Additional Praise for *Leading with IT: Lessons from Singapore's First CIO*

"Alex has the battle scars from his digital journey, starting from an era of mainframe computing to the current situation where everyone is connected and (almost) everything can be achieved digitally. It is great to have him share his experience and insights in a candid and humble manner."

– Saw Ken Wye, CEO, CrimsonLogic

"The only constant is change. Without change, an organisation will be made obsolete in a rapidly-evolving ecosystem. Alex Siow's book addresses the challenges and strategies in change management. The lessons in the book are based on experience and are therefore practical and transcend theories. Although the narratives are IT-related, anyone involved in change management can benefit from the examples cited. This book is now part of my reference sources, as all of my roles involve managing change."

– Gerard Ee, Chairman, Agency for Integrated Care

"Digitalisation has become a crucial driver of competitiveness and survival for organisations. This book is, therefore, an essential read for the C-Suite so that they understand how ICT can transform their organisations – and how leaders can leverage digitalisation to serve their stakeholders better."

– Peter Lam, Principal and CEO, Temasek Polytechnic

"Alex Siow has made such a significant impact on the IT industry and the organisations he has served through his visionary, practical, unassuming, and humorous style of leadership. This book reflects Alex's practical nature of combining stories of his experience and the learnings gleaned from them. A worthwhile read indeed."

– Dr. Chong Yoke Sin, President, Singapore Computer Society

"It is always pleasant and enlightening when having discussions with Alex Siow. He has vast experience in IT across various roles as a seasoned practitioner and the first CIO in Singapore. Drawing on his lifetime of experience and practices, he offers today's IT leaders a practical roadmap to building an effective digital organisation to face the new challenges arising from the unprecedented rate of change in the world."

– Leong Chin Yew, Group Director (Retired), Information Systems, HDB

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Foreword

Tan Chin Nam

I WAS GLAD WHEN ONE of my close friends, Alex Siow, asked me if I would write the Foreword to his book, *Leading with IT: Lessons from Singapore's First CIO*. I first met Alex in 1980 when he came for an interview for an open position in the Systems and Computer Organisation (S&C) at the Ministry of Defence.

Alex had just returned from Germany after completing his engineering degree. He still had to complete his national service stint in the army. I interviewed Alex and a few others. He turned down the offer to join S&C and said he wanted to be a structural engineer in the Housing and Development Board (HDB).

But fate played its hand, and Alex switched his career from engineering to IT in a few years. We kept in touch with each other, and Alex was invited to join as a member of the board at the National Computer Board (NCB) Society in 1998.

When I read through the chapters in Alex's book, I found a strange déjà vu; to some extent, the learnings from his book reflected mine, even though our career trajectories have been very different.

Leadership is about creating purpose and meaning in work and life, and aligning people to achieve greater things together for the organisation or the benefit of society. I was fortunate and honoured to have been given many opportunities to create, reposition or transform organisations in the Singapore Civil Service, where I spent 33 years serving the nation. Alex, likewise, evolved into a worthy leader, working in HDB and StarHub, and leading organisations like the Singapore Computer Society (SCS), the IT Management Association (ITMA), and others.

I started my career in the public sector as a systems engineer in the Ministry of Defence, applying modern management approaches in solving complex problems, including computerising the ministry. This paved the way for my active involvement in the national computerisation effort, which led to the formation of the NCB. Throughout this journey, I observed that everyone is in a position to make a difference, irrespective of the level of responsibilities. Alex, likewise, honed his leadership skills as he climbed the corporate ladder.

The NCB was set up in 1981 with the vision to drive Singapore into the Information Age with a series of national IT plans to follow. That was motivational for the staff. They found this national-level movement meaningful and engaging and were equally inspired by the 3P philosophy of professionalism, partnership, and people. The "NCBians" were emotionally connected with their work and users; Alex, in performing his chief information officer (CIO) role, reflected this philosophy fully.

When I was appointed permanent secretary of the Ministry of Labour, some colleagues offered their sympathy, suggesting that managing work permits for domestic helpers and construction workers could not be very exciting. But with the Manpower 21 Plan, the ministry was repurposed as the Ministry of Manpower (MOM) with the vision to make Singapore a talent capital in the knowledge economy.

This involved re-looking at human resources as capital for the country's knowledge, innovation, emotional well-being, and social relations. Efforts were underway to cultivate an engaged workforce, including transforming the workplace into one in which staff can have an emotional connection. Naturally, this mission riding on the strong foundation of the Labour Ministry, was a big boost for the motivation and morale of MOM staff.

That was akin to Alex being asked to head the Computer Services Department (CSD) at the HDB and the subsequent issues he had to deal with, totally unprepared. But he rose to the challenge, transforming the CSD – and thereby the way IT was perceived in the HDB – which eventually made him Singapore's first CIO. It's a journey of grit and confidence, and the ability to motivate a team to work as one.

I was directly involved overseeing the various versions of the National IT Plan from the beginning with the exception of the very last version. The evolution of the National Computerisation Programme (1980) into National IT Plan (1986), IT 2000-Intelligent Island (1991), Infocomm 21 (2000), Connected Singapore (2003), Intelligent Nation 2015 (2006), and

finally Infocomm Media 2025 (2019) paralleled the development of info-communications technology (ICT) and digital media technologies in the world.

It was an exciting journey and I could sense the zealous efforts of all those who were involved in this partnership between the public, private, and people sectors in our concerted national transformation for economic competitiveness, better quality of life, and a better tomorrow. Successive leaderships have been able to achieve good alignment in this purpose-driven national undertaking, which had been the highlight of my journey in the public sector.

We had a very humble beginning with meagre IT manpower of 850. Today, at 220,000 strong, our IT talent pool is providing an accelerated thrust to launch Singapore into the digital economy with a bright future for all. Our vision and aspirations of successive IT plans, and now with an overlay of Singapore as a Smart Nation in the transforming global economy, are being realised. Chief information officers, chief digital officers, and IT professionals can expect even more challenging and fulfilling times ahead.

This book is essential reading for anyone who aspires to lead, whether in the ICT industry or elsewhere. After all, all industries are ICT industries today; no business can survive without ICT. This book contains important lessons – and examples – in vital areas such as innovation and change management, motivation, and mentoring, and the future of work and money.

Leadership is a journey with its ups and downs. What sustained me in difficult times was my personal motto – to be a useful person and to make tomorrow better than today. It is a journey about making a more significant difference in what we do. For Alex, it was about respecting others, never looking down on others, and treating others, whether employee or vendor, fairly.

The final point: When the going gets tough, think of the meaning of your job, and work creatively and collaboratively to make it more meaningful. Every one of you is a leader in your own way. There is no need to wait for a CEO or a leadership position before you make a meaningful difference. After all, we are the stewards of functions entrusted to us by our destiny – a privilege – and ultimately, it is about making tomorrow better for our children and our grandchildren.

Dr Tan Chin Nam retired from the Singapore Administrative Service in 2007 after 33 years. Since 2008, he has been a senior corporate adviser, serving on various boards and advising companies. He has held top management positions, including Chairman of the National Computer Board; Managing Director of the Economic Development Board; CEO of the Singapore Tourism Board; Chairman of the Media Development Authority; Chairman of the National Library Board; Permanent Secretary of Singapore's Ministry of Manpower; and Permanent Secretary of the Ministry of Information, Communications, and the Arts. He is a Fellow of the Institution of Engineers, Singapore; Fellow Member of the Singapore Institute of Directors; Honorary Fellow of the Singapore Computer Society, and Distinguished Fellow of the EDB Society.

that the ITD has to maintain to protect the company from attacks, including malware, DDOS (distributed denial of service), or ransomware. Even when such complex tasks are in process, the CIO's first key performance indicator (KPI) is to "keep the lights on" so that the company can continue to function.

LERNAEAN HYDRA

- **Heracles' Labour:** Slay the Lernaean Hydra. The Lernaean Hydra was raised by Hera just to kill Heracles. When Heracles cut off one of the hydra's heads, two others grew back in its place. To add to this complication, one of the hydra's heads – the middle one – was immortal. Heracles turned to his nephew Iolaus for help. Iolaus came up with the idea (possibly inspired by Athena) of using a firebrand to scorch the hydra's neck stumps after each decapitation. Heracles cut off each head; Iolaus cauterised the open stumps, thereby killing the Lernaean Hydra.
- **ICT Analogy:** Find the root cause of problems. The ICT environment is composed of many technologies, often from different vendors. The ITD's technical resources similarly come from multiple sources. When these diverse systems and technologies are not synchronised, it can result in a hydra-headed monster of solutions trying to work together, and sometimes crashing. The CIO and the ITD team may try to fix one problem (cut off one head), and two issues may crop up, much like the Lernaean Hydra.

To address these myriad heads of the hydra, the CIO cannot just slice off one head; that would be like fixing a temporary patch or asking IT vendors to solve a specific problem without realising how it may impact other systems. As CIO, you need to identify the root causes, the base issues, and maybe even engage independent external expertise to troubleshoot and resolve tough technical problems. If you don't find the root cause of the problems and get them fixed, the heads of the hydra will reappear.

CERYNEIAN HIND

- **Heracles' Labour:** Capture the Ceryneian Hind. The Ceryneian Hind was a giant female deer, which lived in the region of Keryneia. It was sacred to the Hunting Goddess, Artemis. Although female, it had male-like antlers, which were made of gold, while its hooves were bronze. It could

outrun a flying arrow. Heracles awoke from sleep and saw the hind by the glint of sunlight on its antlers. Heracles chased the hind on foot for a full year through Greece, Thrace, Istria, and the Hyperboreans. In some versions, he captured the hind while it slept, rendering it lame with a trap net.

- **ICT Analogy.** Persistence pays. It took Heracles a year to capture the Ceryneian Hind. Heracles had to chase the creature across multiple geographies; he had to persist in getting to this goal. Likewise, in the ICT space, some projects will take longer to mature, will require teams to jump through technical hoops, often coming close to "throwing in the towel" and going back to status quo ante. For example, many projects involving big data analytics, AI and DX (digital transformation) are tough to do, require long periods of testing and fine-tuning, and need the persistence of the entire ITD as well as the organisation.

As CIO, you have to be the cheerleader of your team. You have to get them to carry on the tasks, no matter how challenging, until you reach the goal. You can, of course, take help from external parties, vendors, consultants, SMEs (subject matter experts). Your team will otherwise give up. You as CIO have to persist with the plan, and get your team not to lose hope.

ERYMANTHIAN BOAR

- **Heracles' Labour:** Bring the Erymanthian Boar. This task was to bring the Erymanthian Boar back alive to King Eurystheus. A boar is a huge, wild, fierce pig with tusks growing out of its mouth. The Erymanthian Boar lived on the Erymanthus mountain. Every day it would come crashing down from its lair, attacking people and animals all over the land, gouging them with its tusks, and destroying everything in its path. Heracles had visited Chiron for advice on how to catch the creature. Chiron told him to drive it into thick snow during winter. Heracles caught the boar, bound it, and carried it to King Eurystheus, who was scared of the beast and fled into his half-buried storage, called Pithos, and begged Heracles to get rid of the creature.
- **ICT Analogy.** Negotiate and seek expert advice. Heracles was not shy to seek advice or external expertise. The CIO would likewise be required to introduce new technology or solutions and might have no knowledge or talent in-house to get it done. Don't be shy to ask for advice, either from your vendors, industry bodies, or consulting companies.

Capturing the wild Erymanthian Boar is akin to introducing major IT solutions. IT projects come in waves: mainframes to client/server systems to Y2K migration, to e-commerce and mobile computing. Adopting and implementing these widely differing technologies requires different types of resources and IT talent. The only way to obtain both of these is to negotiate and seek expert advice.

AUGEAN STABLES

- **Heracles' Labour.** Clean the Stables of King Augeas. Getting Heracles to clean the stables of King Augeas was designed to be very humiliating (rather than impressive, as the previous tasks had been) and impossible, since the livestock was gifted with divine health (and immortality) and therefore produced an enormous quantity of dung. For more than 30 years, nobody had cleaned the Augean Stables, and more than a thousand cattle lived there. Heracles successfully rerouted two massive rivers, Alpheus and Peneus, to wash out the filth and clean the stables of King Augeas.
- **ICT Analogy.** Think outside the box. There was no feasible way to clean the dung that had accumulated for 30 years. If Heracles had not "thought out of the box" and managed to divert the paths of two major rivers, the dung would keep accumulating. Cleaning it piecemeal would complicate the issue, not solve it.

In an implementation of ERP (enterprise resource planning), the first in Asia, I faced a major dilemma: how to handle a new, central, enterprise-wide technology solution within budget and with the Y2K issue staring us in the face. I had to think out of the box. We proposed a plan, we asked for vendor time, expertise, and investment, we tweaked the contracts and worked together with multiple and diverse teams to get the ERP done on time and budget – and were Y2K compliant.

STYMPHALIAN BIRDS

- **Heracles' Labour.** Defeat the Stymphalian Birds. These were man-eating birds with beaks made of bronze and sharp metallic feathers that could tear apart their victims. The birds were sacred to the god of war, Ares. Their dung was also highly toxic. Heracles could not wade too far into

the swamp, for it would not support his massive weight. Athena noticed his plight and gave Heracles a rattle, which Hephaestus had made for an occasion like this. Heracles shook the loud rattle and frightened the birds. When they tried to fly away, Heracles shot a bunch of them with his arrows. The rest of the flock flew far away, never to return.

- **ICT Analogy.** Break down the problem. Heracles had a complex problem to solve, with multiple moving parts. He had to break down the problem into smaller components and solve each first, before going for the "big kill". That's also true in the ICT environment. Sometimes a problem looks huge, and it could be huge, such as a significant DDOS or ransomware attack. You can't solve it in one go. You must break it down into smaller components and fix each small issue first before you can go after that big mountain.

Take one example: a significant system slowdown. That could be due to legacy applications, or massive loading on the servers, or inadequate storage, or some servers not functioning, or malware in an application, or a dozen other reasons. Sometimes it's a mixture of multiple reasons. When the IT landscape is vast, the natural tendency is to leave it alone, as any change may create a disruption. As the CIO, you must have a bird's-eye view of your ITD systems and narrow down the possible causes of the problem. It could be something simple, like adding additional storage during month-end to handle the load.

CRETAN BULL

- **Heracles' Labour.** Capture the Cretan Bull. The Cretan Bull had been wreaking havoc on Crete by uprooting crops and breaking down orchard walls. Heracles sneaked up behind the bull and used his hands to throttle it; he did not kill it. The hero then shipped it back to King Eurystheus, who got so scared of the creature that the King stayed hidden in the Pithos dungeon. He wanted to sacrifice the Cretan Bull to Hera, who hated Heracles. She refused the sacrifice because it would reflect glory on Heracles. The Cretan Bull was tamed and released; it wandered into the city of Marathon and was then known as the Marathonian Bull.
- **ICT Analogy.** Nip the problem in the bud. Heracles knew that he had to nip the problem (the destructive bull) before it continued to do more damage. If he waited too long, the problem would be compounded and get

out of control. But once the problem got resolved and the issues straightened out, there was no need to keep the bull captive, for it could not do any more damage. So it was released and allowed to wander wherever it wished.

For the CIO, problems may occur from many quarters. Key talent is resigning, or some specific software is slowing down other systems, or a piece of malware that has infected one application and might infect the whole ITD if not nipped in the bud right away. The CIO has to take charge immediately and instruct his team to resolve the issue (not patch it) as soon as possible. Letting a problem carry on – hoping it will resolve by itself – could be a fatal error of judgement.

MARES OF DIOMEDES

- **Heracles' Labour.** Steal the Mares from Diomedes. The Mad Mares of Diomedes were four horses that ate humans. They belonged to a giant named Diomedes, King of Thrace, son of Ares and Cyrene. The names of the mares were Podargos (swift), Lampon (shining), Xanthos (yellow), and Deinos (terrible). Some versions of the myth mention that the mares also exhaled fire. Heracles brought several volunteers to help him capture the giant horses. After decimating Diomedes' men, Heracles broke the chains that tethered the horses and drove the mares out into the sea.
- **ICT Analogy.** Get teams to collaborate. Heracles enlisted volunteers to help out with a pesky problem; the volunteers decided to chip in for three reasons: One, the Mad Mares were causing issues across the city that affected everyone. Two, it was apparent that the volunteers by themselves could not tackle the Mad Mares. Three, they believed in the leadership skills of Heracles to lead them to victory.

Those three points are precisely similar to issues that most organisations face in dealing with complex ICT problems, which are akin to the mares that impact all stakeholders. The ITD by itself cannot handle all of the issues because it may have roots in other business units (BUs), such as finance, sales, marketing, and logistics. You, the CIO, have to become Heracles, the leader, and get teams from all specific BUs to collaborate to solve ICT problems. Most often teams work in silos; the CIO has to get them to collaborate and work in diverse groups to "fight the Mad Mares of ICT".

Much like Heracles, who took over the chore for a while and transferred the heavens back to its rightful owner, the ITD must transfer the ownership back to the original BU after implementation. The CIO should involve key stakeholders and BUs early on with a clear understanding that the "Golden Apples" do not belong to the CIO or the ITD, and will revert to the rightful BU.

CERBERUS

- **Heracles' Labour.** Capture Cerberus. The most dangerous task of all was this one: King Eurystheus ordered Heracles to go to the Underworld, called the Kingdom of Hades, and kidnap its guardian, Cerberus. Ancient Greeks believed that when one dies, his or her spirit goes to the Underworld and lives there forever. All souls, whether they were good or evil humans, are destined for the Kingdom of Hades.

Cerberus guarded the entrance to Hades and kept the living from entering the world of the dead. Cerberus was a fearsome creature with three heads of wild dogs, a dragon for a tail, and snakeheads all over his back. After much rigour, Heracles reached Hades. He grasped all three heads of Cerberus at once and wrestled the beast into submission. After a long fight, Hercules captured Cerberus and carried it to Eurystheus, who fled once again to his lair, Pithos. Eurystheus then begged Heracles to return Cerberus to the Underworld, offering in return to release him from any further labours. The story has a happy ending: Cerberus was released back to rule the Kingdom of Hades, and Heracles got released from all future "Labours".

- **ICT Analogy.** Aim for a win-win outcome. The best deals in business, and ITD, are ones where all the parties feel they have contributed to the win individually and collectively. That is ideal, and not as rare as it seems. Key stakeholders should come together in the initial phases and chalk out what success should look like, and how each party can contribute to a successful outcome. It's then likely that the high level of trust and transparency may lead to everybody getting credit if the project succeeds, or everybody pitching in if the project goes through challenging phases.

On the flip side, Cerberus presents the dark forces of conflict management. In every organisation, there are always boundaries of political turf and the hidden walls of pride. These creep in as false objections, sabotage, fake news, and canvassing others to rebel. The CIO should face each of these stakeholders to address their complaints. The CIO needs charisma, integrity, and humility. The more effectively that you or your team can directly address these objections, the more buy-in you can achieve – and the better will the win-win outcome be for all stakeholders.

Acknowledgments

I WAS AN "ACCIDENTAL CIO" and inadvertently became Singapore's first CIO. This book, likewise, is an accidental product and was conceived from a series of articles I was invited to write for *The Straits Times* (*ST*) in the 1990s. The credit for those articles goes to Grace Chng, who was then the special projects editor in *ST*; the credit for this book goes to Joelle Choo, executive education fellow at the NUS School of Computing, who suggested I compile and update the articles into a book to document my journey from a structural engineer to a CIO at HDB.

This book aims to inform and educate the C-suite on the crucial role that IT plays in organisations and why the C-suite should take the CIO seriously enough to accord him or her a seat on the top decision-making body or board. Given the digital transformation that's occurring across the world, the book also deals with AI, the future of work, the future of money, and lessons learnt from managing the pandemic. For this, I thank my friends and fellow ICT professionals, Professor Keith Carter, Mr Teo Chin Seng, Mr James Lau and Mr Jim Lim for contributing guest chapters in the book. Special thanks to Mr Teo for helping with the extensive background research for this book.

I would not have been able to succeed in my job as a CIO without the continued support of my late wife, Ms Chew Sok Chuang. I'm grateful to my son Ivan and my daughter Iris, both of whom were my inspiration. My present wife, Marilyn Lew, continually encouraged me to work on this book when the task seemed daunting and challenging.

I also wish to thank all my former colleagues at the HDB, StarHub, Accenture, and the NUS School of Computing, as well as my many friends and former students. They have always been patient with me and encouraged me to continue to develop my skills in IT strategy and governance. I'm very grateful for the help given by May Ho for the transcriptions, and Stephanie Viki Thegarajan, my trusted secretary.

Last but not least, this book would not have been possible without the editing and rewriting skills of Raju Chellam. He was the BizIT Editor of *The Business Times* and the first to interview me as Singapore's first CIO. It's serendipitous that he also offered to edit the book and make it readable for the business executive.

Introduction: The Mission and the Vision

*Raju Chellam**

ON A CHILLY FRIDAY afternoon on June 12, 1987, at 2 p.m., US President Ronald Reagan delivered a speech at the historic Brandenburg Gate in West Berlin that had this iconic line: "Mr Gorbachev, tear down this wall!"

It was a bold and open call to the General Secretary of the Communist Party of the Soviet Union, Mikhail Gorbachev, to open the Berlin Wall, which had separated West and East Berlin since 1961.

It took 28 months and 28 days for the wall to come down after Mr Reagan's speech. The Berlin Wall fell on November 9, 1989. An end to the Cold War was declared at the Malta Summit three weeks later, and the reunification of Germany took place in October 1990.

On a cool Monday night on October 12, 1987, at 2 a.m., another wall, albeit not as iconic, was broken in the heart of Singapore, overseen by a young structural engineer who had studied civil engineering in Germany. The wall was in the new HDB headquarters at Bukit Merah Central. The reason was to move a mammoth mainframe into the facility. And the young structural engineer was 33-year-old Alex Siow.

They had to remove a portion of the wall facing Bukit Merah Central. An industrial crane had to be put into service to move the mainframe computer into the new building through the wall because the lifts were too small

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to accommodate the mainframe. The hoisting work started around midnight, and the police had to close two lanes of the road. The new DC (data centre) was located on the sixth floor of the building, and they had to deploy a supersized crane to get the job done.

That operation – and that day – left a deep impression on Alex Siow; he had joined the HDB in September 1980. "Breaking the wall to move in the mainframe was the right solution, but a costly solution," Mr Siow says. "It could not have been avoided because the building was not purpose-built to house the HDB HQ. It was supposed to be an office complex, with units that were offered for rent."

But HDB's HQ in Maxwell Road was running out of space to house all the employees. So a new spacious HQ was required. The Bukit Merah Central building was not in the initial list, so no provision was made to house a DC. "Hence, a decision was made to crack an opening in the wall to move in the equipment," Mr Siow says. "This operation taught me a lesson about getting things done by breaking walls. And that nothing is impossible if there is a will to find a solution, no matter how complicated the problem."

ACCIDENTAL CIO

By 1990 Mr Siow had taken over as CIO of HDB. That was also accidental. "I thought I was a good structural engineer and was focusing on building design and going deep into construction technology," Mr Siow reminisces about the late 1980s. "However, from the early days of my career, I was fascinated with how computer software could help increase the productivity of engineers. I wrote a few software programs for my structural engineering colleagues to use."

That proved he had an aptitude for computing. The result: Mr Siow was roped into the computer unit of the structural engineering department to work on engineering software. Two years later, HDB decided to introduce a CADD (computer-aided design and drafting) system to improve the productivity of the drafting teams in its building and development division.

"They asked me to join the CADD team and, eventually, to take charge of it," he says. "In 1986, the management told me to introduce a computer-aided project management system. That project ran on the mainframe, which introduced me to a whole new world of mainframe computing."

In September 1989, Mr Siow was called to the CEO's office and told to relocate to the CSD to understudy the job of the head of the CSD. Mr Siow was stunned; he was neither prepared nor interested in changing his career from

engineering to IT. Moreover, he knew that the CSD was facing many issues, both technical and administrative. The former head had quit abruptly, and a global search for his replacement bore no fruit. So the CEO Mr Chuang Kwong Yong, told Mr Siow to spend a "couple of months in the CSD and figure out how to fix it."

Fate sometimes works in strange ways. As it turned out, Mr Siow and Mr Chuang had met each other 16 years ago in 1973. Under Singapore's compulsory military service for males, Mr Chuang was for a period a trainee under Mr Siow.

"I was the platoon sergeant in the School of Section Leaders in the army, and Mr Chuang was a trainee in my platoon," Mr Siow says. "I maintained a high standard of training and discipline in the platoon and had a reputation as a tough guy. So I thought he had a tough time under my leadership. Maybe he wanted to put me to the test to see if the guy he trained under 16 years ago was that tough after all."

Once Mr Siow got to the CSD, he realised the extent of the problem that needed fixing. The CSD had 220 staff, mostly systems analysts. Mr Siow didn't exactly get a warm welcome. Here was a structural engineer who knew nothing about the intricacies of mainframe computing – and how dare he would be the boss of the CSD.

"I was used to managing large teams; the army had taught me how to manage a large number of people," Mr Siow says; in 1989, he was a battalion commander with about 800 soldiers in the reserve force. "That didn't matter at this point. The question was whether I could fix the sad state of affairs in the CSD, which had always operated in a silo. Staff morale was low; the attrition rate was 25 percent. The CSD staff were located in three different HDB sites with the HQ being at Maxwell Road."

A more significant concern was the potential clash of egos. Some team members were more senior and had a "superscale" status in the CSD; they resented having to report to a senior structural engineer. "I had been a follower of the concept of 'servant leadership' that was first embodied by the Prussian King Frederick II," Mr Siow says. "I now needed to muster all that learning to get my team to work with me – and not kill me."

SERVANT LEADERSHIP

Germany – of which Prussia was a historical province – was figuring once again in Mr Siow's life. Historically, King Frederick the Great ruled the Kingdom

of Prussia from 1740 until 1786, the longest reign of any of the Hohenzollern kings, for 46 years. He called himself "the first servant of the state" and oversaw a stunning transformation akin to today's digital transformation.

Frederick the Great modernised the Prussian bureaucracy and civil service, tolerated religious freedom, reformed the judicial system, encouraged immigrants of various nationalities and faiths to come to Prussia, supported artists and philosophers, allowed complete freedom of the press and literature, and believed in a true meritocracy. For the first time in Europe, he made it possible for men not of noble status to become judges and senior bureaucrats.

The phrase "servant leadership" was first popularised by author Robert K Greenleaf in his 1970 essay, *The Servant as Leader*. Mr Greenleaf credited the book, *Journey to the East*, published in 1932 by Hermann Karl Hesse (another connection to Germany) as his inspiration.

Journey to the East is about Leo, a servant just like all the others. All the servants work well together. One day, Leo disappears. The servants then figure out that things aren't the same without Leo; they then realise that Leo was far more than a servant; he was in effect their leader. Taking a leaf from that book, Mr Greenleaf advocated that a leader should be someone that servants or workers can relate to. Mr Greenleaf first put his idea of servant leadership to use while he was working as an executive at AT&T Corp.

When Mr Siow took over the CSD, he met all of his staff: "I am here to work with you, to help you. So you need to help me to help yourself." The talk – and his style of management – made a deep impression on the staff.

"He did not micromanage, he walked around and talked to the staff, he knew everyone – that's more than 200 – by name," says Christina Lim, Mr Siow's secretary at HDB. She had been the previous CSD head's secretary and found Mr Siow's management style refreshing. "He delegated and trusted the staff to do their work. He talked to everyone in the CSD, even the cleaners. Alex was my fifth boss and probably the best."

HDB was her first job after Ms Lim did her O-Levels and a private secretary course; she later attended night classes to complete her A-Levels and earned a diploma in Human Resource Management at the PSB Academy. "Alex was kind to all his staff and me," Ms Lim says. "He was stricter with senior staff. He was a forgiving person and willing to listen. The door to his office was always open. He treated women equally as men. If you were good at your job, he would show his appreciation whether you were male or female. That was quite refreshing."

Ms Lim recollected an episode that left an impression on her. "Once, our cleaner aunty told me that Alex saw she was carrying some heavy stuff and

helped her to carry it," Ms Lim says. "She said that my boss was so humble and she was very *paiseh* (shy) to be helped. Alex always said it is better to be friends with people, no matter who they are. That was one of the lessons he had learnt in Germany."

GERMAN OMEN

Germany was where Mr Siow spent five years, from 1974 to 1979, studying civil engineering at the Stuttgart University of Applied Sciences. which had the German name, Hochschule für Technik (HFT) Stuttgart. Located in downtown Stuttgart, it is one of 10 institutes for higher education in Stuttgart, which is the capital of southwest Germany's Baden-Württemberg state. Stuttgart is a manufacturing hub; Mercedes-Benz and Porsche's headquarters and museums are located in the city.

How did Mr Siow strut from Singapore to Stuttgart? Serendipity. Singapore's Public Service Commission (PSC) had advertised overseas undergraduate engineering scholarships to Japan and Germany. He was friends with a woman he had met in high school, and she applied for the German scholarship – without informing him. So when the PSC called him for a scholarship interview, he was surprised. He went for the interview, and the PSC subsequently approved the scholarship.

"I was surprised, not shocked," Mr Siow laughs. "Many major events in my life, like going to study in Germany, was something quite unexpected. But I learnt to take such events as a good omen. Germany certainly was."

The HFT University was founded as a winter school for building craftspeople in 1832. By 1918, it was the largest of the then 67 construction schools in Germany with 923 students. The original winter school has long since become a modern University of Applied Sciences and is characterised by inter-faculty projects and contacts to numerous companies in Stuttgart and Germany.

Other than civil engineering, Mr Siow learnt about servant leadership, meritocracy, and, most importantly, treating women as being equal to men. HFT applies the principles of "gender mainstreaming". That means that all plans, concepts, and activities of the university are examined for their impact on gender equality.

The "Gleichstellungsbeirat", in which professors from all faculties are involved, works on university-wide concepts for the actual implementation of equality between women and men. HFT reports on its website. "The comparatively high proportion of women among the students, even in the very

Mr Siow was empowered to make the changes necessary to reengineer the department within three years.

"This was not an easy task, and the only way to do it was to attack on all fronts," Tung Lai and Efraim Turban wrote in the *Singapore Business Development Series* in 1996. "Mr Siow had a special relationship with staff members, resulting from his emphasis on people-orientation. He had the support of top management, and because he sat on several important committees in HDB, he knew various changes in policies and projects. According to Tan Poh Suan, a team leader in the ISD, Mr Siow not only reorganised the people and the systems, he also imparted a sense of freshness and motivation."

Mr Siow held quarterly departmental gatherings to improve staff communication and morale. "Staff members interviewed said that they felt a greater sense of departmental spirit than before and that there was a sense of belonging," the authors noted. "Mr Siow made it a point to send a personalised card to each staff on their birthday, and also called them in to help them to prepare for their promotion interviews. He also attended unit informal gatherings. Unit meetings were also instituted to promote interaction and information sharing at the unit and team levels."

One significant achievement was HDB's painless transition during the much-feared Y2K (Year 2000) rollover. "HDB enjoyed a smooth and trouble-free transition into the new millennium, thanks to the careful planning and preparation led by Alex," says Randy Lim, HDB's assistant CEO and chief data officer. "Alex steered HDB to win the National IT Awards in 1996 under the 'Public Sector' and 'Excellence in IT Training' categories. Alex was also instrumental in helping HDB win the Singapore Quality Award in 1997."

During his tenure, HDB also launched its online presence, called InfoWeb. Mr Lim says despite his taxing portfolio, Mr Siow also found time to serve in leadership positions in the Singapore Computer Society as president; and at the Information Technology Management Association, as the founder-president. He also held directorships in the National Computer Board and Institute of Systems Science. For his outstanding contribution to the HDB, the government awarded him the Public Administration Medal (Silver) in 2000.

THE VISION

But it was not always smooth sailing. An HR system that was outsourced to an external vendor ran into problems; it was overdue, over budget, and came

under the Ministry of Finance (MOF) oversight. Mr Siow studied the case and found that the users were changing the requirements multiple times. "I wrote to the MOF and explained the reasons for the delay and said we would not impose liquidated damages," Mr Siow says.

The outsourced company was Asian Computer Service (ACS), an IBM business partner; the ACS CEO was Edward Lim. "I met Alex in 1998 as a result of ACS' failure to deliver a payroll project to HDB," Mr Lim says. "We explained the reasons for our failure and to request HDB for their understanding. Alex listened to both sides – the HDB team and us – and realised that the fault lay with both parties. He waived our penalties."

That incident left a lasting impression on Edward Lim. Years later, he could return the favour in an equally dramatic fashion. In 2001, Mr Lim was general manager at Veritas Software, a US software firm that was acquired by Symantec in 2004. Mr Siow was then head of enterprise sales at StarHub; his team had been trying in vain to get an appointment at Veritas, but their procurement manager was always busy.

Mr Siow called Mr Lim to request a meeting. "I rolled out the red carpet for Alex and his team, I had our procurement manager be present at the meeting and even organised a luncheon as a show of respect for Alex," Mr Lim says. "Soon, Veritas Software Singapore became a StarHub customer."

The StarHub enterprise sales team was impressed. "It was highly unusual for a prospect to host lunch for a vendor," Mr Siow says. "My team had never experienced anything like this before. I explained to my staff that treating people fairly and equitably will always pay dividends. Instead of bullying your vendors, make them your partners. Get them to help you. Make it a win-win situation. That's the best business model."

The "win-win" formula became Mr Siow's unstated vision that even his staff recognised and appreciated. "He liked mentoring and was very active in the IT community," says Serene Tan, Mr Siow's secretary at StarHub. "He was president or chairman of many IT-related entities. I remember updating the awards that he had earned and the list of boards that he sat on; it filled an A4-size page. He was also licensed to solemnise marriages and would do so quite often when requested by couples."

Serene Tan held a series of jobs and took part-time classes to pass a secretarial course. She worked as a secretary with Singapore Technologies before joining StarHub. "I supported Alex from 2005 until he retired in 2015," she says. "I remember he had a fantastic memory. When he was heading the CSD, we had many Indian and Myanmar staff. He would greet them by name whenever they walked past him and at team social events."

In 2013, her father was diagnosed with bone cancer and had to undergo surgery. "During my dad's stay at the hospital, I often had to bring lunch to him as he refused to eat the hospital food," Ms Tan says. "Alex knew the pressure I was under. He would often grant me the afternoon off so I could spend more time with my dad. I can never forget that act of compassion and empathy."

FAIL FAST

Another person who preferred working directly with Mr Siow was Dr Chong Yoke Sin. She was a systems engineer at IBM and part of Big Blue's team to service the HDB account. "Alex transformed the CSD in HDB and made it a vibrant organisation with many firsts," she says. "These included using a bank-style booklet that families could use to record payments made to the HDB, setting up the first client-server environment in Singapore, and one of the first to do regular BC-DR (business continuity, disaster recovery) trial runs. Alex was not afraid of failure; his motto was to fail fast, fix quickly and get things going."

Dr Chong Yoke Sin holds a PhD in chemistry and attended the Advanced Management Programme at the Harvard Business School. She has excellent credentials, among them: the founding CEO of Integrated Health Information Systems; CEO of NCS; Head of Enterprise Business at StarHub; Board Member of the Singapore Land Authority; Board of Governors of Republic Polytechnic, SG Enable and the National Kidney Foundation; Managing Partner at iGlobe Partners; and President of the Singapore Computer Society, which has 41,000 members, the largest ICT association in South-East Asia.

"Even as I moved on in my career from IBM to NCS and then to IHIS and StarHub, Alex and I have always been in touch," she says. "We also worked together in industry associations such as the IT Management Association and the Singapore Computer Society. Alex was willing to try new tech, which was a very refreshing attitude."

That attitude made Dr Chong invite Mr Siow to advise her on a deal at the Hong Kong Housing Authority in 2000. By then Dr Chong had taken over as the chief operating officer at NCS, a subsidiary of Singtel. Dr Chong and Mr Siow made a few trips to Hong Kong to present their solution, but the deal didn't materialise. "We were trying this for the first time, and we failed to win the deal," Mr Siow says. "However, I learnt a lot about doing business in Hong Kong."

On one of his trips to Hong Kong, he brought along his daughter, Iris. "We went to Hong Kong Disneyland together," Iris says. "During my university years, my dad gave me a lot of freedom to do the things I wanted to do. When I needed help, I would ask, and he would always try to help me out. We could talk about anything. He always encouraged me to pursue my dreams."

Iris says her earliest memories of her dad were about playing educational computer games like *Freddy the Fish* and *Putt-Putt*. One hidden talent: Cooking. "On Saturday nights, Dad would cook the most delicious meals for the whole family," Iris says. "On Sundays, we would travel all around Singapore, looking for the best food and different cuisines. These are some of the happiest moments that we had as a family. My parents always ensured that both my brother and I were treated equally. My brother and I were very close growing up; we still are. If my brother and I did not do well in a test or exam, we would not get scolded; we always received encouragement to do better. This positive reinforcement meant a lot to me."

Iris was four years younger than her brother, Ivan. His first memories of his dad was visiting HDB on special occasions like a family day or taking a bus to Malaysia. "All his colleagues were very friendly with us and spoke well of my dad," Ivan reminisces. "This memory stuck with me because I was very impressed at how his subordinates regarded him as a good friend, but at the same time, looked up to him with respect. It showed me that my dad was a good boss and treated his subordinates well."

Iris says she was closer to her mother because her father was busy at work or travelling. Her mother, Chew Sok Chuang, passed away from breast cancer when Iris was 16 and just about to enter junior college. "It was a hard time because it was a transition into a new school, my brother was just about to enter the army; it suddenly felt like I was all alone," Iris says. "But my dad was always making sure that I was fine. We got closer to each other. He helped me through school, and he encouraged me to obtain my driving license. Sometime in 2011, Dad suffered from a slipped disc and had to undergo surgery. I was not able to drive him to the hospital, but it made me determined to do well on my driving test, which I eventually did."

It was the serendipitous German connection that had bought the two together: Alex Siow and Chew Sok Chuang first met in 1980 at a Germany alumni event in Singapore. Ms Chew worked at the Department of Statistics, which had sponsored her trip to Germany to do a course in statistics. It turned out that Ms Chew had also studied at the Raffles Institution, and was just a year behind Mr Siow. They got married in 1982.

In November 1996, the entire family – Alex Siow, Chew Sok Chuang, son Ivan and daughter Iris – went to Europe on vacation. Their first stop was in Frankfurt where they rented a car and drove to Stuttgart to visit the Stuttgart University of Applied Sciences – or Hochschule für Technik (HFT) – where Alex Siow had studied civil engineering 20 years earlier. The German connection had come full circle.

a problem. If you do not upgrade, your service levels and cost will suffer; if you do, then it will be expensive and disruptive to the organisation. That's a dilemma every CIO faces in almost every organisation.

There are two factors in legacy. The first is machine-related. You need to address the current inventory of what you already have, which is your existing technology legacy. It's not limited to the hardware and software that your ITD has. It could be multiple projects and implementations that your ITD may have deployed over the years. All of this is, therefore, a legacy for you.

The second is the human factor. That is an important step: having a competent workforce that is ready to adapt, learn and change.

The Third Dimension

As a CIO, you need to consider the third dimension of legacy, which is about change management. It involves both technology and HRM (human resource management). For example, during my tenure at HDB (Housing and Development Board), my ITD was very comfortable in the batch processes of our IBM mainframe. We had adapted to spending many days that were required to complete month-end closing statements. We were comfortable using punch-cards, we knew how to load multiple reels of tapes to back-up data, and how to change numerous drums of disk-packs to get our work done.

The minis ran faster, but it became an organisational nightmare to inform the IT operators that their jobs had now become obsolete. The minicomputers needed just a room, not the entire floor. The HDB's nontechnical staff could handle the closing of the month-end accounts; there was no need for data centre operators. Legacy is about people's work parameters and about changing established processes. It involves changes in technical knowledge, HRM and change management.

- **Organisational knowledge.** You have an army of people in your organisation who use computer systems to do their work. They form habits, have adapted to the organisation's culture and are knowledgeable using these systems. These older systems could be inefficient in the current environment, but to your senior employees, they are "efficiently inefficient".
- **Technical integration.** You have multiple generations of systems deployed in your organisation, integrated at the hardware, software and data levels. That becomes your legacy as it involves the knowledge of numerous teams in your ITD, BUs (business users) and your services providers. Some of your staff would meanwhile have left your company; some

others would have forgotten the work they have done or lost the manuals and documents. However, nobody dares to touch these interfaces as it may disrupt the systems, create errors, and generate faulty output.

- **Trusted business processes.** Your ITD has automated the business processes in your firm. Therefore, your IT systems represent the trusted business processes of your company; your existing employees – whom you trust – have vouched for these systems. So when you introduce a new technology or software, you will be challenging the comfort levels and knowledge of your staff. If your team does not change and adapt to the new ways, your new implementations will fail.

THE Y2K SCARE

The most significant legacy issue – and the biggest scare – was the Year 2000 problem, also called the Y2K problem, the Millennium bug, and the Y2K glitch. They all referred to events related to the formatting and storage of calendar data for dates beginning in the year 2000.

The issue: many software programs represented four-digit years with only the final two digits – making the year 2000 indistinguishable from 1900. Moreover, some legacy programmers had misunderstood the Gregorian calendar rule that determines whether years that are exactly divisible by 100 are not leap years, and assumed that the year 2000 would not be a leap year. In reality, there is a rule in the Gregorian calendar system that states years divisible by 400 are leap years – thus making 2000 a leap year.[1]

Fixing all this was not the core part of the problem. The real Y2K scare was that all of this would need changes at the source code. In 1997, AT&T had estimated that up to 60 per cent of the time and money required for its total compliance efforts would be devoted to testing the source code changes made to address the issue.

Organisations in many countries checked and upgraded their computer systems to address the anticipated problem. The reality: there were very few computer failures when the clocks rolled over at midnight on December 31, 1999.

[1] https://bit.ly/3jjBkAx.

In Singapore, in preparation for the Y2K crossover, many organisations took the opportunity to revamp their legacy systems and give them a new lease of life. One of the most impactful learnings from the Y2K transition was the coming together of C-level executives, finance, IT and stakeholders to address any IT issue that could potentially stop services and bring the company to a halt. It was probably the first time that CEOs saw IT as being strategic to the business.

In due course, the definition of legacy included mainframes and minicomputers. They were mainstream a couple of decades ago, but would they continue to be deployed in the new millennium? It was feared that many of the legacy systems would not survive the Y2K Bug or be around during the "dotcom generation". However, most of them did, once they were carefully analysed, modified and upgraded.

It was during this time that the companies followed three main types of migration strategies:

1. **Patch.** Some companies patched the mainframes or proprietary systems to remove the Y2K Bug. At HDB, we ploughed through millions of lines of code and still faced a danger of oversight. The rubbish in our existing systems consisted of patched routines, workarounds, temporary subroutines, and others. With staff turnovers, incomplete handovers, and insufficient or missing documentation, many companies had accumulated a tonne of IT rubbish. Making modifications to a legacy system was often impossible because of inadequate documentation, and was prone to bugs due to oversight. So a few organisations overcame the Y2K Bug by temporary patching until they could upgrade the systems.
2. **Migrate.** Some companies migrated to modern commercial systems like ERP, SCM (supply chain management), CRM (customer relationship management), sales, and distribution. These projects were expensive and disruptive as they were to be implemented company-wide. Most of these next-gen systems could support the mainframe environments as well as the lower-cost client-server architecture of minicomputers. Therefore, the risk was more to do with change management and change of attitude issues. It was also an excellent opportunity to discard the mainframe legacy and migrate to new sets of computer hardware.
3. **Segregate.** Some companies segregated the systems and created interfaces to new financial and accounting applications. That was a hybrid approach intended to maintain as much of the status-quo as possible in operations, manufacturing, sales and distribution. The focus was to ensure robust and accurate financial reporting and accounting.

Case Study

In HDB, we went with the second option, which was to migrate to commercial Y2K systems. We had support from all levels across the organisation. We considered this an opportunity to not only upgrade technology but also to revamp or reengineer our internal and customer processes. We got the top management to agree to our plan. We formed teams to chart out the methods and systems for migration.

The result was that the HDB got a new, modern technology platform from which many of our customer-friendly services got successfully launched, giving HDB the label of being ground-breakers and trail-blazers. In another example, during the Y2K transition, Parkway Healthcare Group was able to reduce its IT operational cost by 66 per cent by migrating from its old proprietary platform to a modern one.

LEGACY OF ITD

Right from the mainframe era, there was a need for skilled IT talent. The lack of talent became critical as most countries ramped up their computerisation efforts. Some nations even changed their immigration laws to attract ICT (info-communications technology) talent.

Once organisations upgraded from the mainframes to minicomputers, IT solutions expanded in reach and scope. At the start of the minicomputer migration, companies began to adopt ERP systems. That started the commoditisation of IT tools in programming, databases and the eventual emergence of PCs to replace the old green dumb terminals.

These changes in the technology landscape led to a massive shift in business processes and units; in many companies, the finance and accounting departments shrank. Most companies also saw considerable changes in their ITD to adapt to these new generations of technology. But at the core, one factor remained constant: the need for IT talent.

The situation in Singapore was not much different as compared to other rapidly developing nations. In 1990, there were about 37,000 ICT professionals in Singapore, but the demand was more than double that. To alleviate the shortage, many companies in Singapore resorted to pushing non-IT professionals to learn IT skills. If that didn't work, they began hiring IT professionals from other countries.

With the advent of the Internet, there was a massive demand for ICT professionals with skillsets in webpage design, e-commerce enablement, virtual

presence and online security. The paradox: most ICT professionals in large organisations had no training in these new skills.

Most staff in the ITD possessed traditional skillsets in business, systems and data analysis, or structured programming. While these skills were still in demand, some people considered them to be "outmoded" and "archaic". It was no wonder then that new entrants to the ICT industry were reluctant to take up the "old-time" skills. At the same time, existing ICT staff were also leaving companies to pursue jobs in the new e-commerce areas that were opening up. As a result, many companies, especially large ones with legacy systems and applications, found it hard to fill vacancies in their ITD.

My colleagues, friends and peers in the ICT industry held long debates on how we could tackle the staff shortages. One easy way was to outsource or pass the problem to somebody else, to the outsourced contractor. That was not the right solution because it assumed that the outsourced firm had staff who were skilled to work on legacy systems. Therefore, outsourcing would, at best, be a temporary fix. We had to find a more permanent solution.

Retooling ITD

Before a massive rejuvenation exercise can happen, the IT staff must be trained and equipped with new skills. The organisation must invest in reskilling and training of its IT staff. Top management's commitment to change is most necessary; they should communicate this to the team. The ITD should realise that the ability to marry legacy skills with new economy skills would eventually be more valuable than just possessing new skills.

Legacy systems do not need to disappear; they can be given a new lease on life and remain relevant to businesses even in the new economy. It is worthwhile trying to rejuvenate legacy systems and marry them where possible to the latest technologies in the new economy. That is called "retooling". Eventually, the health of an organisation's digitalisation journey will depend on the effectiveness and relevance of its ITD.

The ITD would need constant retooling in the following areas:

- **Structures and capabilities.** When I first started my career in IT, the structure of the ITD was simple; it rested on the mainframe as the underlying system. Each department denoted a function, like systems administration, for example. That structure has since been transformed.

  Companies are now grouping departments by business value, not by functions. Teams that do projects may consist of multiple disciplines, such as security, systems analysis, and testing. Accordingly, the skills

The bottom-line: IT management approaches need to change with time. That's because the evolution of tech is transforming business, government and consumer behaviour and services. It becomes a legacy if you don't change and adapt your organisation to support new advances in technology. The tech industry changes rapidly, as Moore's Law has shown; so should your ITD.