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TEAMWORK IS THEIR SECRET WEAPON IN THE FIGHT AGAINST COVID-19

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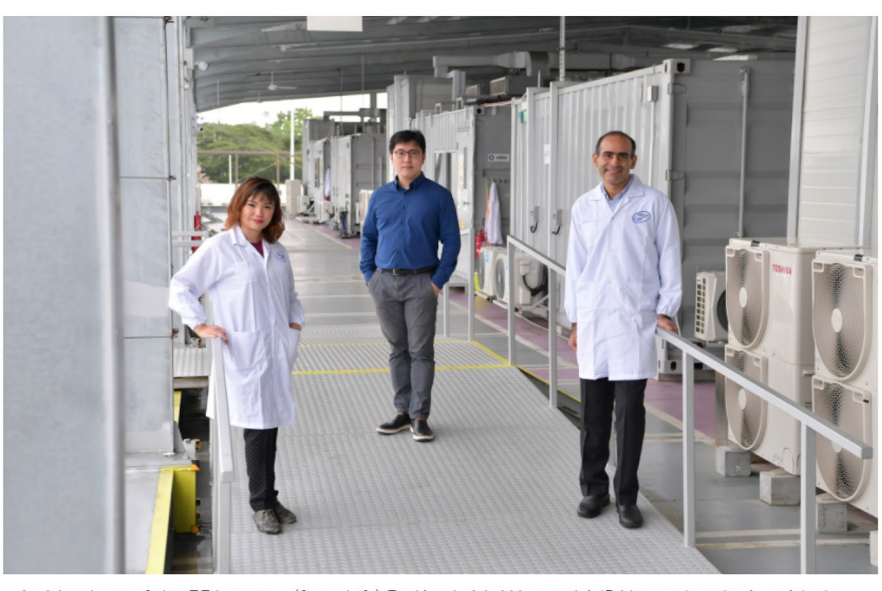


▲ Members of the FDL team – (from left) Dr Kwok, Mr Wee and A/P Uttamchandani – with the containerised laboratories they worked on.

When COVID-19 broke out in Singapore's migrant worker dormitories last year, the Defence Technology Community was tasked to help contain the outbreak. They had to find a way to quickly and safely ramp up diagnostic capabilites to curb the spread of the virus.

Inspired by the idea of the Singapore Armed Forces' Mobile Laboratory for chem-bio testing in the field, the team set off to work on a containerised laboratory that would be mobile and scalable to meet daily diagnostic testing demands.

They would take just four months to set up and operationalise the MINDEF Forward Deployment Laboratory (FDL), which is capable of providing 10,000 COVID-19 tests daily.

Led by Associate Professor (A/P) Mahesh Uttamchandani who is Director (Combat Protection and Performance Programme) at the Defence Medical & Environmental Research Institute (DMERI), the team comprised members from DSO National Laboratories (DSO), Defence Science and Technology Agency (DSTA), Future Systems and Technology Directorate, and Defence Technology Collaboration Office.

▲ The FDLs are designed to be mobile and scalable.

Putting their plans into action

The team first tackled the FDL's layout and workflow design by modifying existing protocols from the Clinical Diagnostic Services Laboratory in DSO's DMERI.

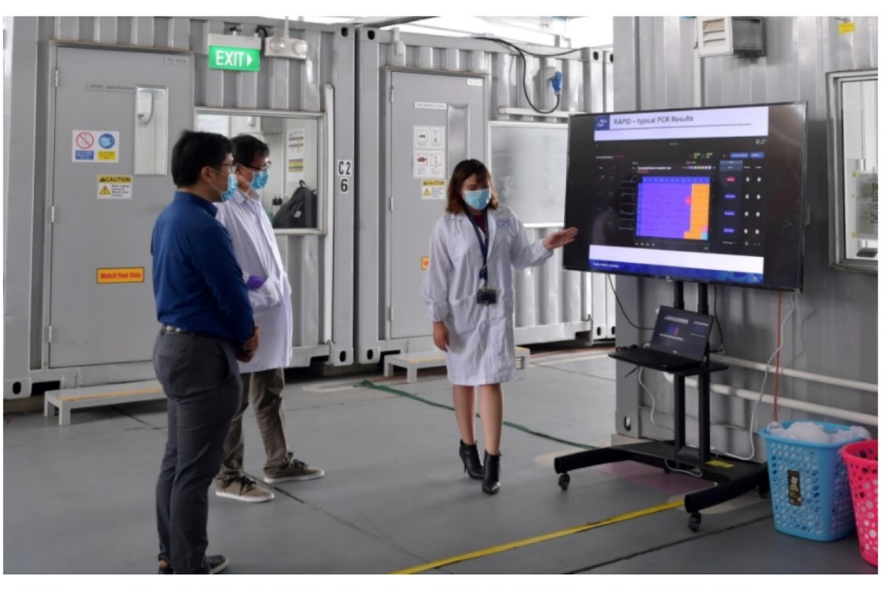
DSTA was then roped in to help identify the potential deployment sites, conduct the site assessment and develop the infrastructure support solution.

Mr Alvin Wee, Senior Programme Manager (Building and Infrastructure), DSTA, said: "It was a mad rush for time. We capitalised on offsite construction, where the various FDL container parts were assembled at a location other than their final installed location, to improve our efficiency."

The 39-year-old added: "We also worked together with the Building Construction Authority, Ministry of Transport and Ministry of Manpower to make sure that the structures complied with safety standards."

Driving technical innovation

The FDLs' work processes were digitalised as mobile applications, making the management and tracking of operations more efficient.



▲ Team members looking at PCR test results outside the lab through a digital interface.

A consolidated dashboard used by the FDL Operations Centre provided complete end-to-end traceability of swab testing operations — from the receiving of electronic swab orders from agencies, to the receiving of physical samples, to testing and submission of electronic results.

Additionally, an Artificial Intelligence system for Polymerase Chain Reaction (PCR) analysis was developed to assist testers in interpreting test results. Named RAPID: ResoluteIT Analyser for PCR with Intelligent Decision-Making, this increases accuracy especially during long-drawn operations.

Automated pipettes are used during the preparation of samples for testing, to reduce testers' exposure to the virus.

The FDL also incorporated the use of automated equipment to replace part of the sample preparation process for testing. This increased testers' productivity by streamlining workflows.

With the use of automation, testers without biomedical background could be quickly recruited, trained and qualified within a month to conduct COVID-19 tests safely and confidently. Manpower training was handled by an operations team comprising volunteers from across DSO.

Overcoming challenges

But the team's journey was not without hiccups. "We faced difficulty in procuring the reagents when supply lines were under stress during the outbreak period," recalled A/P Uttamchandani, 41.

On that front, the team received significant support from the Ministry of Defence (MINDEF), which helped to ensure that all the necessary supply chains were in place.

The MINDEF Future Systems and Technology Directorate also worked closely with the Defence Technology Collaboration Office to resolve any policy and finance issues that the team faced.

The two initial FDLs at Changi Exhibition Centre and Army Museum of Singapore have also been redeployed as part of a cluster of four at Changi Airport to support the ongoing fight against COVID-19.

▲ A/P Uttamchandani (right) receiving the DTP 2021 Team (Engineering) Award on behalf of the team from Defence Minister Dr Ng Eng Hen at the DTP ceremony on 26 Oct.

Teamwork key to success

In recognition of the team's efforts, they received the Defence Technology Prize (DTP) 2021 Team (Engineering) Award on 26 Oct. Established in 1989, the DTP is awarded annually to individuals and teams that made significant technological contributions to the defence capabilities of Singapore.

Team member Dr Sylvie Kwok, 33, a Senior Member of Technical Staff from DSO, said: "Beyond this current pandemic, the experience that we have gained from this project will become a valuable asset for Singapore in future health crises."

A/P Uttamchandani added that the win was only possible with everyone's effort: "Through this year-long experience, I have learnt to appreciate the phenomenal power of teamwork.

"This particular project has also reaffirmed my personal belief that nothing is impossible as long as you put your mind and heart to it."

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