS *Courageous* crew and the first responders dealing with firefighting and damage control while attending to the injured and attempting to locate the missing crew. Tough training and realistic drills had stood them in good stead. The other lesson ingrained in me is that as commanders, we owe it to the families of our crew to grow them professionally and watch after their safety. It has become my commitment to bring every crew member safely home after each and every sortie.

Every year in early January, the Navy remembers RSS *Courageous* by reflecting on the accident and sharing the lessons learnt. We do it for two reasons. First, we paid a high price for this painful lesson and we must never allow it to repeat. Second, while the Navy Family has stumbled before, we have been able to get back on our feet and move onwards and upwards. To quote RADM (RET) Lui Tuck Yew: "The organisation that succeeds is not the one which holds back, fearing failure, nor the one which never fails. Rather, it is the one which moves on in spite of failure."

COL Ong Chee Wei was the Executive Officer of RSS *Valiant* when the ship was activated to assist RSS *Courageous* in January 2003.

DRAWING STRENGTH FROM ONE ANOTHER

ME5 Richard Goh, 54, Master Chief Navy, has served the Navy for 37 years. The first ship he sailed on was RSS *Jupiter*, a *Bluebird*-class minesweeper.

RSS *Valour* on its journey home from Guam in April 1999, after participating in a multinational exercise led by the US Navy.

I have seen many changes in hardware, training paradigms and engineering support. Yet, systems alone, no matter how sophisticated, will come to nought without committed people. Let me share a story.

In 1999, the RSN sent two missile corvettes, RSS *Valour* and RSS *Vigilance*, to Guam for a multinational exercise led by the US Navy. At 62m long, the missile corvettes were the smallest among the participating ships. Many people thought we were crazy to embark on such a journey. We battled waves up to 4m high across the Pacific Ocean for five days. Half of the crew became seasick. Those who were managing better volunteered to do additional watches to help those who were very sick. It was a relief to reach Guam.

Returning to the rough sea for the exercise was daunting, but we were motivated by the prospect of firing our Harpoon missile. Unfortunately, the range was fouled when it was our turn and the US Navy could not grant us another firing window. Everyone was extremely disappointed. However, we completed all exercise serials and successfully conducted an unscheduled gunnery firing on the target.

We could have given up halfway through the journey. We could have given up when we could not fire our missile. We did not. Instead, we persevered, and did what we had to, to the best of our abilities.

In the years that I have been in service, I've heard countless accounts of Navy men and women who have faced the odds and made the best of what they had.

Why do we repeatedly continue our duties under stress and extreme conditions, against normal human instincts? On reflection, I realise that we do so because we have found meaning in serving the Navy, through one another. In our years on board ships, we spend a great deal of time interacting with one another. Our ship is not only our workplace but also our second home. We found another family in the Navy. Through thick and thin, ups and downs, we forged tight bonds of friendship and care genuinely for one another. Seeing fellow sailors staying the course and supporting one another strengthens our will to push through as we know that we just cannot let them down.

This is the Navy Spirit. It "cannot be taught, but must be caught". It must be experienced and lived. It is how we draw strength from one another. It is what drives us to weather storms and achieve greater things, together. It is what brings out our courage and commitment, and can ultimately tip the outcome of battle in our favour.

Our illustrious naval heritage and success today are the fruit of the toil and devotion of many generations of men and women who exemplify the Navy Spirit. Our people will keep the spirit burning bright and bring our Navy to new heights – now and beyond.

ME5 Richard Goh, Master Chief Navy, has shown and witnessed *Valour at Sea*. The sculpture bearing this name at Tuas Naval Base symbolises the Navy Spirit and its pledge to never flag in the face of adversity.

CHALLENGING YOUR FEARS

MAJ Charlene Tan, 30, a staff officer at the Naval Plans Department, enlisted in the Navy in 2005. After graduating from New York University with a Bachelor of Arts in Political Science and Public Policy in 2010, she served several tours aboard patrol vessels, landing ships tank and missile corvettes. Her last two appointments were aboard RSS *Sovereignty* and RSS *Victory* as Executive Officer.

Maybe you're expecting a story about being a woman in the Navy. But that is not what defines my RSN experience, which has been about challenging my boundaries and growing as a person.

Joining the Navy was about changing my perspective on life. At 18, I told myself being comfortable wasn't enough. That version of me within my comfort zone was just the beginning of who I was. I had to sail out to discover my own boundaries, so I could challenge them. In testing what I thought I couldn't do, I achieved. And I overcame my fears one by one.

A 10m drop into the sea from the NDU tower – part of Officer Cadet School training – gave me nightmares for months leading up to the jump. Did I lose my fear of heights? No. But I did win my battle against it. I jumped. By psyching myself up, closing my eyes and running into nothingness. I had come so far. I couldn't let a jump stop me.

> "Every time you challenge your fear head on, you become stronger. The challenges grow as the years pass, but so do you... "

Fast-forward 10 years to Langkawi, Malaysia, when RSS *Sovereignty*, tightly wedged between two other warships whilst at anchor in formation, started showing worrying signs of dragging anchor. The tidal stream was building, and the CO was ashore on an official call. Everyone was looking to me: "What do we do now?" Of course I was afraid. This wasn't something I could solve by closing my eyes, running and jumping. To keep my ship and crew safe, I had to consider carefully and act decisively. I decided to weigh anchor and re-position the ship with the crew at hand. I didn't regret making that call.

Every time you challenge your fear head on, you become stronger. The challenges grow as the years pass, but so do you. You learn to manage your own emotions and stay afloat amidst the pressure. That's one of the best things about my Navy journey. I came to know myself, and in doing so, I've learned to master myself.

My experience has shown me that you don't have to be of a certain mould to serve in the RSN. Mindsets are changing and stereotypes about the kind of women who join the military are being shed. The RSN has recognised the growing need to recruit personnel from different groups in society and introduced family-friendly policies to allay the concerns of women and their families. I know many women with meaningful careers in the RSN who enjoy fulfilling family lives.

I hope women themselves can look beyond gender conventions to realise what they can gain from challenging their fears in the RSN, in ways they can't in civilian jobs. We started with the small group of SWANS in 1956. Today, women make up just below 10 per cent of the RSN's strength. Who knows? Maybe in a decade, this number will double.

MAJ Charlene Tan served aboard RSS *Victory* as Executive Officer in 2016.

ANSWERING THE CALL OF COMMAND

Colonel Cheong Kwok Chien

For me, command has been the most defining appointment during my time in the RSN, and is as demanding whether at sea or ashore. Most of the defining moments of my naval career were forged during my 10 stints in command. Each Command is the same, yet different, and there is never a dull moment. From the moment I take the Command oath each time, I am expected to lead my people to overcome every challenge that stands between my unit and mission success.

In 2009, I was in command of RSS *Stalwart*, which was deployed to San Diego for seven months to learn how to operate the RSN's new Sikorsky S-70B Seahawk naval helicopters and bring them home. The voyage there, across the Pacific Ocean, was already a daunting task. For an entire week, we rode 9m waves and were battered by winds of up to 80km/h. I had to call on all of my experience to navigate the ship safely through the adverse conditions, all while projecting steady calm and confidence despite the punishing conditions.

In San Diego, I leveraged on the strengths of my team to seize opportunities and overcome adversity. I was rewarded when I witnessed what a group of united minds and hearts can achieve. The 80 core crew members who sailed with me, together with the air detachment from the RSAF, accomplished all our tasks and achieved more than 300 incident-free shipboard helicopter launch and recovery operations. We even produced a training manual that is still used today to train teams in naval aviation. I am always proud and honoured to have commanded this crew. By bringing this new capability to the RSN, we had put the RSN on an equal footing with many established navies around the world.

Knowing that one can make the ultimate difference is the special

RSS *Stalwart* and the Sikorsky S-70B Seahawk naval helicopter air detachment underwent four months of gruelling integration training in San Diego to bring the naval aviation capability to the RSN.

CO of RSS *Stalwart*, LTC Cheong Kwok Chien (seated, centre, in uniform) with his ship and air detachment crew on board the frigate on the seven-month deployment to San Diego. They returned home on 25 April 2010.

privilege of command that few will experience. With this privilege comes the burden of responsibility that fewer can carry. One needs to always maintain the highest level of integrity and honour. I once discharged a serviceman who was found wanting in his conduct. It was difficult to sever a person's livelihood, even when it was the right course of action. Some years later, I met him on the street. He came up to me and told me that he was living an honest and honourable life because of the lesson he had learnt and appreciated what I had done. That day, I felt the positive impact I had made on a person's life.

For the RSN, the Command is the greatest source of drive and hope. When I was commanding *RSS Valiant*, I was asked to review the war-fighting concept of the missile corvettes. I led a small team that brainstormed ways to break out of our paradigms. Together, we started the missile corvette on its transformation journey. I continued to see this through when I became squadron commander of the missile corvettes and then flotilla commander. A decade later, I witnessed the fruition of this transformation – the upgraded missile corvette with its organic unmanned aerial vehicle capability. Today, I am proud at the speed at which we achieved this transformation. The substantial shift in how we operate the missile corvettes today resulted from a fundamental change in the war-fighting concept developed a decade ago. That in turn drove follow-on changes to capability development and training systems. This decade-long evolution could be achieved only because of the alignment we had in our commanders. Knowing that the echelons of commanders are aligned gives the RSN the confidence to venture into new areas of operations and developments.

My evergreen lesson in command is about giving hope to my

people, and then turning this hope into a belief in a greater purpose. With strong beliefs, people are able to surmount challenges and deliver mission success. During my command of the task groups and task force operating in the Gulf of Aden, we were always faced with real-life challenges, from deterring the pirates who operated along the coastline and responding to calls for assistance at sea, to facing constant resource demands and weather challenges. My forces, including the international forces under my charge, always prevailed under these conditions because of our shared belief that we were making a difference to the safety and security of the merchant vessels plying the Gulf of Aden. This belief spurred on closer collaboration and cooperation between the deployed patrolling ships.

On one occasion when I was the Commander of a SAF Task Group, we organised a logistics transfer of common components between ships spread over a few hundred nautical miles, so that units could repair their defects in situ and continue with patrols in their assigned sectors. In the Gulf of Aden, every extra day on patrol mattered because the presence of ships and aircraft was the key deterrent against the pirates. On another occasion, we leveraged the strengths and capabilities of different ships to avert a possible pirate attack. We deployed the RSN's helicopter that was on "hot standby" to quickly locate and identify a suspicious vessel so that a ship nearby could conduct the boarding and investigation.

In its 50 years, the RSN has been blessed with many outstanding Commanders. It will always be grateful to the sacrifices of all those who have taken the oath and answered the call of command.

Chief of Navy, RADM Ng Chee Peng (left), presenting the Singapore flag to the SAF task group commander, COL Cheong Kwok Chien, at Changi Naval Base on 17 March 2014. The group of 151 sailors, soldiers and airmen joined international counter-piracy efforts in the Gulf of Aden for three months.

L/RADM Cheong Kwok Chien, aboard People Liberation's Army (Navy) ship *Xiang Tan* during a visit hosted by Commander Escort Task Group 531, Senior Captain Wang Hong Li (left) and ship CO, Captain Dong Qian (right) in Djibouti in May 2016.

Colonel Cheong Kwok Chien was appointed as the Fleet Commander on 12 August 2016. He has commanded three ships – RSS *Brave*, RSS *Valiant* and RSS *Stalwart* – and has held commands of the *Victory*-class missile corvette squadron, the *Formidable*-class frigate squadron and the First Flotilla. He also commanded the two SAF task groups that deployed to the Gulf of Aden in 2012 and 2014, and the international counter-piracy task force there, the Combined Task Force 151, from March to June 2016.

RIDING THE WAVES, RAIN OR SHINE

Sometimes, when one door closes, another opens.

Corporal First Class (CFC) Kewin Yeo, 22, had initially been slated to do National Service at the NDU. However, he did not meet some of the physical requirements and was posted to the Fast Craft and Training Unit (FCTU). He admitted: "I felt pretty low as I had already built great bonds with my NDU teammates." Nevertheless, he remained positive. "I had never heard of FCTU, but 'fast craft' made me feel excited!"

Such craft are on standby 24/7, ready to be deployed for up to 15 hours under challenging weather and sea conditions at a moment's notice. As the crew – a coxswain and three to four seaman per craft – is small, everyone has to be fully conversant with their roles and capable of executing their missions independently.

On 28 December 2014, AirAsia flight QZ 8501 crashed into the Java Sea en route from Surabaya to Singapore, killing all 162 people on board. The FCTU crew on standby, among many others in the Navy, were activated for the search and locate operations. Inspired by the crew's dedication to their duty, CFC Yeo volunteered to go despite it being the holiday season.

He added: "The thunderstorms often came unexpectedly and drenched us. The craft would slam against the huge tides. A lot of us were vomiting from seasickness but no one gave up. In fact, the tougher it got, the more we encouraged one another, fuelled by the same purpose of wanting to help bring closure to the families of those whose lives were lost. The coxswains especially took care of the less seasoned ones."

Coxswains, who are primarily responsible for the craft and crew, are drawn from a select group of mostly regular personnel. Although he was an NSF, CFC Yeo was chosen to undergo the craft coxswain course, shortly after returning from the operation, "as not only was he

Craft Coxswain, CFC (NS) Kewin Yeo (centre) with Craft Technician, LCP Ganardhipan S/O Mathialaku (left), and Craft Seaman, CPL Muhammad Sardi Bin Abdul Hamid (right), at the FCTU marina at Tuas Naval Base in September 2016.

"The thunderstorms often came unexpectedly and drenched us. The craft would slam against the huge tides. A lot of us were vomiting from seasickness but no one gave up. In fact, the tougher it got, the more we encouraged one another, fuelled by the same purpose of wanting to help bring closure to the families of those whose lives were lost. "

competent, he also displayed leadership and was able to rally his peers", said his Company Warrant Officer, ME3 Max Yeo. After the gruelling three-week course during which he sailed for numerous day and night sorties, CFC Yeo joined the ranks of the craft coxswains.

At that point, he had three months of NS left, but he volunteered to extend his stint by six months so that he could participate in an overseas exercise. He remarked: "We have to contend with more challenging conditions when exercising overseas. I wanted to contribute in a larger capacity as a coxswain to lead and take care of my crew, just like how my coxswains have always done."

He reminisced: "I miss the camaraderie with my Navy brothers and sisters. Once, we were out on the craft when it poured and we were all cold and wet from the rain. The moment we got back to our mothership, the crew and even the CO himself welcomed us with hot drinks and snacks. We are really one big family, regardless of which unit we come from in the Navy."

In July 2016, he became a National Serviceman (NSman). He looks forward to meeting more NSmen from the Navy, whom he fondly calls "Navy sons". He added: "It will be a great chance for me to get to know the Navy even better!"

FINDING A HOME AWAY FROM HOME

After graduating with an engineering degree from Nanyang Technological University, ME4 Alvin Siah, 35, spent more than eight years as a project manager at SPRING Singapore and an operations manager at National Parks Board, before joining the RSN in 2015. He graduated with top honours at the 11th Military Domain Expert Course that year, and is undergoing qualification training at 171 Squadron for the role of Senior Marine Engineer aboard the *Archer*-class submarines.

Many join the SAF after leaving school for a dynamic and fulfilling profession and thereafter leave to start a second career. With the Military Domain Expertise Scheme, it is now possible to do the reverse – first work in the private or public sector and then join the Navy for a meaningful second career. And this was what I did.

When I announced my decision to sign on with the RSN in 2015, my family and friends asked: "How old are you? Why are you joining the Navy to do what 18-year-olds are doing?" At 33 years old, I was the oldest trainee in the 11th Military Domain Expert Course, with most of my batch mates younger by at least 10 years. I've always felt an affinity with the sea – I was a sea scout as a boy – and the desire to serve my country had never waned since my days as a Full-time National Serviceman with the Commandos. After more than eight years in other areas of the public service, I decided that there was not going to be a better time, and I wasn't going to let such scepticism stop me.

> "Go make things happen; do not look back." Her sacrifice and support have been everything to me... "

Life as a submariner is not easy. Once you dive, Mother Nature is against you. You do not see daylight for days on end. You work in a demanding environment where little mistakes could mean the difference between life and death, and where you depend on the next guy aboard to watch your back and keep you safe.

Just my training – 35 weeks at Officer Cadet School and the subsequent year-long training for submariner qualification — has not been easy for my family, particularly with the arrival of my son, Aden, in December 2015. I returned from the six-week Midshipman Sea Training Deployment to see how much my wife's tummy had grown – a keen reminder of what I had missed. I asked myself: "Is this worth it?" To that, my wife's reply has always been the same: "Go make things happen; do not look back." Her sacrifice and support have been everything to me.

The pursuit of a common cause despite the challenges and the sacrifices is also the very reason that submariners – and all sailors in the RSN – share such a strong identity and kinship. This rare combination of service, sacrifice, teamwork and kinship has made the RSN my second home. Some of my friends have asked if I ever felt like the odd one out, and my answer is no. I have always felt like I belonged to the Navy Family, thanks to the policies to help mid-career professionals and the camaraderie in my unit. My experience has convinced me that regardless of your age, background, or upbringing, what matters is the path you choose. I am glad to have found my path with the RSN and will not look back.

ME4 Alvin Siah hopes to assume the role of Senior Marine Engineer on one of the submarines like RSS *Swordsman*, seen here at Changi Naval Base in December 2016.

ONCE NAVY, ALWAYS NAVY

In 2012, the Navy took the bold move of having ships manned fully by NSmen performing Operationally Ready National Service (ORNS). The Navy demands of them the same level of competency and operational readiness expected of all Navy servicemen. LTC (NS) Chiu Eng Tatt, 50, CO of the ORNS Team of the missile corvette, revealed the secret to the naming of RSS *Vengeance* as the Best Naval NS Unit in 2016.

LTC (NS) Chiu Eng Tatt and his crew of RSS *Vengeance* marking the completion of their ICT at Tuas Naval Base in August 2016.

I felt honoured to be given the opportunity to give this pioneering concept my best shot. I remembered the strong camaraderie, friendship and professionalism during my times in the Navy, particularly when ships were deployed to sea. Even though I was older and might have already lost my sea legs, I wanted to give it a go.

When I first met my crew, I saw no familiar faces. Some key appointment holders voiced their apprehensions. We were unsure if the team had the motivation to attain the required standards. Fortunately, the Navy Spirit was still within all of us. When I spoke to the crew for the first time, I emphasised this: everybody counted, we were in this together and we would accomplish our In-Camp Training (ICT) safely and properly.

The challenge of being NSmen is that our civilian work continues despite the ICT. I observed that some crew members, especially those who were in sales, were excusing themselves during training to answer phone calls. I adjusted the training programme to cater for short breaks to return calls or messages. In return, the crew put away their mobile phones during training. I was glad I could do something so they could give their best during ICT despite their work constraints.

Just before one training sortie in 2015, CPL (NS) Ong Chong Boon called me. He had encountered a flat tire. I thought that he would not be able to turn up for sailing. Instead, he told me that he arranged for Coxswain, ME4 (NS) Alan Neo Ban Lam, to pick him up. He said: "Don't sail without me!" After we set sail, I found out from the Coxswain that Master Sergeant (NS) Ng Chee Wee turned up despite feeling unwell. He felt that he would be failing his shipmates if he did not turn up. We reassigned his work so that he could contribute while getting the rest that he needed. Their commitment is reflective of my crew's dedication to duty.

At the end of the ICT, many NSmen asked when the next session was, with the intent of deconflicting their schedules. They had thoroughly enjoyed the training and were looking forward to going back together. For instance, Staff Sergeant (NS) Matthew Kwan was supposed to be in Thailand for work but took annual leave to make it for the ICT in 2016. That was how much he wanted to be with the team that he has grown close to. When we joined the Navy, we did not join an organisation; we became part of a family. We gained experiences and grew, together. Although some of us have moved on to other jobs, we never completely leave – because family is for life.

LTC (NS) Chiu Eng Tatt receiving the best NS naval unit award from Minister for Defence Ng Eng Hen at SAFTI Military Institute on SAF Day, 1 July 2016.

THE NAVY SONG:
ONWARDS AND UPWARDS

The Navy Song was originally a two-stanza Midshipman Song composed by then-Midshipmen Melvin Huang and Lionel Liew in 1974. It was a song about the Navy's humble beginnings and the character of its men and women. It also represented the spirit of the first batch of locally trained Midshipmen and their aspirations for the future Navy. The spirit of the song represented the Navy so well that it was adopted as the Navy Song.

In 1989, a third stanza was added by the Chief of Staff – Naval Staff and Director of the Joint Operations and Planning Directorate, Colonel Teo Chee Hean. He felt that the fledgling navy, like the Navy Song, had arrived at a point where it was writing a new chapter in its history. The first two lines of the new stanza highlighted the need for the Navy to work closely with its sister services, a key focus then as the SAF developed into a joint force. The last two lines paid tribute to the Navy's fighting spirit in overcoming all odds to achieve Victory, with the capital V also signifying the *Victory*-class missile corvettes that were then going into service. Unlike those in the first two stanzas, the first couplet of the new stanza does not rhyme, and this was deliberate. It was to signify that this stanza was different from the earlier two stanzas, and that the Navy's progress, while built on strong foundations, would not simply be a continuation of the old.

Today, the Navy Song continues to be a stirring reminder of the Navy's character, spirit and purpose.

From a humble beginning the day we were born,
Onwards and upwards we've moved on and on.
Never looking back we'll always grow.
Onwards and upwards the best we'll show.

Chorus:
We're the ones the sons of the sea.
Mighty men of the Singapore Navy.
We will stand for the right,
We will fight to the end.
We will always be true to our land.

Our waters to guard to ensure they are safe.
It's a great task only meant for the brave.
It does make us proud to know that we
All play a part to protect our seas.

With our comrades in arms from the Land and the Air,
Together we stand in defence of our land.
Never flagging in adversity,
Forward we'll march on to Victory.

Observing Colours at RSS *Panglima* - Changi Naval Training Base on 5 May 2008.

THE RSN AT FIFTY

REAR ADMIRAL

LAI CHUNG HAN

In 1992, a time capsule was sealed and buried during the foundation laying ceremony of Tuas Naval Base, as part of the Navy's Silver Jubilee celebrations. Earlier in 2017, this RSN25 time capsule was unearthed and opened. In it were artefacts from the Navy then – photographs of its ships and a pictorial history of Brani Naval Base, navy publications and memorabilia, such as the bridge card and souvenirs from the Silver Jubilee celebrations. There were also records of the hopes and aspirations of the Navy's men and women for the RSN at 50. One midshipman hoped that we would be capable of designing our own warships, while one of our first female naval officers wished that women would become COs. "To be the Best Little Navy in the World" was how the Chief of Navy, RADM Teo Chee Hean, summed up the collective aspirations of the RSN in 1992.

Today, the Navy's ships include indigenously designed and built patrol vessels and landing ships tank. Five out of six of its frigates and missile corvettes were also locally built. The replacement for the patrol vessel, the littoral mission vessel, is a product of the partnership between the Navy and the DSTA. For the many innovative "firsts" in the new ship's design and construction, the littoral mission vessel project was awarded the Defence Technology Prize Team (Engineering) Award in 2016. Today, women assume different roles and appointments in the RSN. Some are engineers, coxswains and even naval divers. Many servicewomen have also gone on to command patrol vessels, missile gunboats and corvettes, frigates and even squadrons.

The Navy has been able to meet and exceed the aspirations expressed at its Silver Jubilee because of the qualities that make the Navy special. These are the qualities of solidarity, resilience and enterprise, bound up in what we have come to call the Navy Spirit. In the words of our former Chiefs of Navy, the Navy has always moved as one entity and whatever we do, we do together. Down to the most junior sailor on the ship, everyone shares a common vision and a common goal. In the same way that the Navy men and women trust the leadership to chart the way ahead for the Navy, the leadership trusts all Navy men and women to play their part in propelling the Navy forward.

THE NAVY SPIRIT

Our solidarity as a Navy Family has seen the Navy through tough times. We overcame the 'lost decade' of Operation Thunderstorm with renewed confidence and embarked on a period of robust development to build the 2nd Generation Navy. Our resilience also helped us cope and recover from the darkest hour of the RSS *Courageous* collision in January 2003,

Chief of Navy, RADM Lai Chung Han, reflecting on the enduring Navy Spirit that has propelled the RSN through the generations. Picture: Singapore Press Holdings

Left: Chief of Navy, RADM Lai Chung Han, with the men and women of the Navy Family who serve aboard RSS *Freedom* in December 2016.

Facing page: Members of the Naval Leadership Group viewing the RSN25 time capsule artefacts at Tuas Naval Base in January 2017.

and more recently in December 2012, when ME2 Jason Chee lost three of his limbs in a shipboard work accident. The camaraderie of the Navy Family shone through during those difficult times. Our people rallied together and helped one another move on. Together, we emerged stronger.

Whenever there were bold but difficult decisions to be taken, the Navy Family rallied around its leadership to move the Navy forward. This has enabled us to embark on ambitious but risky projects, including operating larger ships, such as the frigates and the landing ships tank with better seakeeping and endurance. These ships have contributed to operations around the world and in the case of RSS *Endurance*, even circumnavigated the globe! Recognising the strategic value of submarines, the Navy took the plunge twenty years ago and grew from scratch a submarine capability, complete with submarine rescue, maintenance and medical support services.

When the leadership saw a pressing need to change the way the Navy organised itself and its people, the Navy Family again embraced these bold moves and made them work. These included the Combat-Technician Scheme and the Military Domain Experts Scheme that have fundamentally changed how our people are developed and deployed. These were deep changes that required a shift of mindset and strong buy-in throughout the Navy to succeed.

The Navy Spirit explains why the Navy has been able to weather great storms over the past five decades and emerge stronger. It explains why we have been able to transform the constabulary force we were to the balanced and potent 3rd Generation Navy that we are today. The RSN, at 50, punches above our weight in our capabilities, reach and influence because of the solidarity, resilience and enterprise of our leaders and our people, and the trust between them.

CELEBRATING THE NAVY'S GOLDEN JUBILEE

On our Golden Jubilee Navy Day on 5 May 2017, Prime Minister Lee Hsien Loong commissioned our first-of-class littoral mission vessel, RSS *Independence*. As the third RSN ship to bear this name, it reflects the coming of age for the 3rd Generation RSN. The ship's innovative design, modular capabilities and integration with unmanned systems represent the future force structure and operating paradigm of the RSN.

On that same day, Prime Minister Lee also sealed the Golden Jubilee time capsule, containing our people's aspirations for the RSN over the next 25 years. Many have high hopes for and big dreams of the future capabilities of the Navy. A good number also wished for the expertise and ethos of our people to be further deepened and strengthened. In particular, two submissions resonated with me: for the RSN to be "the pride of the nation" and for the RSN to become "a force that reflects the reality of our maritime geography". These aspirations reflect the essence of the book's title, *A Maritime Force for a Maritime Nation*. This is our timeless raison d'etre, because Singapore's future, as much as its past and present, is very much a maritime story. Likewise, the RSN's purpose and mission must remain unchanged – to defend and safeguard our nation and our way of life, with our lives.

What will the next 25 years be like? Can we be confident that the RSN will remain the maritime force for our maritime nation? I believe so, as long as the Navy Spirit endures and is passed from one generation to next.

Rear Admiral Lai Chung Han was appointed the Chief of Navy in August 2014. He joined the RSN in 1992 and spent his formative years on board the missile corvettes. He subsequently assumed command of the missile corvette, RSS *Valiant*, the missile corvette squadron and the Fleet. He has held various staff appointments, including that of Head Long Term Planning Secretariat in the Office of the Chief of Defence Force and Office Director in the Future Systems Directorate. He has also served as Director (Policy) and Deputy Secretary (Policy) at MINDEF.

In the future, the RSN's purpose and mission remain unchanged – to safeguard Singapore and Singaporeans' way of life. Picture: Courtesy of MAJ Zann Sim

Picture: Courtesy of Master Sergeant (NS) Koh Beng Chye

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And many others from the Navy Family
who were always a phone call or text away

The Republic of Singapore Navy has grown from humble beginnings to become the ready, strong and committed maritime force it is today. Its progress mirrors that of Singapore, reflecting the intertwined destinies of the maritime nation and its maritime force, as depicted on the book cover. This book, featuring the brave men and women who have served with distinction, is a celebration of the RSN's 50-year journey.