Australian Defence aims to boost innovation through Defence Innovation Hub, Next Generation Technology Fund (NGTF) and Capability and Technology Demonstrator program

Australian Defence has launched a number of initiatives to boost innovation in defence sector. It has launched Defence Innovation Hub, focused on late-stage technology development, and the Next Generation Technology Fund (NGTF), focused on defence-related research.

The Defence Innovation Hub, managed by the Defence Industry Policy Division, has responsibilities for facilitating research efforts "from concept exploration and technology demonstration, through to prototyping and integrated capability demonstration and evaluation". It has a nominal funding allocation of AU$640 million over ten years. The second tranche of Defence Innovation Hub investments worth $12.3 million has been announced today by Minister for Defence Industry, the Hon Christopher Pyne MP, ensuring Defence has access to ground-breaking technology. The Defence Innovation Hub was established in December last year as a robust program to facilitate and nurture the development of innovative technology and ideas in support of Defence capability," Hon Christopher Pyne MP said. "The Government has invested $1.6 billion to develop Defence capability through growth in the capacity and capability of Australia's defence industry and innovation sector.

The NGTF is overseen by DSTG and has been allocated AU$730 million over the same period. Sitting alongside these programs is the Centre for Defence Industry Capability (CDIC), which “provides advice to the Australian defence industry, supports industry growth, and facilitates innovation”.

The “innovation priorities” that set overarching guidance for both the Defence Innovation Hub and NGTF identify six streams according to the Force Structure Review: intelligence, surveillance, reconnaissance, electronic warfare, space and cyber; key enablers; land combat and amphibious warfare; strike and air combat; maritime and anti-submarine warfare; air and sea lift. The “strategic priorities” of the NGTF has emphasis on: directed energy weapons; intelligence, surveillance, reconnaissance; cyber and space.

Capability Technology Demonstrator (CTD) program

It had launched the CTD program that aims to show Australian Defence Force (ADF) users how leading edge technology can be integrated quickly into existing, new, enhanced or replacement high-priority capabilities. The CTD program is organisationally located within DST Group. DST provides a management office for the CTD Program and contract management for most of the CTD projects.

The CTD program is not a grants program; rather it is a collaborative activity conducted under contract between Defence and industry, or research organisations, to deliver a demonstration of the capability potential of new technology. The program’s emphasis is on technology in Australian / New Zealand industry that is going to provide capability advantages for Defence and allow Australian / New Zealand industry to position itself to provide in-service capabilities

and through-life-support.

A Capability Technology Demonstrator (CTD) program was raised in 2001 under Project AIR 5425 to demonstrate that the DSTO wingkit could extend the range of the 500lb class GBU-38 JDAM weapon .The addition of the DSTO wingkit to the JDAM represents a significant improvement in capability; by greatly enhancing the range of the standard JDAM it will allow the RAAF to engage their targets from beyond the range of enemy air defences.

Defence Priority Areas

CTD proposals may address any of the following Defence capability area: Communications in the Sea and Land Domains, Communications in the Information Domain, Battlespace Awareness in the Sea and Land Domains, Battlespace Awareness in Information Domain, Force Protection in the Land Domain, Force Protection in the Cyberspace Domain, Logistics in the Sea, Land and Air Domain and National Support in the Sea, Land and Air Domains

Some of the successful programs developed under CTD program are:

Australian Defence showcases innovative technologies developed under Capability and Technology Demonstrator program

The Australian Department of Defence has showcased a number of innovative technologies designed to support the Australian Defence Force, or ADF, as its participation in National Science Week. Among the technologies showcased were the low-cost, lightweight force protection systems for soldiers under

the Redwing programme of the department.

Chief Defence Scientist Dr Alex Zelinsky said the event highlights the diverse range of technologies developed by Defence scientists and manufactured by the Australian industry under the Capability and Technology Demonstrator, or CTD, Programme.

Non-Rigid Electromechanical Exoskeleton was part of the technologies designed for the modern soldiers. The exoskeleton technology takes the weight off a soldier's back while carrying heavy backpacks, and transfers the weight load to the ground to reduce fatigue, pain and injury when walking over long distances.

The technology uses the **Soldier Integrated Power System**, which is a kit of flexible, lightweight solar cells, and power-generating electronic textiles that can reduce the weight of batteries carried by soldiers. The technology was developed by the Australian company Tectonica under the CTD programme, and has been successfully demonstrated.

To date, Defence scientists are exploring a **novel energy-harvesting approach** that uses power from the structural vibrations of vehicles. The approach converts the vibrations into electrical power for embedded diagnostic sensors and devices.

Recently, Defence scientists have developed a unique computer security device called **Digital Video Guard** that provides protection against cyber intrusion. And the scientists have won an innovation award for the development of the device.

"Wing kit" for the Joint Direct Attack

Munition, or JDAM.

Another successful technology developed by the scientists was the “wing kit” for the Joint Direct Attack Munition, or JDAM. Zelinsky said the successful technology demonstrates the value that science and technology adds to Defence capability.

“The wing kit, developed by our scientists, enables the standard JDAM weapon to more accurately find longer range targets, giving the launch aircraft a fire-and-forget capability at a safe standoff distance,” he said. The first wing kits, manufactured by the Australian company Ferra Engineering, were recently delivered to the Royal Australian Air Force.

“The technology examples highlighted demonstrate the close partnerships between Defence, industry and universities,” Zelinsky said.

Haptically-Enabled Robotic Vehicle

The Centre for Intelligent Systems Research at Deakin University has developed a mobile platform with a controllable arm that gives operators a sense of the weight and solidity of an object being manipulated.

This technology improves the ability of operators working at a safe distance to identify and manipulate hazards such as improvised explosive devices by providing a sense of how the object feels. The robotic arm is fitted with strain gauges that meter the force being applied to manipulate the object. This force is reproduced via actuators mounted in the hand controls that push back on the operator’s hands according to the force being applied by the arm, thereby producing the sense of feel. Stereo camera vision gives the operator depth perception that improves the accuracy of arm control and also

enhances the realistic sense for the operator of being right at the scene

Kestral Aerial Surveillance System

Kestrel is a video motion target indication technology produced by Sentient.

It enables real-time video-based target identification operations to be conducted over sea and land with unmanned aerial vehicles and manned surveillance aircraft. The system operates by comparing pixels in frames of video footage of a particular scene. If any differences are found between frames, the system alerts an operator to the point in the scene where something has moved or is moving, this possibly being indicative of enemy activity.

Naval Automated Personnel Tracking

This tracking system, developed by Blue Glue, ensures the whereabouts of all personnel aboard a vessel can be known at all times through use of wearable radio transmitter tags.

Every 1.5 seconds, the tag emits a pulse of data that identifies the tag wearer. Radio receivers fitted around the ship detect this signal, and based on the strength of signal received, the system can determine where on board the person is. Every tag is programmed to transmit at a unique time so that transmissions do not mask each other. The system also features the use of laser and infrared beams as hazard zone entry alert devices. If a person steps through the beam and interupts light transmission to a receptor, the system is alerted.

Fibre Laser Sensor Array

The Fibre Laser Sensor array, jointly developed by DSTO and Thales Australia, is a sea-bed surveillance array that detects sound with extreme sensitivity using micro-sized lasers embedded in the core of optic fibres.

The system is very robust, lightweight and ultra-thin and uses minimal electric power compared to the previous electronics-based kinds. It can be rapidly deployed from a rigid hull inflatable boat and brought into operation almost immediately.

During trials in the West Australian Exercise and in Jervis Bay, it successfully detected the sound emissions of vessels of different sizes and sonar signature types, and even detected the presence of Navy divers as well.

Throughout its history the CTD program has proven to be highly successful in its goal of bringing together Defence, research organisations and industry (large and small) to work on developing new technologies to the demonstrator level.

References and Resources also include:

https://www.minister.defence.gov.au/minister/christopher-pyne/media-releases/innovation-hub-boosts-australias-defence-industry-123

https://www.ussc.edu.au/analysis/next-steps-for-australias-defence-innovation-lessons-from-darpa