Panel on Commerce and Industry
Meeting on 15 June 2021

Response of the Government

(1) The ratio of the five Research and Development (R&D) Centres' royalty and licensing income arising from the use of their patented R&D outcomes in the Mainland and overseas countries / places from 2018-19 to 2020-21

R&D Centres	R&D Centres' royalty / licensing income arising from the use of their patented R&D outcomes ($0,000) (2018-19 to 2020-21)			
	Hong Kong (a)	The Mainland (b)	Overseas countries / places (c)	Ratio (b) : (c)
Automotive Platforms and Application Systems R&D Centre (APAS)	3	0	0	-
Hong Kong Applied Science and Technology Research Institute (ASTRI)	70	145.2	110	1:0.758
Hong Kong Research Institute of Textiles and Apparel (HKRITA)	274	23	5	1:0.217
Logistics and Supply Chain MultiTech R&D Centre (LSCM)	95	0	0	-
Nano and Advanced Materials Institute (NAMI)	939	354	60	1:0.169
Total	**1 381**	**522.2**	**175**	**1:0.335**

Note: The above licensing income / royalty are part of the commercialisation income of the R&D Centres with the remaining part being contract service income. Due to social unrest and the outbreak of the novel coronavirus disease (COVID-19) in 2019-20 and 2020-21, commercialisation income was being affected.

- In 2018-19 to 2020-21, the commercialisation income of the five R&D Centres are as follows –

Commercialisation Income（$ million）				
	2018-19	2019-20	2020-21	2019-21 Average
APAS	1.87	2.58	2.21	2.40
ASTRI	21.16	25.88	10.03	17.96
HKRITA	10.98	29.30	5.62	17.46
LSCM	10.09	15.95	24.12	20.04
NAMI	17.11	12.25	17.74	15.00
Total	**61.21**	**85.96**	**59.72**	**72.84**

(2) A list of the five R&D Centres' R&D outcomes which had been adopted for trial / use by the HKSAR Government in 2018-19 to 2020-21

APAS	
1.	Electric Vehicle (EV) Charging Station with Load Management - The research result of this project is an EV charging station with load management that can manage charging of many EVs.
2.	Combo Fast EV Charging Station and Mobilized EV Charging Service Vehicle - The research result of this project is a Combo fast charging station with 50kW EV charger and a mobilized EV charging service vehicle.
3.	Battery Storage EV Charging Station - The research result of this project is a battery storage electric vehicle charging station with solar panels, which can charge and provide lighting for EVs.
4.	On-board Diagnostic System With Telemetry - The research result of this project is an on-board diagnostic system with telemetry for government vehicles.

ASTRI	
1.	Ultra-low power long distance Long Range (LoRa) sensors and Distributed Network Protocol 3 (DNP3) Big data processing technology - By adopting the technology, data can be transmitted in areas without electricity or mobile network coverage.
2.	Intrusion Detection System (IDS) Benchmarking - The project developed an attack dataset for IDS benchmarking. In addition, the project provided an anonymiser for adding other attack traffic into the current benchmarking dataset.
3.	Wireless smart water metering system standard based on long range wide-area network (LoRaWAN) and the reference design - The wireless smart water meter reading system can replace manual meter readings and provide remote reading of the water meters. Customers can easily access their real-time water consumption data via Internet.
4.	Smart credit assessment and analytics engines for alternative credit scoring - The outcomes of the project include the Hong Kong Monetary Authority White Paper on Alternative Credit Scoring and a software platform that consists of four smart engines: (1) alternative credit assessment engine; (2) Online document processing engine using Artificial Intelligence (AI)-based optical character recognition technology; (3) Data analytics engine; and (4) Application Programming Interface (API) Management Engine. The software platform can be adopted by the banks to conduct credit scoring by using alternative data.
5.	Cold Food Import Safety Management (CFISM) Platform - The project integrated Blockchain, Smart Contract, Internet of Thing (IoT) and other technologies to provide trusted documents and continuous compliance tracking data for predictive risk assessment at the checkpoint. As a result, it greatly increases the efficiency and enhances food safety by 24x7 auto-issuing of "Import License" and reducing inspection rate and duration.
6.	To study and test Cellular Vehicle-to-Everything (C-V2X) technology's application scenarios on the roads of Hong Kong, as well as the network and infrastructure required for the application - C-V2X can facilitate the development of autonomous driving technology, assist the detection of hidden dangers and improve road safety and traffic efficiency.

ASTRI	
7.	Smart Service Voucher System (SSVS) - The SSVS system enhances the administrative efficiency in handling Community Care Service Voucher-related work and information exchange between the Recognised Service Providers and Social Welfare Department.
8.	Portable Gas-sensing Device - ASTRI is now collaborating with the Fire Services Department in developing a portable remote gas sensing device based on infrared multispectral technology. It will allow firefighters to monitor the concentrations of explosive gases, such as methane and carbon monoxide, at a safe distance away.
9.	Intelligent Form/Document Processing Platform - The outcome of this project was an automated document processing platform that integrated with the existing Optical Character Recognition solution to recognise filled forms.
10.	Smart Water Treatment Works and Meter Reading - The IoT surveillance system is based on LoRa technology. By installing object detection sensors and IoT sensors to monitor water levels, chlorine gas leaks, collapsed trees or trespassing, the system makes Hong Kong's water treatment works and the meter reading system smarter. It automatically generates alert messages to the Water Supplies Department for follow-up actions.
11.	Customs Crime Analytics System (CCAS) - CCAS is the first all-in-one integrated system on crime/risk analytics. It can help Customs and Excise Department reduce operating cost, strengthen enforcement capability in crime detection, case investigation, cargo profiling and intelligence processing, etc.
12.	3D Geographic Information System (GIS) Platform - The GIS platform enables the creation of 3D indoor maps and routing network, as well as register assist markers (e.g., BLE, Wi-Fi, NFC, QR Code, etc.) standardised for indoor positioning using mobile devices.
13.	Robust Form Recognition Platform to digitise handwritten characters on their forms - The project is to develop a form recognition platform to handle large variation handwritten traditional/ simplified Chinese and English characters, especially handwriting outside the designated space of the form.

ASTRI	
14.	Platform with edge computing devices with AI to recognise noises - The solution can detect, monitor and classify noise timely to reduce human efforts spent in handling noise compliant cases.
15.	Automation system for water quality monitoring based on robotics and AI - By using robotics, IoT and AI technologies, the automation system can continuously monitor water quality to ensure the safety of drinking water.
16.	Smart visual sensing device, recognition software for equipment and character recognition software based on deep learning technology, and armory management software - The user will have the capability of real time monitoring of armory status, direct control over permission, statistics of historical armory usage and efficient armory allocation.
17.	Intelligent Knowledge Management Platform for customer services - An AI solution which helps automatically read, classify and prioritise complaints and enquiry emails, such that customer service pipeline can be accelerated and domain knowledge and experience can be preserved.
18.	Portable Smart Alcohol Multimeter - The project is to develop a portable smart alcohol multimeter. With the integration of smartphone platform, miniature optical spectrometer, and advanced algorithm, the portable device can be used for the fast screening of alcoholic disinfection products by measuring the compositions and concentrations of the alcohols through the transparent containers. It can thus quickly find out the products with toxic methanol to ensure the safety of the consumer products and public health.
19.	Auto-Transcribing Platform - The speech recognition engine will automatically transcribe the video recorded interviews, telephone recording system records and voice records into full transcriptions.
HKRITA	
1.	Utilising image & clothing recognition engine to perform analysis for identifying the people in similar clothes, who may have appeared in the area or involved in the incidents - System engine for identifying persons in similar clothes who appear in the area.
2.	The CuMask+™ adopts an ergonomic design and is of multi-layer structure, two of the layers are specially made with small quantities of copper, capable of immobilising bacteria, common viruses, and other

	harmful substances. The design of the mask was awarded a Gold Medal at the International Exhibition of Inventions of Geneva 2018. The mask reaches the American Society for Testing and Materials (ASTM) F2100 Level 1 standard and is effective for 60 washes.
3.	Providing high performance sportswear and devices for Hong Kong athletes doing intense training, participating in international competitions such as the Tokyo Olympic Games and making post-match recovery. It is expected that these sportswear and devices are able to enhance their performance, provide protections, support cooling down and recovery after exercise and prevent injuries.
4.	Developing 60 sets of bedding textiles, including pillow cases, bed sheet, quilt, quilt cover, mattress and mattress topper, to help athletes have better sleeping quality during local and overseas competitions such as the Tokyo Olympic Games. After the completion of the seed research, Airland Holding Company Limited and Shenzhen PurCotton Technology Co Ltd have licensed the technology to produce their products.
5.	Developing 300 sets of on-field wear for Rowing, 60 sets of on-field wear for Track & Field, 60 sets of thermal protection jacket and trousers and 60 sets of outfit jacket to help athletes enhance their performance under different weather conditions.
6.	Developing 370 pairs of Asymmetric Competition Footwear for the Hong Kong Fencing Team. The shoes were designed according to the leg movements to provide sufficient support for the legs and better protections and performance during competitions. Hong Kong elite fencing athletes put on the fencing shoes in the 2016 Rio Olympics and the 2018 Asian Games. This project won a bronze award in the Asia Exhibition of Inventions Hong Kong in 2018. Azza Inc, a French company, has licensed the technology for their business.
LSCM	
1.	Integrated Sensor Module and Ubiquitous Wireless Network for Smart Drainage - A ground-level sensing and wireless network for real-time collection of information about water level and hazardous gas inside the drainage and sewage pipes.
2.	"Hermes Messaging Gateway" software application for Government Electronic Trade Services – "Hermes Messaging Gateway" software provides trade related data exchange functions between traders and the Government.

LSCM	
3.	Immersive and cave-like Virtual Reality (VR) System for Correctional Services Department (CSD) to provide scenario training - A VR-empowered scenario training system for CSD to provide training to their officers to handle untoward incidents, such as assault among persons in custody (PIC) or PIC inflicting incidents in dormitories.
4.	WiFi Mesh Network - The Lavinet mesh network technology enables user to extend its existing wireless network and establish a standalone wireless network to cope with training needs.
5.	Differential Global Positioning System (DGPS) Tracking System - A Differential Global Navigation Satellite System (DGNSS) Server Platform for tracking, logging and managing data of waste. Besides, the DGNSS Server Platform enables the police to effectively monitor and allocate police resources through on-site tracking of police presence.
6.	SHIELD smartbox for protection of critical infrastructure against cyber-attacks - The SHIELD smartbox is deployed at critical infrastructure units so that the users will receive alarms when these units are under cyber-attacks. The users will further analyse the cyber-attack data for planning future actions.
7.	1. Anti-wandering Radio Frequency Identification (RFID) Gate System - Anti-wandering RFID Gate prevents the elderly residents from wandering off the building. 2. Service Logging System - The Service Logging System helps staff perform routine operations and provide services to the elderly residents via a series of pre-defined workflows. 3. Information Kiosk System - The Information Kiosk System acts as an information dissemination center. 4. Global Navigation Satellite System (GNSS) Tracking System - The tracking system using GNSS to help track the elderly residents in an outdoor environment.
8.	Using DGNSS to provide more accurate positioning service - The solution uses the DGNSS, different sensors and 3D street models to improve serious positioning errors in dense urban areas. These errors are usually caused by factors such as signal occlusion.

LSCM	
9.	Smart Wearable Tag and Monitoring System - The system provides a single location monitoring system to assist in tracking the location of PICs outside correctional institutions for both outdoor and indoor environments. The Smart Wearable Tag for PICs is designed based on RFID tag system.
10.	Online Dispute Resolution Cloud Services Platform for e-Arbitration/Mediation - The platform utilises AI technology to develop a domain-specific language translation system.
11.	Multi-scale segmentation method for SAR-based land cover change detection using high-resolution COSMO-SkyMed images - The project customised the hardware and software modules for high-resolution COSMO-SkyMed satellite data to monitor land cover changes. It provides a tool for better land administration and mapping in Hong Kong.
12.	Trained Video Analytic Detectors and System that deployed on site for traffic flow monitoring - The project applies video analytics technologies to provide real time traffic flow monitoring capabilities. Detected traffic disruption will be notified for immediate attention to ensure road traffic safety and to avoid impelling any large-scale traffic blockage.
13.	"StayHomeSafe" electronic wristband and monitoring solution - The smart wristband and home quarantine monitoring system can effectively monitor whether persons under quarantine are staying at their designated premises.
14.	Smart Contracts System on Blockchain network with AI translation/transcription - This project develops a series of solutions to facilitate enterprises to complete contracts, delivery, and payment arrangements for commercial transactions through the Internet. These solutions include a translation engine that uses AI and deep learning to more accurately translate business documents in professional domains (such as marketing) and transcribe virtual meeting discussions, therefore enabling transaction parties to communicate in different languages.
15.	Electronic form system with blockchain - A workflow management and electronic form framework system for landslide prevention and mitigation projects, using blockchain and peer-to-peer storage network technology to monitor work processes.
16.	Logistics and Related Support Services for COVID-19 Vaccination Programme - This project applied E-Lock secured logistics technology, IoT technology, web based cloud services application technology, data analytics technology, etc. to develop Vaccine Supply Planning Software with Simulation, Community Vaccination Central Manager Control System, e-Lock vaccine tracking system, Stock Transfer Logging system, Vaccine Dispensing and Counting System, Inoculation Booth's Vaccine Intelligent Counter, and Private Medical Practitioner Vaccine e Ordering System.

NAMI	
1.	Self-compacting Backfilling Material for Pavements – This is a new universally applicable, highly flowable, easy for placement and excavation backfilling material. With the optimization of the material's curing time and final setting strength, the risk of road collapse is minimized, and easy for future excavation.
2.	Hydrophobic Conduits – The Drainage Services Department has applied the highly hydrophobic conduits with riblet surface for sustainable urban drainage systems.
3.	Multifunctional Roofing Materials – Waterproof and heat-resistant multifunctional roofing materials made from recycled tyre materials.
4.	Rapid Repairing Mortar Material - Applicable on corroded reinforced concrete structure.
5.	A Highly Efficient Filtration Cartridge as Reverse Osmosis Alternative for Water Dispenser – The highly efficient cartridge can purify drinking water in water dispenser without producing waste water.
6.	Microalgae Green Wall for Air Purification – The microalgae green wall can absorb carbon dioxide (CO_2), improving the indoor air quality.
7.	Multifunctional HEPA Media for Air Purification – High performance air purification system that can effectively remove volatile organic compounds (VOCs), odors and virus.
8.	STEM Kits - Application of NAMI's smart reactive color-changing materials on STEM Kits.
9.	Antibacterial and Anti-dust Coating for Air Ducting – Coating to be applied on air ducts to prevent accumulation of dust and inhibit growth of bacteria in air ducts.
10.	Self-cleaning Antibacterial Vitreous Enamel Panel – NAMI's self-cleaning antimicrobial vitreous enamel panel has enhanced level of resistance to microbes, mold and bacteria, ensuring a cleaner and safer living environment. The antibacterial panels will be adopted at the facilities under the Architectural Services Department and Electrical and Mechanical Services Department (EMSD), including the Legislative Council Complex, Tin Shui Wai Temporary Market and the EMSD Headquarters.

Innovation and Technology Bureau
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