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**SPEECH BY DPM LEE HSIEN LOONG
AT THE 25TH ANNIVERSARY DINNER AND DANCE,
DSO NATIONAL LABORATORIES
ON 3 OCTOBER 1997 AT SUNTEC CITY BALLROOM**

It is a great pleasure to join you tonight for the Silver Jubilee celebration of DSO National Laboratories.

MINDEF set up DSO, then known as ETC, in 1972. Later it was renamed the Defence Science Organisation, and now DSO National Laboratories. The initials ETC were believed to stand for Electronics Testing Centre, a suitably opaque name. The head of ETC was the late Dr Tay Eng Soon.

It was a very hush-hush outfit. As a young officer I used to attend meetings in Mindef, where Dr Tay would be a mysterious civilian presence. We all wore security passes, but Dr Tay's pass was special. It was so secret that instead of a colour photograph, his pass had a blank patch on it. It took me a long time to find out where he came from, and how he fitted in.

But there was a good reason for the security and the mystery. Singapore was young and vulnerable. We could not risk betting our survival by depending on others to defend us. We had instituted National Service, and were building up the SAF. But the SAF could never overwhelm an opponent by numbers. It would

have to fight smart. And mastering electronic warfare was an important way to develop a qualitative edge over potential threats. This edge depended on our efforts, and their results, being kept absolutely secret.

It was Dr Goh Keng Swee, as Minister of Defence, who made the bold decision to commit some of our ablest engineers and scientists to defence science and technology, and to build up its expertise in this area systematically year after year. Looking back, it was one of the wisest decisions Mindef has made.

In the seventies, DSO played a key role building up the SAF's electronic warfare capabilities. It also provided Mindef with scientific and technological advice, to enable it to make intelligent decisions on new technologies for the SAF.

In the eighties, DSO enhanced the advanced hardware the SAF was acquiring, such as the E-2C Hawkeyes, and helped the SAF make the best use of the hardware.

The nineties saw DSO developing state of the art equipment for the SAF, and making major investments in the underlying technologies. DSO had built up significant capabilities. This has led to opportunities for foreign collaboration on substantial projects, considerably broadening the technology available to the SAF.

The edge won by DSO's efforts for the SAF is valuable, but ephemeral. It requires constant effort to maintain and renew. When advanced countries release for sale a more capable missile or radar, using sophisticated technology which they previously withheld, what we have may be rendered obsolete overnight. Then no matter how much effort DSO has put in to tweak our old equipment, it

has to press on to work on the next generation, to develop a new edge. The payoff from doing these projects is not just the indigenously developed hardware, which has a finite useful life. It is also in the people and their capability to understand fully the systems of that class that we will sometimes make, but often buy, and will almost always upgrade and reconfigure to our particular needs.

Besides providing crucial scientific and technological services to the SAF, DSO also nurtured many of the engineers in Mindef and Singapore Technologies. Even though they left DSO, they took with them valuable experience, which helped them to build up the Defence Technology Group and the defence industries.

The state of technology in Singapore today is vastly different from what it was in 1972. Then, Mindef was a pioneer in R&D. It was the first major user of R&D, and also the first major supplier. Today many MNCs as well as Singaporean technology companies do R&D here. The Government has set up a series of research institutes which do research at one remove from commercial applications, of which the first was the Institute of Molecular and Cell Biology. The National Science and Technology Board disburses funds to build up research programmes in institutes, centres and the universities, as well as to help private sector R&D efforts.

This is a different environment for DSO. To attract the most talented and ambitious young scientists and engineers, DSO must offer research opportunities which are as exciting, demanding and rewarding as any in the private sector. It must enthuse and inspire them into taking up the scientific challenge, and in doing so create something valuable for the SAF.

In principle this should not be difficult. The SAF has a wide range of

complex operational needs, and demands sophisticated technological solutions to its problems. Indeed the SAF's needs far exceed what DSO can provide in-house. The problem for DSO and the SAF is to identify those projects (1) with the greatest operational payoffs, (2) which are within DSO's capabilities, and (3) which are worthwhile to do in-house rather than to source elsewhere, either because we want to keep our secrets secret, or because we cannot obtain them from other suppliers.

There is, however, one difficulty: so much of DSO's work cannot be publicly discussed. It used to be that when we recruited an engineer, we could not tell him what he would do in DSO. When he was in DSO, he could not tell others what he was doing, not even his spouse. And after he left, he could not publish his efforts in journals, or list his accomplishments in his CV.

The BBC World Service recently broadcast a programme about the Soviet space programme. It recounted how the Soviet Union launched the Sputnik, then sent a rocket to the moon, put Yuri Gagarin in space, and so on, each time keeping a step ahead of the Americans. The mastermind of the whole effort was a scientist named S P Korolyov. His achievements were never acknowledged during his lifetime. He was frequently decorated, but was not allowed to wear his medals. When Yuri Gagarin returned to earth after the first manned flight into orbit, the photograph shows Nikita Krushchev warmly welcoming and congratulating Gagarin. Korolyov was just an insignificant figure in the corner. But when Korolyov died in 1966, Brezhnev himself carried his ashes to be emplaced in the Kremlin Wall.

But that need not be the fate of defence scientists. DSO has opened up significantly in recent years, though not at the expense of security. Today DSO engineers and scientists publish papers, deliver lectures, collaborate

internationally and participate actively in conferences and seminars. DSO is perhaps still one step behind the CIA, which operates a gift shop for visitors to its headquarters at Langley, Virginia. But like the CIA, DSO has a web site on the Internet, which in this infomatic age is presumptive proof of its existence.

Thus despite this problem of secrecy DSO has succeeded over the years in recruiting and building up a strong team. It helps that people often know of DSO by reputation, even if they do not know what exactly DSO is doing. However, finding talent is a never ending process. The SAF's needs grow year by year, and DSO must continue to recruit and to keep up with new fields of defence science.

DSO therefore needs to get some of the best engineering and technology graduates each year. Some will have studied on DSO scholarships. Some will join DSO upon graduation. And some will have been recruited abroad, to reinforce our home-grown talent. Even in as sensitive an outfit as DSO, we can and must find ways to integrate and use foreign talent. This is one aspect of the national problem – gathering enough talent in Singapore to make this our best home. But from Mindef's point of view, it is a not inconsiderable aspect.

The problem of deciding what work to undertake and what to farm out is not unique to DSO. Indeed countries with far larger defence budgets and far more comprehensive research establishments face exactly the same dilemma. In the 1970s and 1980s the Israelis undertook a very ambitious and extravagantly expensive programme to develop the Lavi, an indigenous fighter aircraft. They finally cancelled the project in 1987. One Israeli scientist I met recently told me this cancellation was the best thing that ever happened to Israel's high-tech sector, because it released so many engineers to be creative and productive in startup companies and other high-tech firms.

This is not the right occasion to discuss exactly which projects DSO should or should not do. Suffice it to say that no Lavi-equivalent project is underway in DSO, waiting to be cancelled. Within our constraints, with the man-years of engineers and scientists that we have available, we have deployed our resources well and obtained good value for money.

DSO's corporatisation in April this year does not change its primary mission – to support the SAF. There is always a certain tension between the research establishment, which needs freedom to think, innovate, and do creative scientific work, and its customers, in DSO's case the SAF, who want prompt, specific, solutions to practical problems. Fundamental insights do not occur on demand; nor do they always lead to immediately useful solutions. But without the longer range thinking, the engineers will just be hacking at individual problems, and will not make breakthroughs.

The challenge is to manage this creative tension, to give the scientists and engineers enough room to explore and understand, yet provide them enough guidance, incentives, and perhaps even a little pressure, to deliver practical results. Outstanding research institutes like Bell Laboratories or the IBM Research Laboratories have managed this. IBM would not have developed Deep Blue to beat Garry Kasparov, if it did not believe that there would be a payoff, albeit an indirect one, from this project to its principal business and bottom line.

I doubt DSO is developing any chess playing computers. But DSO too must achieve this balance between freedom and accountability, between free-ranging exploration and pencil-beam inquiry. It must contribute to the SAF's bottom line, which is the security and defence of Singapore.

However DSO and the SAF establish this balance, as a research

organisation DSO needs autonomy in personnel, finance and management, to allow it to function properly and to serve Mindef and the SAF effectively. Proper systems of accountability are always necessary. But excessive red tape is especially burdensome to a research organisation. DSO's corporatisation will give it greater latitude and flexibility to manage, develop and motivate its staff. DSO should make use of this freedom fully but wisely, to grow into a national research institution.

DSO's accomplishments in its first quarter century have been significant. But your goals for the next quarter century will be even higher. If you do your work well, perhaps in 2022 some of you will attend the golden anniversary dinner of DSO National Laboratories, by then renamed something else. Then you can tell your younger colleagues war stories of how primitive we were 25 years ago, and how much more progress we have still to make.
