Knowledge Transfer Annual Report 2018/19

Submitted to

University Grants Committee

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The Hong Kong University of Science and Technology
Clear Water Bay, Kowloon, Hong Kong

TABLE OF CONTENTS

EXECUTIVE SUMMARY

At the end of 2018-19, the final year in the current Triennium for Knowledge Transfer (KT), The Hong Kong University of Science and Technology (HKUST) looks back on another fruitful 12 months of active engagement with the industry and the community, having made tremendous efforts to increase the variety and intensity of its KT activities in line with the following strategic goals:

- Strengthen the leadership and governance of KT endeavours in Hong Kong and the nearby areas
- Foster an inspiring, engaging and vibrant entrepreneurial environment at HKUST
- Actively pursue outreach to society and industry
- Help build an entrepreneurship eco-system in Hong Kong and the nearby areas
- Strengthen knowledge dissemination and enhance the effectiveness of KT operation
- Strengthen manpower support for commercialisation

This report provides a summary of HKUST's KT-related activities and achievements in 2018-19.

ENHANCING KT INFRASTRUCTURE

FOSTERING THE CULTURE OF RESEARCH EXCELLENCE

In 2018-19, the University attracted a combined HK$266.1 million for 134 collaborative research projects, with a total number of 223 collaborative partners from Hong Kong, Mainland China and overseas. Selected projects are highlighted below.

Areas of Excellence Scheme Project

The "Center for Slope Safety" project led by Prof Charles Ng, Chair Professor of Department of Civil and Environmental Engineering (CIVL), was awarded close to HK$92 million by the Areas of Excellence Scheme, the largest funding support in the three most recent rounds of funding from the University Grants Committee (UGC). The project aims to deliver an artificial intelligence (AI) system capable of detecting extreme weather and landslides in Hong Kong.

Theme-based Research Scheme Projects

Two HKUST-led projects were awarded over HK$57 million by the Research Grants Council (RGC). A project led by Prof Nancy Ip, Vice-President for Research and Development (VPRD), aiming to dissect the disease pathways of Alzheimer's disease (AD) and identify novel therapeutic targets using state-of-the-art stem cell and genome editing technologies was awarded over HK$37 million. Another project, led by Prof Kar Yan Tam, Dean of Business and Management, seeking to develop a fintech development strategy for Hong Kong by investigating the impact of fintech on individual investors, financial institutions, regulators and the industry as a whole, was awarded over HK$20 million. This project was also the only submission under the theme of "Enhancing Hong Kong's Strategic Position as a Regional and International Business Centre" that was funded by the RGC for the three recent rounds.

Research Impact Fund (RIF) Projects

The objective of the newly established RIF from the RGC is to encourage universities to conduct more impactful and translational research projects which may help meet Hong Kong's strategic and societal needs and foster more collaborative efforts with stakeholders beyond academia. HKUST has also secured four projects at the inauguration round of the RIF by the RGC with a total funding of over HK$30 million. The four awarded projects are in the areas of power electronics, environmental research in airborne particulate matter pollution source identification, organic photovoltaics, as well as broadband microwaves and ultra-low frequency mechanical waves absorbers.

Applied Research Projects from the Innovation and Technology Fund (ITF)

The ITF from the Innovation and Technology Commission (ITC) supported 36 projects with total funding of HK$152.6 million during the reporting year. Prof Huamin Qu from Department of Computer Science and Engineering (CSE) was awarded over HK$10 million for his study on an open learning design, data analytics and visualisation framework for e-learning. Prof Dit Yan Yeung, Head and Professor of CSE, was granted nearly HK$8.8 million to develop a personalised e-learning platform for all ages.

Projects Funded by Mainland Sponsors

HKUST is also making continuous efforts in seeking research funding from sponsors from Mainland China to support the overall KT goals for HKUST. A project on "Research on Diagnosis and Treatment of Alzheimer's Disease", led by Prof Nancy Ip (VPRD), was awarded over HK$25 million by the Guangdong Provincial Department of Science and Technology. The project involves the collaboration of 10 institutions, including two hospitals and a center for disease control in both Hong Kong and Mainland China. In addition, the Shenzhen Research Institute (SRI) ranked second in terms of grants awarded among 60 member universities in Shenzhen Virtual University, in securing 34 research projects with total funding of RMB33.6 million from the Shenzhen Science Technology and Innovation Committee (SZSTI).

In response to President Xi Jinping's pledge to support Hong Kong's development into an international hub of innovation technology. Funding bodies from Mainland government began accepting direct applications from Hong Kong institutions in late 2018. The Research Office at HKUST has enhanced its Mainland operations in anticipation of substantial interest from eligible faculty and staff in seeking funding support from this massive pool of resources for research.

GRASPING THE OPPORTUNITIES: BE A LEADING UNIVERSITY IN TECHNOLOGY AND INNOVATION IN GREATER BAY AREA

HKUST has been putting much effort in exploring opportunities in the Greater Bay Area (GBA) in extending the University's influence in KT from Hong Kong to nearby cities, and actively participating in the development of the GBA. The establishment of HKUST Guangzhou (HKUST (GZ)) Campus, with application submitted to the Ministry of Education (MOE) in April 2019, would be the best manifestation of the close cooperation with Mainland counterparts and the dedication to make influential societal impact beyond Hong Kong. Postgraduate students will be admitted in the initial phase, with admission size eventually growing up to 4,000. The first phase of the HKUST (GZ) Campus construction is anticipated to complete in 2022. With the new campus located next to the newly planned high-tech park in Guangzhou, HKUST students could better transfer their research achievements and innovative ideas

HKUST Guangzhou Campus

through the established industrial chain there. Students from both campuses can also share each other's laboratories and research facilities. The exchange will be beneficial to the science and technology development in both Hong Kong and the region.

FUTIAN BASE IN THE LOK MA CHAU LOOP (THE LOOP) IN SHENZHEN

A collaboration agreement between Shenzhen Research Institute (SRI) and the Shenzhen Futian Municipal Government was signed in May 2019, in setting up the HKUST Futian Base in the Chang Fu Commercial Building (CFC Building) of Futian Bonded Zone. The Futian Base will occupy three floors at the CFC Building, with a total area of over 6000m^2. This will provide much needed R&D spaces for faculty members at HKUST, and to facilitate the commercialisation of R&D outputs. In addition, the Futian Base will also provide entrepreneurship incubation, and professional skillset and executive training facility. The renovation of the Futian Base will be completed by the end of 2019, and the recruitment of research and entrepreneurship teams is ongoing.

HKUST-ZHONGSHAN JOINT INNOVATION CENTER

In July 2018, HKUST and the Zhongshan Municipal Bureau of Science and Technology signed an agreement to establish the HKUST-Zhongshan Joint Innovation Center. The Center will coordinate research project applications to the Zhongshan-HKUST Project Fund, with an initial funding support of RMB30 million from the Zhongshan Municipal Bureau of Science and Technology for three years. With the establishment of Zhongshan platform in 2018-19, HKUST is well-positioned to exert its KT power in the GBA with the presence of research institutes in Nansha (Guangzhou) and Shenzhen, and strategic collaborative partnerships with Governments of Nanhai (Foshan), Futian (Shenzhen) and Zhongshan.

CENTER FOR ARTIFICIAL INTELLIGENCE RESEARCH – PROMOTING CROSS-DISCIPLINARY RESEARCH IN ARTIFICIAL INTELLIGENCE

HKUST established the Center for AI Research (CAiRE) – the first such university-based center in Hong Kong – to spearhead cross-disciplinary research in all of the scientific, technological, societal, business and educational dimensions of AI. Prof Pascale Fung from CSE is the Founding Director of CAiRE. The Center will propose new AI research projects involving faculty from HKUST's four schools and research centers, including the Big Data Institute, Robotics Institute, Human Language Technology Center and HKUST Shenzhen Research Institute. It will also collaborate with top universities and organisations in Hong Kong and worldwide, such as Massachusetts Institute of Technology (MIT) and the World Economic Forum, to transfer knowledge of the AI research discoveries made by HKUST.

Prof Wei Shyy, President and Prof Pascale Fung from CSE unveiled the CAiRE plaque

LAUNCH OF THE SOCIAL, COMMUNITY AND CULTURAL ENGAGEMENT ACTIVITIES REPORTING SYSTEM

User training session for Social, Community and Cultural Engagement Activities Reporting System

To facilitate data collection and enhance the quality of data on the University's social, community and cultural engagement activities, the Technology Transfer Center (TTC) has taken the lead to develop the Social, Community and Cultural Engagement Activities Reporting System to help collect data on Key Performance Indicators (KPIs) for University-wide KT activities. The data collected serves as a measure of the University's performance in KT. Based on the concerted effort of various units, the system was refined and launched in May 2019 and used to collect data on KPIs in 2018-19. The System contributes great enhancement to the University KT data collection, reporting and analysis endeavours.

TECHNOLOGY TRANSFER ENDEAVOURS

INVENTION DISCLOSURE AND INTELLECTUAL PROPERTY PROTECTION

HKUST has ceaselessly sought to develop a comprehensive and robust intellectual property (IP) portfolio, which is critical to its KT missions. In the last year, researchers working at HKUST's Clear Water Bay and Mainland platforms developed 147 inventions and filed 275 new patent applications. With 112 newly granted patents in the last year, HKUST's current IP portfolio now contains 1,488 active patents and patent applications.

IP Seminars: HKUST organised three seminars in partnership with prominent IP practitioners and renowned IP firms to equip researchers in the University community with essential IP knowledge and skills. The elementary IP seminars "An Introduction to Intellectual Property and its Protection Strategies" and "Is My Invention Patentable? Patent 101 – Fundamental Concepts in Patent Law" explored fundamental concepts relating to different IP types, patent laws and patent filing and prosecution strategies. Beyond this basic introduction to IP, an advanced IP seminar entitled "Is Your Invention Inventive? – What Is Obvious Is Not Obvious: A Conversation with Your Patent Attorney" was held to illustrate the basic legal framework of the concept of obviousness in patent

The IP seminars attracted more than 300 attendees

law, providing several legal cases for discussion. The seminars were well-received and attracted over 300 attendees, including not only HKUST members but also business leaders and veteran IP practitioners.

CONTRACT RESEARCH, CONSULTANCY AND TESTING SERVICES

Through its business arm, HKUST R and D Corporation (RDC), HKUST has partnered with the private sector in a wide spectrum of technology areas. In 2018-19, RDC managed 213 research contracts that attracted funding of HK$80.9 million in total. In addition, HKUST researchers carried out 11 consultancy projects collectively worth HK$1.6 million. Making use of the University's major equipment and facilities, RDC also arranged 341 equipment and facilities service agreements with companies in Hong Kong and elsewhere, bringing an additional cash receipt of HK$2.1 million. The total income generated by the RDC through contract research, consultancy and testing services, including projects initiated by HKUST's Mainland platforms, reached HK$95.2 million in 2018-19.

LICENSING AND RELATED ACTIVITIES

HKUST proactively explores channels and opportunities for IP licensing to the industry. During the reporting period, RDC managed 105 active patent and software licensing agreements, while the University's Mainland platforms managed another three active licenses. The total cash receipt generated through technology licensing by RDC in the reporting year was HK$3.4 million. In addition to its licensing activities, HKUST leads the development of Massive Open Online Courses (MOOC). As of June 2019, 55 HKUST MOOCs have been offered on Coursera and edX through partner licensing arrangements, with over 1,700,000 enrolments. Recently, two new specialisations, Finance Industry Transformation, Regulation and Security (Fintech/Regtech) and Full-Stack Web Development with React, were added to HKUST's Coursera catalogue. Together with the licensing income generated from MOOCs and Mainland platforms, the overall licensing income of the University in 2018-19 was HK$7.2 million.

BRIDGING THE DEVELOPMENT GAP AND STRENGTHENING THE KT VALUE CHAIN

Apart from enhancing its culture of research excellence, HKUST is determined to foster an innovation and entrepreneurship ecosystem. In 2018-19, it continued to work diligently to design and provide gap funding support to encourage technology commercialisation and start-up formation.

PROOF-OF-CONCEPT FUND (PCF)

In 2018-19, HKUST received 13 PCF applications, of which nine were recommended by the PCF Committee comprising industry experts, to compete for a total funding of HK$1.6 million. HKUST continues to see promising results from these PCF projects. PCF's funding helps research teams develop prototypes for background technologies, leading to more industrial collaborations and licensing outcomes.

HKUST U*STAR PROGRAM (U*STAR)

At the beginning of this Triennium, HKUST established the U*STAR (previously known as the Innovation Acceleration Fund) to serve as another channel for gap funding support. It aims to encourage entrepreneurial technology transfer through new business creation based on the University's technologies and research outputs. The Program received 12 applications in 2018-19. During the Triennium, the U*STAR has received 40 applications from students coming from more than 10 departments and programs. In the past year, seven projects were recommended for and received cash awards of HK$40,000 each, bringing the number of award-winning teams to a total of 23 over the Triennium. To provide coaching for the student teams in building their business models and to attract investment from investors, HKUST and the Hong Kong Science Park (HKSTP) co-organised pre-incubation training sessions for the awardees. With the fruitful entrepreneurial education and culture fostered on campus, applicants are increasingly well prepared to embark on entrepreneurial careers. We are delighted to report that five companies, formed by 2017-18 U*STAR awardees, were shortlisted for the final panel interview of the Technology Start-up Support Scheme for Universities (TSSSU) Program to compete for the funding support from ITC. Three of them successfully secured funding support from TSSSU.

HKUST DREAM BUILDER FUNDS

Aiming to support full-time HKUST students at an early stage in their development of innovative ideas and start-up activities, two entrepreneurship funds, namely the Yeung Wing Yee Entrepreneurs Fund (YWYEF) and HKUST Entrepreneurship Acceleration Fund (EAF), were established by the Entrepreneurship Center (EC). Together with the Alumni Endowment Fund (AEF) Student Start-up Grants set up by the Development and Alumni Office, these funds help students pursue their dreams with guidance and encouragement from HKUST. In 2018-19, over HK$1 million was committed to 59 innovative projects supported by the EAF, eight HKUST start-ups were supported by the YWYEF and three projects were supported by the AEF Student Start-up Grants.

HKUST ENTREPRENEURSHIP FUND (E-FUND)

Aligning with HKUST's KT mission and seeking to strengthen the promotion of entrepreneurial spirit among HKUST stakeholders for social and economic gain, the E-Fund with an initial funding of HK$50 million was set up to support promising HKUST technology start-ups. E-Fund is positioned as early stage capital investment to help bridge the funding gap encountered by HKUST start-ups before they are able to secure sufficient external funding to grow or expand. The E-Fund intends to work with prequalified experienced venture capital (VC) funds, incubators, accelerators and other

types of private funds with a track record of investing in start-ups. With the guidelines for operation and management established, E-Fund will be in full operation in 2019-20.

NURTURING AN ENTREPRENEURIAL CULTURE

To create an entrepreneurial ecosystem on campus, HKUST emphasises entrepreneurship education. EC works with academic units to set up credit-bearing courses on entrepreneurship. Seminars, workshops and training programs are also organised to provide opportunities for the community to learn. EC also organises prominent competitions, such as hackathons and entrepreneurship competitions, to provide platforms for young and enthusiastic entrepreneurs to try out their start-up ideas.

HACKATHON@HKUST

As the most influential hackathon event in Hong Kong, "hackUST + hardUST" gives participants from different backgrounds the chance to enrich their coding and prototyping development skills in 24 and 48 hours respectively, enabling them to take the next step in their entrepreneurship journeys. This year's hackathon@HKUST event attracted 521 participants from around the globe.

Final Round of hackathon@HKUST

LEAPFROG

E-Commerce Challenge Start-up Tour 2019

The Leapfrog Program provides opportunities for our students to engage in experiential learning, and idea and cultural exchange with foreign students and entrepreneurs. A new initiative under this Program, the E-commerce Challenge Start-up Tour to Seoul, was held in January 2019. The tour enabled participants to put their learning from the trip into practice in managing their own online shops. Under the Program, students also had the chance to explore the emerging opportunities in the GBA by joining the "Entrepreneur Shunde" (創業順德) and "Exploration into the Prospect of Further Employment in the Mainland (Greater Bay Area)" (香港青年內地就業探索活動 (大灣區)) tours in October 2018. Students also joined the entrepreneurship camps organised by Fudan University and Tongji University. In total, over 100 students joined the Leapfrog Program during the reporting year.

ONE MILLION DOLLAR ENTREPRENEURSHIP COMPETITION 2019

This year, HKUST-SINO One Million Dollar Entrepreneurship Competition attracted 117 teams' participation – an increase of more than 15% from the previous year. The competition received continuous support from its title sponsor Sino Group, in addition to the support from 14 other sponsors, strategic partners and organisations. To encourage interested parties in Hong Kong and overseas to participate, a Matching Platform was developed to help participants find partners and form teams to join the competition. In April 2019, 24 shortlisted teams had the chance to showcase their projects at the HKUST campus. Over 1,100 visitors attended the exhibition and voted for their favourite teams. These 24 teams also participated in the Elevator Pitch event.

Prof Lionel Ni, Provost, presented the President Award to Horizon Biochip

At the Final Presentation in June 2019, Horizon Biochip, a team with focus on development of biochip technologies for the preservation of embryos/oocytes in In Vitro Fertilization (IVF) medical procedure, was crowned champion of the competition. Besides receiving the President Award as the overall champion, the team also won the GF Innovation Award and Healthcare Prize. The top three teams, comprising HKUST students, alumni and their international peers, will compete with other finalists from Macau and five other Mainland cities at the Grand Final to be held in Nansha, Guangzhou in early September 2019.

This competition extended beyond Hong Kong to Beijing, Guangzhou, Shenzhen and Macau in 2016, and further expanded in 2018 to cover two more Mainland cities, Zhongshan and Foshan. In 2018, 934 teams from these seven regions participated in the regional competitions, and 35 (five outstanding teams from each region) entered the Grand Final held on 8 October 2018 in Nansha. HKUST senior management, Council members, and over 40 VCs from various organisations attended the event, and made initial contact with the entrepreneurial teams. The Grand Final winner was

"果蔬保鲜抗菌肽", a project from a Guangdong research team responsible for developing high expression antimicrobial peptides to preserve fruit and vegetables at a low cost.

Originally designed to nurture entrepreneurs at HKUST, the competition is now a regional event that helps cultivate an entrepreneurial spirit and promote the exchange of ideas across borders.

ENTREPRENEURSHIP SEMINARS AND SHARING

A total of 38 seminars, workshops and talks were held during the past year, with total attendance of over 3,100 students. One of the most successful seminars was by LINO Network, a decentralised live streaming platform with 500,000 monthly active users. This start-up has raised HK$20 million from top investors such as ZhenFund. Dr Qifeng Chen, co-founder of LINO Network, introduced to the audience about his start-up's platform and business model at the seminar. Over 300 students attended this event to learn more about blockchain applications and about the entrepreneurial experiences and challenges.

Over 300 students participated in the seminar by LINO Network

CYBER SECURITY DEFENDERS COMPETITION

Cyber Security Defenders Competition

Collaborated with the School of Business and Management (SBM) and China Everbright Bank Hong Kong (CEBHK), EC organised the Bank's first academic-industry collaborated cyber security competition for students. The aim was to promote cyber security awareness and give students the opportunity to address some real-world threats faced by information security experts. The full-day event was held at HKUST in May 2019. IT experts from CEBHK were invited to provide training and share their real-life experiences of protecting their customers from hackers and complying with best practice.

FROM RESEARCH TO MARKET: ENTREPRENEURIAL TECHNOLOGY TRANSFER

TECHNOLOGY START-UP SUPPORT SCHEME FOR UNIVERSITIES (TSSSU)

In 2014, the TSSSU was introduced by the ITC, and has since provided annual funding of up to HK$4 million for each of the six local universities to support technology start-ups. Recently, the ITC doubled the annual funding support to HK$8 million effective from 2019-20. In the reporting year, the TSSSU attracted 51 applications, bringing the total number of applications for TSSSU funding in the last six years to 227. With the increase in funding, in 2018-19, 17 start-ups were recommended to the ITC by the HKUST vetting committee, which consists of seasoned investors and industry experts from different backgrounds. This brings the total number of HKUST affiliated TSSSU start-ups to 53. Over 60% of the TSSSU start-ups are using HKUST technology. About half of these start-ups have entered incubation programs organised by HKSTP and Cyberport.

HKUST START-UP AND SPIN-OFF COMPANIES

Established in 1999, the HKUST Entrepreneurship Program (EP) has supported HKUST communities in establishing technology-based start-ups. The EP has assisted in the formation of 64 technology start-ups on the Clear Water Bay campus, of which five are in incubation while 36 have graduated from the EP. The renovation of incubation space on the Clear Water Bay campus was completed in 2018-19, and four new HKUST start-ups were then admitted to EP.

To serve the entrepreneurship needs of the HKUST community beyond Hong Kong, HKUST also operates incubation programs in both Shenzhen and Nansha. Under these programs, a total of 90 start-ups are currently hosted by incubation programs in Shenzhen and Nansha (62 and 28 respectively). In particular, the Blue Bay Incubator located in Shenzhen has been growing rapidly. It was established in 2016 at HKUST Shenzhen Industry, Education and Research (IER) Building to support HKUST faculty, staff, students and alumni in their entrepreneurial endeavours to start-up companies in Shenzhen. In June 2017, Blue Bay Incubator Phase II was officially launched at the E-hub of Qianhai Free Trade Zone. While Qianhai opens its door to all start-ups who wants to start their business in Shenzhen, Blue Bay provides multi-dimensional services and support to nurture and facilitate start-up companies to grow and flourish in Shenzhen.

CONNECTING START-UPS TO THE MARKET

HKUST provides opportunities for affiliated start-ups to participate in marketing events, enabling these companies to showcase their products to potential customers. Below are some highlights of selected marketing events.

HKUST Start-up x Investors 2018 (SxI): TTC and EC jointly hosted SxI 2018, the TTC's flagship event, on 4 December 2018 to connect HKUST technopreneurs and start-ups with the investment community and professional networks. 37 HKUST technology start-ups from five technology areas participated in this event, showcasing their innovative technologies, breakthrough business ideas, remarkable products and unique services. To present their business models, services and products, start-up teams gave two-minute presentations at a pitching session and exchanged ideas with other start-up teams and investors at a mingling session to gain inspiration for further developing their

HKUST Start-up x Investors 2018

business. The event attracted 179 participants, including investors from over 100 organisations in various business sectors – nearly double the number of participants at the HKUST Technopreneur Outreach Day in 2017.

HKUST booth at the Hong Kong International Medical and Healthcare Fair 2019

The 10th Hong Kong International Medical and Healthcare Fair: The 10th Hong Kong International Medical and Healthcare Fair 2019 was held on 14-16 May 2019. Over 280 exhibitors from eight countries and regions gathered at the exhibition to showcase biotechnology applications and smart portable devices. A notable exhibitor was Infitech Limited, a HKUST start-up which showcased its latest technology and medicine related products.

Start-up Launchpad October 2018: Six HKUST technology start-ups showcased their cutting-edge technologies and products at this exhibition. During the show, the HKUST start-up teams not only introduced their technologies to potential buyers and collaborators, but also learned about market trends. The show provided a valuable chance for the start-up teams to gain feedback on and suggestions for improving their business by enhancing their products and services.
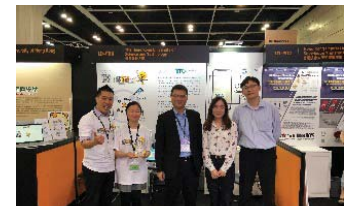

HKUST pavilion at Start-up Launchpad

HKUST Booth at ICT Expo

International ICT Expo 2019: Six HKUST start-ups showcased their services and products in the fair's Home-grown Innovations Zone. This zone featured the talent and expertise of Hong Kong based companies, aiming to showcase the new ideas and strategies developed by the educational institutions and professional associations that drive the city's success.

Entrepreneur Day 2019: 10 start-ups from HKUST participated in the exhibition, showcasing their technologies and products in the Imaginarium Zone. With the theme of "The Start-up Living Lab", the exhibition aimed to address current social problems and showcase corporate social responsibility initiatives. Three HKUST start-ups, iSTEM, Roborn Dynamics and Without Limited were featured in the exhibition's press conference.

HKUST booth at HKTDC Entrepreneur Day 2019

ACHIEVEMENTS AND RECOGNITION OF HKUST STUDENTS AND START-UPS

SOCIF won the Silver Award of HKICT Award 2019 (Student Innovation Award)

This year, HKUST start-up teams made great achievements. Many start-ups won awards in different entrepreneurship competitions.

Student Innovation Grand Award at the Hong Kong ICT Awards (HKICTA) 2019
SOCIF, a start-up established by students from SBM and School of Engineering, developed an "Estimated Time of Arrival System" for the Hong Kong green minibus industry. The company provides solution for the estimated time of arrival (ETA) of the upcoming minibus to be calculated and the computed result displayed on the passengers' mobile applications. The project was awarded the Silver Award in the HKICT Awards 2019 (Student Innovation Award).

First prize in the Innovator Tribank Fintech Challenge 2019

Organised by the Shanghai Commercial Bank, Shanghai Commercial & Savings Bank and Bank of Shanghai, and supported by Cyberport, the Hong Kong Monetary Authority (HKMA) and IBM, the Innovator Tribank Fintech Challenge 2019 is a "Haccelerator" event looking for breakthrough solutions to enhance customers' banking experience and solve real-life business problems. "We_Love_FinTech", a team formed by students from HKUST and the Chinese University of Hong Kong, won the top award and a cash prize of HK$200,000 in the final competition. The team's solution, called BankMiner, applies frontier AI technology to the relationship management of retail banking customers.

HKUST students won first prize in the Innovator Tribank Fintech

HKUST start-up named Champion at the Hong Kong Value Creation for Technology Pitching Competition 2019

Champion at the Hong Kong Value Creation for Technology Pitching Competition 2019

At the International ICT Expo 2019, iSTEM won the Champion award in the Hong Kong Value Creation for Technology Pitching Competition 2019. Organised by the Hong Kong Trade Development Council (HKTDC) and Angel Investment Fund, the pitching competition has been held for the last three years. Of more than 100 start-up exhibitors, only nine start-ups were admitted to the final round to compete for the championship. Reviewed by a team of veterans from the Angel Investment Fund, iSTEM stood out among the candidates by using AI and Virtual Reality (VR) technologies to promote science, technology, engineering, arts and mathematics (STEAM) education.

Winner at the Pitch@Palace China 3.0

Selected from over 30,000 start-ups and innovation projects, 37 entrepreneurs took part in the Pitch@Palace China 3.0 to pitch in front of an influential audience of CEOs, influencers, angels, mentors and potential business partners. Incus Company Limited, a healthcare company that provides smart hearing aids based on advanced technologies at affordable prices, won the first place in China. The team would soon compete with other winners all over the world for the final at the prestigious Pitch@Palace in London. Founded in 2014 by the Duke of York, the event aims to provide a platform to amplify and accelerate the work of entrepreneurs by giving them the opportunity to meet people who can help make their business dreams come true.

STRENGTHENING INDUSTRIAL ENGAGEMENT AND COLLABORATION

JOINT LABORATORIES WITH INDUSTRIAL PARTNERS

Through setting up joint laboratories, HKUST collaborates with leading industry to provide a platform for synergistic collaboration and knowledge advancement. In 2018-19, HKUST established HKUST-Xunlei Joint Laboratory on Blockchain Technology, with the goal to establish a high-performance blockchain ecosystem in the GBA. HKUST-Xiao-I Joint Laboratory on Machine Learning and Cognitive Reasoning was also set up to conduct fundamental research on AI with an emphasis on integrating machine learning and cognitive reasoning to build the next-generation AI system with high credibility and cognitive capabilities. In addition, the HKUST-WeBank Joint Laboratory on Banking Technologies for exploring cutting-edge banking technologies and nurturing talents was also established.

These joint laboratories act as a focal point and multidisciplinary platform for integrating and facilitating University-wide programs in strategic research areas, development, education and KT. Meanwhile, cooperating with the industry and various sectors broadens the University's scientific exposure, enhancing its educational offering through pioneering research and providing hands-on experience in the industry.

THE HKUST-BRIGHT DREAM ROBOTICS JOINT RESEARCH INSTITUTE (HKUST-BDR JOINT RESEARCH INSTITUTE)

The HKUST-BDR Joint Research Institute has been established as a unique platform to strengthen the collaboration between University and Industry in talent development and research innovation, with focus on the mutually interested strategic areas including construction & restaurant robotics, artificial intelligence and big data, smart cities and smart living, thus supporting the transition of Hong Kong and the GBA into a knowledge-based economy through the development in innovation and technology. The Guangdong Bright Dream Robotics Co. Ltd, a wholly owned subsidiary of Country Garden, will provide strong support for applied research and deployment of research results from the Joint Research Institute.

STRATEGIC PARTNERSHIP WITH HUAWEI TECHNOLOGY INVESTMENT ON RESEARCH AND TALENT GROOMING

HKUST and Huawei Technologies (Huawei) have formed a strategic partnership to promote high impact research and strengthen the University's academic caliber. Under this partnership, Huawei will support HKUST for recruiting top-notch visiting researchers from various disciplines and establishing seed funding for high impact research. The visiting researchers – whom will be recruited globally, are set to reinforce the University's research competence through academic and research collaborations with HKUST faculty; they will also help nurture research postgraduates of the University. The seed funding will be used for discovery-driven research in potential high impact areas such as information and communications technology.

COLLABORATION WITH SUN HUNG KAI PROPERTIES TO KICK OFF THE A. KWOK SPORTS AERODYNAMICS SCIENCE INITIATIVE

HKUST signed an agreement with Sun Hung Kai Properties (SHKP) to kick off the "A. Kwok Sports Aerodynamics Science Initiative". Under this initiative, SHKP will make a donation to the Sports Aerodynamics Science Initiative Project to help enhance elite cyclists' performance at the Tokyo 2020 Olympics through the application of sports science. Benefiting from HKUST's advanced technologies, the Project will combine technology with traditional training to help the athletes reach their fullest potential. The collaboration will no doubt strengthen the scientific support for local elite training, helping elite athletes make outstanding achievements in the international arena.

Dr Trisha Leahy, Hong Kong Sports Institute Limited, Chief Executive, Mr Adam Kwok Kai-fai, Executive Director of Sun Hung Kai Properties, and Prof Zhang Xin, Chair Professor of the Department of Mechanical and Aerospace Engineering (MAE), signed the agreement

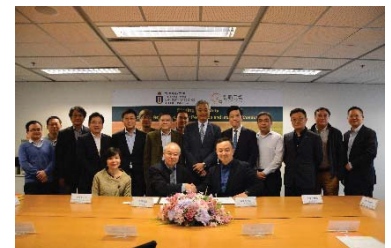## COLLABORATION WITH HAVEN OF HOPE CHRISTIAN SERVICE TO DEVELOP GERONTECHNOLOGY

HKUST signed an MOU with the HOHCS to develop gerontechnology

To enhance understanding of and to develop strategies for improving the quality of life for the elderly and their caregivers, HKUST collaborates with the Haven of Hope Christian Service (HOHCS) with the common goal of improving elderly people's living quality. HKUST combines its research competence with the HOHCS's expertise and experience in healthcare and elderly services to address the challenges brought by Hong Kong's ageing population and promote the city's innovation and technological development through the application of gerontechnology. The collaboration also serves to address some major challenges in the local gerontechnology sector, such as a lack of cooperation between academics, the government and non-government organisations, as well as a lack of test-beds for gerontechnology products. Under this partnership, HKUST aims to develop tailor-made solutions or products to meet the needs of HOHCS service users, and the HOHCS offers a testing platform to facilitate further cooperation between stakeholders.

COLLABORATION WITH SINOVATION VENTURES

The HKUST School of Science and Sinovation Ventures announced the establishment of a new Computer Perception and Intelligent Control Laboratory. Prof Tong Zhang from Department of Mathematics leads the research efforts of the new laboratory, which cover machine learning theories and algorithms as well as AI technologies that can be leveraged by autonomous systems. The laboratory aims to identify real-life issues worth investigating and explore opportunities to translate research outputs to applications in the industry.

Signing Ceremony with Sinovation Ventures

ENHANCING COMMUNITY ENGAGEMENT

HKUST organises events for industry practitioners, the private sector and the public as part of its KT endeavours. In the reporting year, it organised 704 public lectures, workshops and seminars, along with 142 performances and exhibitions of creative works. Highlights of HKUST's community engagement activities in 2018-19 are provided below.

HKUST Underwater Robot Competition

HKUST hosted its annual Underwater Robot Competition as part of its effort to engage and promote robotics education in the wider community. The competition offered a unique iSTEAM experience for students from Primary 4 to Secondary 3 and their teachers. The participants included students with special educational needs, students with disabilities, underprivileged students and students from ethnic minorities. Before the competition itself, the HKUST Center for Global and Community Engagement held a half-day workshop, during which nearly 40 student mentors from different disciplines taught the participants the basics of robot making. This was also HKUST's first mentoring collaboration with the Education University of Hong Kong and the Hong Kong Polytechnic University.

'HKUST student assisted the school team with his robotics knowledge

Academy for Bright Future Young Engineers (ABFYE)

Student participants with cars they built themselves

ABFYE is funded by donations from the Bright Future Charitable Foundation. The support enables the Academy to provide student-centered experiential learning programs, including competitions, courses, seminars, talks, visits and summer camps, in addition to strengthening its efforts to engage high school learners in authentic engineering experiences. A four-day electric vehicle (EV) Summer Program co-organised by the ABFYE and CLP Holdings Limited was held. The 41 participants, who came from five local secondary schools, formed four teams, each of which built a drivable car. The four cars were judged on their aesthetics, engineering and overall performance.

Coastal Habitats Protection Campaign for South Lantau

HKUST's Sustainable Lantau Office, under CIVL and Department of Ocean Science, co-organised a project named ''Coastal Habitats Protection Campaign for South Lantau''. This project, delivered in July and August 2018, was designed to promote sustainable development and conservation initiatives in Lantau through a series of community education activities such as roving exhibitions on coastal habitats in Lantau Island, guided tours to Lantau mudflats (Shui Hau/Pui O) and workshops.

Coastal Habitats Protection Campaign for South Lantau

Promoting STEM Education

The STEM@HKUST team introduced the platform and shared the latest trends in STEM education development

HKUST recently launched an interactive platform, STEM@HKUST, to spark the curiosity and interest of junior high school students in STEM and help local teachers to teach STEM subjects. STEM@HKUST not only offers materials that encourage young learners to tackle everyday problems with a scientific mind, but also seeks to help local teachers instil in their students the true spirit of STEM education – a critical mindset and problem-solving skills. The online platform is designed to be a "one-stop shop" for information on STEM related events and competitions. It also showcases original videos produced by HKUST's faculty, staff and students that explain everyday conundrums in a lively manner.

HKUST Public Humanities Lectures

Since April 2012, HKUST's Division of Humanities has partnered with the Hong Kong Museum of History to hold a series of public lectures on topics in the humanities, namely the HKUST Public Humanities Lectures ("科大人文新語"講座系列). Delivered by HKUST faculty, the lectures are designed to strengthen community engagement and share with the public advanced multidisciplinary knowledge in the humanities. 16 lectures in this series were held in 2018-19, covering topics from art and history to linguistics and ideology.

HKUST Public Humanities Lectures

2019 BizInsight@HKUST Presentation Series

During the reporting period, four seminars on different topics, namely "AI and Deep Learning", "Design Evaluation and Consumer Behaviour", "Politics and Economies" and "Consumers and Online Information", were organised as part of the School's BizInsight@HKUST Presentation Series. At each seminar, two speakers gave presentations, followed by a panel discussion to encourage interactive dialogue with the audience. The seminars had 149 participants, including eight external and faculty speakers. Advertorials summarising the talks were published in the South China Morning Post (with a circulation of 105,347) and the Hong Kong Economic Journal (with a circulation of 83,000) to reach a wider community.

BizInsight@HKUST Presentation Series

IMPACT CASES

Joining Hands with Pangu BioPharma for Potential Lung Disease Therapy

Researchers from HKUST were honoured for their seminal contribution to the discovery and development of a promising clinical candidate for patients suffering from pulmonary sarcoidosis, a rare form of fibrotic lung disease with no known cure. At a joint press conference in January 2019, representatives of the leading biotherapeutics company aTyr Pharma, Inc. (aTyr) recognised the collaboration between its Hong Kong subsidiary, Pangu BioPharma (Pangu), and HKUST researchers on basic and translational research leading to the discovery of ATYR1923, which is currently being evaluated in a Phase 1b/2a study.

With support from Pangu, the researchers were instrumental in discovering a splice variant of histidyl-tRNA synthetase that liberates the smaller, active immuno-modulatory (iMod) domain from full-length tRNA synthetase and has been shown to modulate the immune system. ATYR1923 is a fusion protein comprised of the iMod domain fused to the fragment crystallisable region of a human antibody, and has considerable potential as a therapy for patients with interstitial lung diseases. aTyr plans to replicate this model with many novel forms of tRNA synthetases, as each of the resulting protein compositions will offer opportunities for the development of therapeutics to treat a wide array of conditions.

This is far from HKUST's only achievement in the field. To date, the University's researchers have discovered over 200 novel protein compositions, subsequently covered in patents, and published six articles detailing their research in peer-reviewed scientific journals. The important discoveries that continue to emerge from HKUST's collaboration with Pangu reflect the invaluable contribution made by the University's translational science and early discovery capabilities to the development of life-changing therapies for patients worldwide.

HKUST and WeBank Establish First Hong Kong-Guangdong Joint Banking Laboratory

Signing ceremony for HKUST-WeBank Joint Laboratory

HKUST joined hands with WeBank Co. Ltd (WeBank) to establish the HKUST-WeBank Joint Laboratory in May 2019, an exciting new platform for exploring cutting-edge banking technologies and nurturing talents. Leveraging both parties' expertise in research and KT in the GBA, researchers at the laboratory will collaborate in areas ranging from AI, big data and blockchain to financial and regulatory technologies. At a higher level, this collaboration will also provide a platform for enterprises, universities and research institutes to promote KT under the GBA Development Framework.

This historic agreement, signed by Prof Nancy Ip (VPRD) and Mr Henry Ma, Executive Vice-President and Chief Information Officer of WeBank, marked not only WeBank's very first research collaboration with a Hong Kong university, but also the first joint banking laboratory project linking Guangdong with Hong Kong. Combining HKUST's research capability and WeBank's experience of applying innovative banking technologies in Mainland China, the project is ultimately expected to transform cutting-edge banking technologies into products with socio-economic impact in the GBA and beyond.

Possible research topics include ways to protect data privacy within a culture of resource sharing, and ways to establish blockchain consortia or apply new technologies such as distributed commerce. The laboratory will seek to boost banks'

risk management capability by monitoring bank transactions and assisting officers in risk analysis and system maintenance work through machine learning and data mining. It will also strive to strengthen the banking industry through the development of fintech and other cutting-edge technologies.

Testifying to the considerable potential of this new venture, as many as nine research proposals have been submitted to the laboratory since its establishment, covering the fields of blockchain, risk management and AI.

"SUSTAINABLE SMART CAMPUS AS A LIVING LAB": INSPIRING A CULTURE OF SUSTAINABILITY INNOVATION

Universities are microcosms of society, which recognise the urgent need to develop smart, sustainable policies and technologies for a greener and more liveable future. HKUST is no exception. In early 2019, it launched the HKUST Sustainable Smart Campus as a Living Lab (SSC) – an initiative that transforms the campus into a testing ground for learning about, experimenting with and advancing smart, innovative approaches to overcoming real-life challenges.

Sustainable Smart Campus Launch

Projects need not include cutting edge technologies, nor do they need to succeed on the first try. By turning its campus into a "living laboratory", HKUST hopes to foster a culture of learning from failure and self-initiated change. This impact will not be limited to the campus. Uniting HKUST's high-quality research and innovative learning approaches, SSC projects are expected to become a source of inspiration for Hong Kong at large, helping it evolve into a world-class sustainable and smart city.

The University has pledged HK$50 million over the next three years to the task of identifying sustainable, smart and cross-disciplinary home-grown projects and implementing them on campus to showcase green, resilient, empowering, adaptable and transformative (GREAT) attributes. These projects are collaboratively developed by HKUST faculty, staff, students and alumni, and will be of educational benefit to all.

In the inaugural funding round, nine GREAT projects demonstrating a wide range of application scenarios were selected. One enhanced library user experience through facial recognition technology, using real-time big data on people flows to facilitate effective planning. Another used an e-fuel energy storage system to connect 100% renewable energy with a smart mini-grid. Researchers also developed state-of-the-art wastewater treatment technology to upgrade pond water, promoted positive and healthy behaviours through visual art installations and minimised resource consumption through aquaponic farming technology.

The winning project teams set up exhibition booths in the Chia-Wei Woo Academic Concourse to share their ideas and gain feedback from the community. Project implementation is spearheaded through HKUST's GREAT Smart Cities Center, in collaboration with the HKUST Sustainability Unit. The SSC has already attracted numerous industry partners and government agencies seeking opportunities for collaboration with the University. This innovative platform is expected to help transform otherwise abstract smart city concepts into sustainable and smart realities.

EMPOWERING THE PUBLIC WITH PERSONALISED AIR QUALITY INFORMATION - PRAISE-HK

IENV officially launched its "Personalised Real-time Air-quality Informatics System for Exposure – Hong Kong" (PRAISE-HK) App.

In June 2019, HKUST's Institute for the Environment (IENV) launched the "Personalised Real-time Air-quality Informatics System for Exposure – Hong Kong" (PRAISE-HK), a new smartphone app designed to reduce users' exposure to air pollution and ultimately help develop Hong Kong into a world-class smart and healthy city.

Hong Kong's official air quality monitoring network measures the average air quality across districts. It does not show variation in air quality at street level. Yet, in dense urban cities like Hong Kong, air quality may vary substantially from one street to the next due to differences in traffic and ventilation conditions. Rising to this challenge, PRAISE-HK provides state-of-the-art real-time and predicted air quality information down to street level, both indoors and outdoors.

The excellent performance and accuracy of the app derive from its combination of state-of-the-art sensor technologies, big data, air quality modelling systems and exposure science, developed by the IENV with funding from The Hong Kong and Shanghai Banking Corporation Limited's 150th Anniversary Charity Program.

Complementing these efforts is a series of social engagement activities including user interface workshops, exhibitions, trade shows and school talks. The PRAISE-HK Student Ambassadors Program engages student ambassadors in various outreach activities that not only enhance their understanding of advanced environmental technologies but also sharpen their transferrable skills, which will be essential in their future workplaces.

By providing local people with personalised air quality information at their fingertips, PRAISE-HK is expected to raise public awareness of the risk associated with air pollution exposure, encouraging people to proactively plan their time and activities to reduce their exposure in high pollution areas. This integration of smart city technologies into our lives will create smarter and healthier places in which to live and work, leading to a world-class smart and healthy city.

PEAR LIMITED

Nowadays, the Internet is accessible to almost everyone. However, the huge demand for Internet services also limits the speed of Internet connections for static, dynamic and streaming media. For corporations, a slow or unstable network connection impairs job efficiency and thus overall work performance. Pear Limited (Pear), a HKUST start-up established by Mr Alan Zhuang, an alumnus of the Technology, Leadership and Entrepreneurship Program, tackles this problem using fog computing technology, enabling billions of smart devices to easily share computing, storage and bandwidth resources.

Pear Limited

Conforming to the "X-as-a-Service" philosophy, Pear integrates the principles of crowdsourcing, agglomeration and the sharing economy to scale up a network with a pool of resources, thus providing a reliable and stable service by leveraging a subset of fog nodes.

With support from TSSSU and YWYEF in 2016, together with a one-year incubation program at the PKU-HKUST Shenzhen-Hong Kong Institution, Pear was able to further develop its fog technology and business model. By cooperating with top hardware vendors and establishing effective user incentive mechanisms, the start-up created a very large-scale resource pool that is leveraged to provide clients with high-availability, low-cost fog computing services through Pear, its cloud partners, SaaS partners and individuals with Pear-powered devices.

By actively participating in entrepreneurial exhibitions events with the support from HKUST, such as SxI, the International ICT Expo and CES Asia, Pear was able to meet potential collaborators to develop business applications for fog technology. Pear was approached by VCs during SxI and entered into financing agreements with them. Pear was ranked in the top three in the Venture 50 NewSeed List 2018.

Pear has also gained recognition by winning awards in renowned innovation and entrepreneurship competitions. Pear received the Most Innovative Start-up Award from JumpStarter, an initiative co-organised by the Alibaba Entrepreneurs Fund, Cyberport and the HKSTP in 2017. Pear also won first prize in the Tencent Cloud Session of the HKUST One Million Dollar International Entrepreneurship Competition in 2018. Most recently, Pear won the Best Team Prize in the Global Final of the Create@Alibaba Cloud Start-up Contest, a global program focused on accelerating business success for start-ups. In 2018, Alan was recognized by Forbes China's List of "30 Under 30" in the Enterprise Science and Technology category.

Pear has gradually accumulated capital and built an excellent reputation, and has now completed the distribution of fog nodes throughout China. The start-up is not only the biggest fog computing resource and service provider for the biggest Internet companies in China, as well as the sole fog supplier for their cloud platforms, but also a strategic cooperation partner of two of the world's largest hardware companies.

Advancing in learning and knowledge, as well as assisting in the economic and social development of Hong Kong are the everlasting endeavor of the University. To achieve these goals, KT is one of the three-pronged approach of HKUST as stated in the Strategic Plan to integrate holistically our mission and priorities while promoting cross-disciplinary pursuits. The Knowledge Transfer Advisory Group (KTAG) and the Knowledge Transfer Committee (KTC) were formally established in the Triennium to advise, facilitate and govern the University's KT endeavors.

At the beginning of the Triennium 2016-19, to echo with the Government of the Hong Kong Special Administrative Region (HKSAR Government)'s embarking upon "the development of Hong Kong's innovation and technology industry" and striving for "a robust system for scientific research, development and production" with the additional funding support and the establishment of the Innovation & Technology Bureau, HKUST set up the following two major goals.

1) Expand and enhance the culture of HKUST to embrace and support innovation and entrepreneurship for public benefit;
2) Develop an innovation and entrepreneurship ecosystem to catalyze technology commercialisation and start-up formation.

To achieve these goals, HKUST has unleashed its strengths in scientific research, industrial collaboration, incubation, entrepreneurship, and technology transfer through various initiatives in this Triennium. To foster culture of research excellence, HKUST has been actively seeking government research grants from both Hong Kong and Mainland China and achieved remarkable results in terms of both numbers of projects and funding amount.

To streamline invention harvest and IP Management, with the continuous effort to encourage researchers, in particular with junior faculty members, there is an increase of over 10% on the number of inventions over this Triennium.

To maximize its influence in different industries, HKUST has partnered with the private sector in a wide spectrum of technology areas. The income generated from intellectual property rights, collaborative research, contract research, consultancies and equipment and facilities service agreements exceeds HK$368.5 million in 2018-19, which was approximately a 17% increase compared with 2016-17.

In this Triennium, HKUST has been making tremendous efforts to strengthen the KT Value Chain by enhancing the existing PCF to encourage researchers to develop prototypes for background technologies, aiming to facilitate industrial collaborations and licensing outcomes. With the newly established U*STAR, an Innovation Acceleration Fund, students can go beyond prototypes or laboratory-scale demonstrations resulting from their PCF funding and develop business plan. TSSSU funding from ITC, and other Dream Builder Funds such as YWYEF and EAF, are playing a significant complementary role at different stages of the whole entrepreneurial technology transfer chain. The chain ranges from innovation creation to business start-ups formation, of which involving outputs emerging from HKUST projects supported by the important gap funding opportunities at the most critical period of the initial phase of projects or start-ups.

To foster an inspiring, engaging and vibrant entrepreneurial environment, a wide range of entrepreneurship activities are offered to promote entrepreneurship. The One Million Dollar Entrepreneurship Competition has gradually built up its reputation and became the flagship event of the HKUST entrepreneurship competition. Originally a local event to nurture entrepreneurs at HKUST, the competition has now expanded to a cross-border event with seven regional competitions to cultivate entrepreneurial spirit. Other marketing events, such as SxI, were organised for the HKUST start-ups to meet potential investors and mingle with other entrepreneurs.

Over the past three years, HKUST continues exploring collaboration opportunities leading to a number of contract research agreements signed with major corporations. A number of joint laboratories have been established in this Triennium to enhance research development in different technology areas. These collaborations with industrial partners provide win-win situations for both parties in which HKUST would be able to work with industry directly to gain practical experience in applied research while the industry can leverage HKUST's research excellence to address their challenges.

In response to the Chief Executive's Policy Address on Innovation and Technology, HKUST also provides platforms for enterprises, universities and research institutes to promote KT under the GBA Development Framework. A number of strategic platforms were established to extend HKUST's influence to the nearby cities, and actively participating in the development of the GBA. The establishment of research institutes and centers in the Mainland, as well as the planning

of HKUST (GZ) Campus are excellent examples to show the close co-operation with Mainland counterparts and the dedication to make influential societal impact beyond Hong Kong.

Looking forward, HKUST vows not only to strengthen and enhance its existing KT strategies, but also to identify and pursue new goals for the next Triennium. With the implementation of E-Fund and the revamped EP, HKUST is confident in its ability to provide comprehensive support for young and energetic entrepreneurs. As an ongoing mission, HKUST will continue to proactively seek collaboration opportunities with industry partners, while remaining mindful of its responsibility for enhancing community engagement through KT to the society.

HKUST is encouraged by the HKSAR Government's commitment in providing important I&E resources and infrastructural support to the higher education institutions in Hong Kong. The University is looking forward to the opportunities that the GBA initiative and the Lok Ma Chau Loop development will bring to the region. HKUST will seize every opportunity to position itself as a leader in KT for the social and economic benefit of the region, and to support Hong Kong's development into an international innovation and technology hub.

Appendix A – Key Performance Indicators

Performance Indicator	2018/19 (Projection)		2018/19 (Achieved)	
Inventions, Patents, Licenses, IP, Contracts, and Services				
Number of invention disclosures received [Note 1]	100		147	
Number of patents filed in the year [Note 1 & Note 2]	150		275 [Note 3]	
Number of patents granted in the year [Note 1 & Note 2]	100		112 [Note 4]	
Number of total active licenses granted [Note 5]	75		108 [Note 6]	
Income (on cash basis) generated from intellectual property rights [Note 7]	$9M		$7.2M	
Number of new licenses granted in the year [Note 5]	18		14	
Number of collaborative researches, and income thereby generated [Note 5]	80	$160M	134	$266.1M
Number of contract researches (other than those included in "collaborative researches" above), and income thereby generated [Note 5]	150	$75M	260	$89M [Note 8]
Number of consultancies, and income thereby generated [Note 5]	25	$7M	12	$1.7M [Note 9]
Number of equipment and facilities service agreements, and income thereby generated [Note 5]	480	$3M	628	$4.5M
Sub-total Income	$254M		$368.5M	
Gap Funding				
Number of Proof-of-Concept Fund projects reviewed / funded [Note 10]	20	8	13	9
Number of HKUST U*STAR Program projects reviewed / funded (*previously known as Innovation Acceleration Fund*) [Note 11]	20	8	12	7
Entrepreneurial Education and Culture				
The BASE utilization: Number of Visitor / Dwell Time	8,000/month	0.6 hour	8,204/month	0.6 hour

[Note 1] Starting from 2013/14, the number reported also includes invention disclosures, and patents filed and granted by Mainland platforms.

[Note 2] The numbers are counted based on the definition laid down by UGC under the Common Data Collection Format (CDCF) according to the (1) number of country of filings and (2) the number of patent types which is defined in accordance with the international patent classification (i.e. technology area) of the patents.

[Note 3] CDCF Table 65: The number of patents filed is 275 and the number of inventions involved is 200 in the 2018/19 period.

[Note 4] CDCF Table 66: The number of patents granted is 112 and the number of inventions involved is 72 in the 2018/19 period.

[Note 5] Starting from 2017/18, the number reported also includes number of total active licenses granted, new licenses granted, collaborative researches, contract researches (other than those included in "collaborative researches"), consultancies, equipment and facilities service agreements, and income thereby generated by Mainland platforms.

[Note 6] The number reported also includes 78 patents and software license agreements, and 27 assignments on technology transfer managed by HKUST R and D Corporation Limited (RDC).

[Note 7] It includes both licensing incomes from patent via RDC, Mainland platforms as well as copyright of courseware via the University.

[Note 8] The total number of new contract and contract value for contract researches agreements signed in the 2018/19 period is 205 and $116.1M.

[Note 9] The total number of new contract and contract value for consultancy agreements signed in the 2018/19 period is 6 and $1.4M.

[Note 10] The Proof-of-Concept Fund (PCF) is established to perform technology validation in the pre-commercialisation stage.

[Note 11] The HKUST U*STAR Program (previously known as Innovation Acceleration Fund) is established to serve as another channel of gap funding support to complement the current PCF with a focus gears more on the business side. This is to support development of business idea by turning it into a practical business and implementation plan.

Performance Indicator	2018/19 (Projection)		2018/19 (Achieved)	
Number of teams for One Million Dollar Entrepreneurship Competition at the Clear Water Bay campus [Note 12]	100		117	
Number of teams for HackUST: Total Teams / HKUST Teams [Note 13]	100	65	129	103
Accelerator: Number of Teams / Companies [Note 14]	50		88	
Percentage increase of student participation from School of Science in major entrepreneurial events [Note 15]	15% increase		18% increase	
Number of advising hours for student entrepreneurs	500 hours		596 hours	
Quality of events through on-line feedback form	average >4.0 out of 5.0		average 4.17 out of 5.0	
Start-up and Spin-off Companies				
Number of economically active start-up and spin-off companies affiliated with HKUST	85		238 [Note 16]	
Number of start-ups newly set up affiliated with HKUST	22		74 [Note 17]	
Contributions to the Public				
Number of student contact hours in short courses or e-learning programs specially tailored to meet business or CPD needs	24,080 hours		1,726,342 hours [Note 18]	
Income received from Continuing Professional Development (CPD) courses	$20M		$618.5M [Note 18]	
Number of public lectures / symposiums / exhibitions and speeches to a community audience	528		704	
Number of performances and exhibitions of creative works by staff or students	60		142	
Number of staff engaged as members of external advisory bodies including professional, industry, government, statutory or non-statutory bodies	402		462 [Note 19]	

[Note 12] HKUST One Million Dollar Entrepreneurship Competition is one of Entrepreneurship Center (EC)'s annual flagship events. It is a platform for the students and alumni to realise their business ideas into a real business.

[Note 13] Hackathon@HKUST (hackUST and hardUST) is one of EC's annual flagship events. It has also become one of the largest hackathon organized in Asia. Participants from HKUST as well as other universities in Hong Kong and overseas hack out prototypes of hardware/software solutions over a weekend (non-stop) to solve real problems.

[Note 14] Accelerator includes Funding Programs and Co-working Space Programs under the management of EC for HKUST start-up teams or companies.

[Note 15] Because the ratio of the School of Science (SSCI) students joining EC's events and activities were relatively low, effort had been made to encourage more SSCI students to join entrepreneurship activities, e.g. Seminar, Start-up Weekend and Training Camp with science theme. From 2018/19 onwards, the figure includes percentage increase of SSCI student's participation in HKUST One Million Dollar Entrepreneurship Competition, HackUST, BEST Camp, and other seminars and workshops.

[Note 16] Starting from 2017/18, the number of economically active start-up and spin-off companies affiliated with HKUST reported includes the economically active start-up and spin-off companies being funded, incubated or coached by the entrepreneurship programs located in the Clear Water Bay Campus and Mainland platforms. The entrepreneurship programs include the HKUST Entrepreneurship Program (EP), Technology Start-up Support Scheme for University (TSSSU) Program, HKUST U*STAR Program, Yeung Wing Yee Entrepreneurs Fund (YWYEF), HKUST Entrepreneurship Acceleration Fund (EAF), Alumni Endowment Fund (AEF) Student Start-up Grants, HKUST One Million Dollar Entrepreneurship Competition, and programs under the Blue Bay Incubator and Innovation & Entrepreneurship Center (I&E Center) of HKUST R and D Corporation (Shenzhen) Limited (RDCSZ) in Shenzhen and other programs under Guangzhou HKUST Fok Ying Tung Research Institute (FYTRI) in Nansha. For companies funded, incubated or coached by more than one programs or having offices in more than one location only counted once.

[Note 17] Starting from 2017/18, the number of start-ups newly set up affiliated with HKUST reported includes start-up companies being funded, incubated or coached by the entrepreneurship programs located in the Clear Water Bay Campus and Mainland platforms. The entrepreneurship programs include the HKUST Entrepreneurship Program (EP), Technology Start-up Support Scheme for University (TSSSU) Program, HKUST U*STAR Program, Yeung Wing Yee Entrepreneurs Fund (YWYEF), HKUST Entrepreneurship Acceleration Fund, Alumni Endowment Fund (AEF) Student Start-up Grants, HKUST One Million Dollar Entrepreneurship Competition, and programs under the Blue Bay Incubator and Innovation & Entrepreneurship Center (I&E Center) of HKUST R and D Corporation (Shenzhen) Limited (RDCSZ) in Shenzhen and other programs under Guangzhou HKUST Fok Ying Tung Research Institute (FYTRI) in Nansha. For companies funded, incubated or coached by more than one programs or having offices in more than one location only counted once.

[Note 18] Starting from 2017/18, the number reported also includes taught postgraduate programs (including EMBA, MBA, MSc, MA, PgD) with reference to the definition of Continuing Professional Development (CPD) courses laid down by UGC under the Common Data Collection Format (CDCF). As the compiled income of the programs above for 2018/19 are not yet available by the submission date of the KT Annual Report, the data for KT Annual Report 2018/19 was reported based on the data collected in 2017/18.

[Note 19] The data collected for this KPI is on a calendar year basis from 1 January to 31 December in accordance with the University administrative norm. As the data above for 2019 is not yet available by the submission date of the KT Annual Report, the figure reported is based on the data collected in 2018 calendar year.