



Knowledge Transfer Annual Report 2013/14

Submitted to
University Grants Committee

31 July 2014

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



Table of Contents

FOREWORD.....	1
1. KNOWLEDGE GENERATION AND KNOWLEDGE TRANSFER ENDEAVOR	1
1.1 FOSTERING THE CULTURE OF RESEARCH EXCELLENCE	2
1.2 CULTIVATING KNOWLEDGE TRANSFER CULTURE AND TALENTS	3
1.3 ENHANCING KNOWLEDGE TRANSFER SUPPORTING INFRASTRUCTURE.....	4
1.4 UNDERTAKING KNOWLEDGE TRANSFER ENDEAVORS	5
2. EXPANDING HORIZONS FOR KNOWLEDGE TRANSFER	6
2.1 PRACTICING OPEN INNOVATION	7
2.2 STRATEGIC INDUSTRIAL PARTNERSHIP.....	8
2.3 EFFORTS TOWARDS COMMUNITY ENGAGEMENT	9
2.4 TECHNOLOGY DISSEMINATION AND MARKETING	10
3. FOSTERING ENTREPRENEURIAL CULTURE AND ECOSYSTEM	11
3.1 E-ACADEMY	12
3.2 HKUST ENTREPRENEURSHIP STARTUP WORKSHOP SERIES	12
3.3 ONE-MILLION DOLLAR BUSINESS PLAN COMPETITION.....	12
3.4 VENTURE ENTREPRENEURSHIP FESTIVAL.....	13
3.5 ENTREPRENEURSHIP PROGRAM	13
4. LOOKING FORWARD.....	13
APPENDIX A – KEY PERFORMANCE INDICATORS	I



Foreword

The commitments to create, disseminate, and apply knowledge for the benefit and betterment of society continues university-wide at HKUST. Guided by our strategic goals of knowledge transfer (KT) during this triennium, namely,

- to build a campus culture that is conducive to innovation on an efficient and proactive KT platform
- to bring innovations that meet the specific needs of society, government and industry
- to expand the influence of HKUST's innovations beyond Hong Kong

HKUST has witnessed increased variety and intensity of knowledge transfer initiatives & activities on our campus and beyond in the past year. There are increased awareness and efforts to conduct mission-oriented research that involves greater industry, government and society engagement. Enhanced connections to the industry can be seen at different stages along the KT process. Open innovation as an approach to identify technology challenges and develop innovative solutions at an early stage through closer interaction with industry has become an important part of KT practice at HKUST and beyond, for example, the HKUST-MIT Alliance Consortium. The growth of entrepreneurial activities, enthusiasm expressed by students and faculty as well as active interactions with the private sector are other highly noticeable changes on campus through activities by the newly established E-Academy and Venture Entrepreneur Network. This report seeks to provide a summary of the activities and achievements on knowledge transfer during 2013-14.

1. Knowledge Generation and Knowledge Transfer Endeavor

1.1 Fostering the Culture of Research Excellence



Chinese State Natural Science Awards
Prof Tianshou Zhao and his researchers have received this one of the most prestigious awards in science and technology in China for the second consecutive year.



HKUST Energy Institute
Ms Janet Wong, Commissioner for Innovation and Technology officiates the opening ceremony of HKUST Energy Institute.



Partner State Key Laboratory
The establishment of the Partner State Key Laboratory on Advanced Displays and Optoelectronic Technologies in HKUST.

1.2 Cultivating Knowledge Transfer Culture and Talents



HKUST-Oxford Leadership and Public Policy Program
It is launched in early 2014 with attendance of LAPP Advisory Board Members and guests of honor, including the Honorable C Y Leung, Chief Executive of the HKSAR (7th Left).



Ford-HKUST Conservation and Environmental Research Program
Mr. Dave Schoch, president, Ford Asia Pacific (3rd Front Right) welcomed the HKUST Students in Ford Asia Pacific Headquarters in May 2014.



UC RUSAL President's Forum
The talk, on the topic of "The Growth of China's Manufacturers – Talking about Legend", drew a full-house audience.



ECE Final Year Project Industry Day 2014

With 200 PG & UG students, faculty, and representatives from different companies joined this meaningful activity.



Center for Industrial Engagement and Internship

The 2nd Annual Industrial Forum - Hi-Tech SME in Hong Kong: Prospective and Career Opportunities was organized in Mar 2014.

1.3 Enhancing Knowledge Transfer Supporting Infrastructure



HKUST's Fok Ying Tung Research Institute (FYTRI) at Nansha campus

Its new mission is to implement and coordinate HKUST's technology transfer and commercialization endeavors in the Mainland.



HKUST Shenzhen Research Institute (SRI)

It's the base and bridge for HKUST to expand research collaborations with the Mainland enterprises.



HKUST Foshan LED Center

It has served as the bridgehead to promote innovative LED technologies in the region.

1.4 Undertaking Knowledge Transfer Endeavors



Seminars on Invention Disclosure and IP Protection

The seminars helped to equip over 200 faculty, researchers, students and staff with more IP management knowledge and skills.



1.1 Fostering the Culture of Research Excellence

HKUST remains committed to fostering both fundamental and applied research and innovation in Science, Engineering, Business and Management, and Humanities and Social Science. HKUST received a total of HK\$111.5M in funding for 69 collaborative research projects during the reporting year, representing a staggering 50% year-on-year increase in the number of successful collaborative research projects. Funding of HK\$23M was secured from the Research Grants Council for 3 HKUST-led Collaborative Research Fund projects.

Another 21 Innovation and Technology Fund (ITF) projects were awarded to HKUST as the lead institution, with 4 of those being University-Industry Collaboration Program (UICP) projects—reflecting the industry's continuing desire to work with HKUST to bring cutting-edge technology to the market. Implementation of two projects employing the R&D deliverables of completed ITF projects under the Public Sector Trial Scheme of ITF began during the reporting period. These projects underscore our faculties' keen interest and the University's effort to commercialize our R&D outputs. The past year saw HKUST submitting 69 applications to a range of programs under the ITF and 7 applications to the Innovation and Technology Commission in the inaugural

round of invitation for the establishment of Hong Kong branches of Chinese National Engineering Research Centres (CNERC). Worth particular mention is that the HKUST-MIT Research Alliance Consortium, which received sponsorship from industrial partners and 9:1 match funding by ITF, has launched its founder round on two research clusters – Smart Green Buildings and Information & Communication Technologies. With sponsorship from Intel Corp. and Texas Instruments, the Consortium has pre-screened and recommended three proposals out of 15 submissions for final evaluation by ITC.

During this reporting year, two Areas of Excellence (AOE) projects titled “Novel Wave Functional Materials for Manipulating Light and Sound” and “Mechanistic Basis of Synaptic Development, Signaling and Neuro-disorders” received a combined total funding of HK\$96.75M, with just over HK\$11.9M for the first year of the projects. As another example of HKUST’s success in large-scale funding programs, a project team led by Prof. Mingjie Zhang as the Chief Scientist to conduct research on structural biology of protein complexes regulating neuronal development and signal transduction (translated from “神经生长与信息传递重要蛋白质复合体的结构生物学研究”) was awarded a National Basic Research Program (the “973 Program”) project by the Ministry of Science and Technology of China (MOST).

Harnessing our research excellence, HKUST’s mainland platforms also excelled in winning joint research programs especially in the Pearl River Delta region. The Fok Ying Tung Research Institute (FYTRI) secured RMB25M for 28 projects from MOST, National Natural Science Foundation of China (NSFC), Chinese Academy of Sciences, Guangzhou Science and Information Technology Bureau, Nansha District Government, and Nansha Science and Technology Bureau. The Shenzhen Research Institute also won RMB8.75M for 12 projects from NSFC and the Shenzhen Science and Technology Innovation Committee.

Both nationally and internationally, HKUST scholars continue to receive recognition and awards for their excellent research outputs, of which some highlights are shared hereto: 2 scholars have received **Chinese State Natural Science Awards** and 2 received the **First Class in Scientific and Technological Progress Awards**; one HKUST mathematician won the **Morningside Gold Medal of Mathematics**; three HKUST physicists were awarded the first **Brillouin Medal** for groundbreaking research in phononics.

HKUST research reputation and impact is also bolstered by a number of new multi-disciplinary research establishments. **HKUST Energy Institute** was inaugurated - early this year to engage in emerging energy research that will have a long-term, transformative effect on Hong Kong and the nation’s energy future through a multi-disciplinary research and education platform. The establishment of the **Partner State Key Laboratory (PSKL) on Advanced Displays and Optoelectronic Technologies**, as a joint initiative with Sun Yat-Sen University, was approved by the Ministry of Science and Technology of China with an injection of HK\$13.75M from the ITF as funding support. The PSKL commenced its operation at HKUST at the start of the reporting year.

1.2 Cultivating Knowledge Transfer Culture and Talents

Stimulating and driving innovation is at the heart of the nation’s strategies for sustainable economic development. Hong Kong is no exception. With clear goal to expand the influence of HKUST’s innovations in Hong Kong and beyond, HKUST has taken several new initiatives to foster the culture of knowledge transfer and cultivation of talents that are needed for successful knowledge transfer.

HKUST- Oxford Leadership and Public Policy Program

Early 2014, HKUST and Oxford has jointly launched Leadership and Public Policy Program that focuses on the global dimensions of public policy relating to the global economy, governance, urban planning, sustainable development, science and technology policy-making, and establishing a partnership between academics, government and the community. It aims to stimulate discussions on the development of Hong Kong, Mainland China, and Asia, and nurture a new generation of leaders. The Launching Forum has centered its theme on “Visions of the City”, with participants discussing the challenges and aspirations for urban development from different perspectives.

Ford-HKUST Conservation and Environmental Research Program

In June 2013, HKUST and Ford jointly established the Ford-HKUST Conservation & Environmental Research Grants which have been offered to postgraduate students from the School of Engineering for research in the fields of environmental and conservation science & engineering. 23 projects have been supported during the inaugural year of the program which was concluded with the student grants recipients presenting their projects at Ford's Asia Pacific headquarters in Shanghai in May 2014.

HKUST – Infiniti Program

HKUST also partners with Infiniti to nurture young engineering innovators and boost collaborations. HKUST – Infiniti Program offers top engineering students the opportunity to gain experience with Infiniti Red Bull Racing, a triple Formula One World Championship-winning team, and at Infiniti's European Technical Center in the UK with mentoring provided by key team personnel and Infiniti engineers.

UC RUSAL President's Forum

The UC RUSAL President's Forum hosted by President Tony Chan is a unique KT platform at HKUST to engage prestigious scholars and scientists as well as successful business leaders and entrepreneurs to share with their views on topics such as the latest trends in science and technology, knowledge transfer, entrepreneurship, innovation and creativity. In the Forums held respectively in Nov 2013 and March 2014, Dr Allan Zeman, Chairman of Lan Kwai Fong Group and Ocean Park Corporation, and Mr Chuanzhi Liu, Lenovo Founder, shared their insights with HKUST students, faculty and members of the public. Dr. Zeman touched on entrepreneurship and how to turn "I Wish" into "I Will", while Mr. Liu talked about the growth of China's manufacturers and the story and spirit of Legend.

ECE Final Year Project Industry Day 2014

All Engineering UG and PG students were invited to join the ECE FYP Industry Day on 09 May 2014 to show their projects. There were 15 teams in the Demo Session, 29 teams in the Special Poster Session, 36 teams in the Poster Session. Nearly 200 students, faculty, and representatives from different companies joined this meaningful activity. Judging panels consisted of representatives from ASTRI, The Hong Kong Electronics Industry Council, Hong Kong Electronics & Technologies Association and 11 local and international companies.

Center for Industrial Engagement and Internship

Established in 2012 under SENG, the Center serves to cultivate SENG students' early exposure to professional work experience via internship and industrial training programs. The Center aims to empower our students to strive for the "absolute excellence" in the real world beyond the university. Over the period under review, the Center has organized the annual *Industrial Forum - Hi-Tech SME in Hong Kong: Prospective and Career Opportunities* on 17 March with Mr. Anthony Tan, former CEO of Hong Kong Science & Technology Parks Corporation (HKSTP), as keynote speaker. The Center has also organized numerous seminars and workshops as well as company visits to local enterprises such as Esquel Group, Hong Kong Aero Engine Services Limited (HAESL), MTR Corporation Limited and etc.

1.3 Enhancing Knowledge Transfer Supporting Infrastructure

HKUST has a well-established system, policies and processes to support KT activities at different stage of development through the Office of Contract and Grant Administration (OCGA), the Technology Transfer Center (TTC), the Entrepreneurship Center (EC), and the HKUST R and D Corporation Ltd. (RDC). To further enhance the culture and practice of KT and improve coordination within the whole University, the new position of Associate Provost for Knowledge Transfer (APKT) was created and approved by the Council in 2013. Prof. Patrick Yue, Professor of Electronic and Computer Engineering, has assumed duty as APKT since April 2014.

In connection to research and technology transfer endeavors in the Mainland, the Mainland R&D Committee has been set up to ensure the research efforts in the Mainland are well integrated and coordinated at the University level. OCGA has assigned staff to coordinate major Mainland grant applications and administration.

HKUST's Fok Ying Tung Research Institute (FYTRI) at Nansha campus has been restructured with a new mission to implement and coordinate HKUST's technology transfer and commercialization endeavors in the Mainland. A new Technology Transfer and Incubation Office has been established under FYTRI to provide better support to all level of KT activities at different sites of HKUST Mainland operations. With the opening of new building at Nansha campus this autumn, applied research and technology transfer activities towards the Mainland market will be greatly enhanced.

HKUST Shenzhen Research Institute (SRI) is the base and bridge for HKUST to expand research collaborations with the Mainland enterprises. In addition to the 7 workshops/seminars organized and 33 visits hosted during 2013-14, SRI has initiated the "Walking into the Bay -- and with HKUST" program to bring the Chinese enterprises into the Clear Water Bay campus. The highlights include a one-day in-depth exchange held by the Department of Electronic & Computer Engineering (ECE) to identify the areas of mutual interests with 6 senior members from a globally-leading provider of telecommunications equipment and network in September 2013 and meetings with another Chinese corporation in December 2013 and March 2014 to explore collaborations in the areas related CMOS devices, high-strength fiber technology, graphene, photonic crystals and properties, diamond and carbon material innovation. As of June 30, 2014, SRI has hosted 9 start-up companies created by HKUST students, alumni and faculty.

HKUST Foshan LED Center being located at the heart of PRD has served as the bridgehead to promote innovative LED technologies in the region. During the year under review, the Center co-organized the Solid-state Lighting Exhibition at Zhongshan city, organized a forum entitled "Advanced LED and Solid-State Lighting Technologies – from Wafer Level Processes to System Applications", and a technical summit on packaging, devices, modules and materials. In April 2014, the Center has received official certification from the China National Accreditation Service for Conformity Assessment (CNAS), which allows the Center to carry out accredited LED testing services in future.

1.4 Undertaking Knowledge Transfer Endeavors

Invention Disclosure and IP Protection

Rooted in a rich research culture and an entrepreneurial mind-set, an increased number of innovations were reported through the University invention disclosure system. Taking the Clear Water Bay campus as an example, 101 inventions were disclosed during the period under review as compared to 75 last year and 166 new patent applications have been filed. In particular, three major technology patent portfolios have been established, namely novel acoustic materials, aggregation induced emission materials and their applications, and a series of novel medical devices. With 68 newly granted patents, the whole University's current IP portfolio, including our satellite campus, contains 831 active patents and patent applications.

Two campus-wide seminars were organized during the year to equip researchers with more IP management knowledge and skills. Topics on determination and protection of the patentability of an invention, optimal timing to patent an invention, how to best manage patent prosecution to increase patent value, as well as basic patent specification drafting skills were presented by invited speakers. In total, over 200 faculty, students and staff have attended the two seminars.

Proof-of-Concept Fund

Proof-of-Concept Fund continues to provide important gap funding support for faculty members working towards technology commercialization. The program has been well received within the University community with application number in a constant increase since the inception of the program. 16 projects were submitted for the PCF funding of 2013-14. The PCF Selection Committee, chaired by APKT, together with faculty at HKUST and industries experts from different technology sectors, has recommended 9 projects with commercialization potentials. These 9 projects cover areas from biomedical device, environmental technology, display, advanced 3D mapping to visible light communication. For the 23 projects funded during 2010-13, 5 led to technologies licenses, 10 received further funding for development or undergoing collaborations with

external parties, 4 became the core technology of winning business plan proposals of the One Million Dollar Entrepreneurship Competition at HKUST

Contract Research, Consultancy & Testing Services

During the period under review, the University through its business arm HKUST R and D Corporation (RDC) has been engaged in 207 distinct contract research and consultancy projects. The corresponding total cash receipt is HK\$64.8M, of which 154 are contract research projects with cash receipt of HK\$50.6M, while the remaining 53 are consultancies generating cash receipt of HK\$14.2M. During the same period, RDC has signed 134 new contract research and consultancy agreements, with a total contract value reaching HK\$62.8M. During the review period, 524 analytical and testing jobs have been performed by various University research centers, with a total cash receipt of \$2.6M.

Licensing and Relevant Activity

RDC is managing 41 active licensing agreements (including patent and software licenses as well as assignments), which include 23 exclusive licenses and 18 non-exclusive licenses.

2. Expanding Horizons for Knowledge Transfer

2.1 Practicing Open Innovation



Inaugural Forum on Sustainable Energy of HKUST Energy Institute
Dr Christine Loh, Under Secretary for Environment of HKSAR, delivered the keynote speech at the Energy Institute's first forum on sustainable energy.



Workshop on SoC and IC Design Research
Mr Chuanzhi Liu, Chairman of Legend Holdings Corporation (Legend Holdings) shared his insights on "The Growth of China's Manufacturers – Talking about Legend".

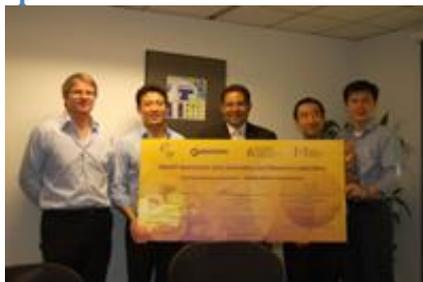


Science for Lunch
The HKUST Science-for-Lunch Talks introduce state-of-the-art R&D to society and business leaders, which has attracted over 300 attendees in 2013/14.

2.2 Strategic Industrial Partnership



HKUST – Thales Collaboration
The collaborative agreement was signed on 19 May 2014.



HKUST-Qualcomm Joint Innovation and Research Laboratory
Qualcomm Inc. donated US\$200,000 as initial funding for the Joint Lab.

2.3 Efforts Towards Community Engagement



Partnership with the UNESCO-IHE Institute of Water Education for a Water Project in Cuban

It aims to apply HKUST-developed Sewage Treatment Technologies to tackle Water Scarcity in Cuba.



The Center for Global & Community Engagement

HKUST students are encouraged to participate in international competitions and to use their engineering knowledge in community projects.

2.4 Technology Dissemination and Marketing



China High-Tech Fair (16-21 November 2013)

HKUST has actively participated in CHTF since the Fair's inception in 1999.



InnoAsia 2013 (4-7 December 2013)

The event has successfully attracted over 2200 attendees.



BIO International Convention (23-26 June 2014)

HKUST representatives participated in the BIO 2014, and visited leading companies and academic institutions in Silicon Valley with HKSTP Delegations led by Mrs. Fanny Law (3rd from the right).

2.1 Practicing Open Innovation

The University continues to foster KT culture by encouraging faculty, researchers and students to participate in different stage of KT related activities. To this end, open innovation has broadened the exposure of our faculty, researchers and students, has facilitated knowledge exchanges and co-developing of new ideas. Open innovation events such as workshops, networking sessions, open day and others have been organized.

Workshop on SoC and IC Design Research

A Workshop on Microelectronics and IC Design was held on 20 Jan 2014. Led by the Executive Director of a Chinese multinational computer technology company, a team of 7 core technical members of the company joined the workshop. Five technical topics were discussed and/or demonstrated by HKUST faculty. There have been several follow-up meetings to define topics for collaboration in voice recognition, 3D mapping and big data.

Inaugural Forum on Sustainable Energy of HKUST Energy Institute

On 13-14 March 2014, HKUST celebrated the opening of the HKUST Energy Institute and hosted the Institute's inaugural forum on sustainable energy. Ms. Christine Loh, Under Secretary for the Environment, HKSAR, delivered the keynote address on "Energy of Hong Kong – An Evolving Picture". The forum featured 16 leading scientists, energy experts and industrialists from Hong Kong, Mainland China, Japan and the United

States, who spoke on some of the world's most pressing energy issues and shared their views on the future of the energy sector, as well as latest innovations in energy technologies. The Forum has hosted over 200 participants from different sectors of Hong Kong.

Workshop on Big Data

On 24 March 2014, a workshop was held at HKUST with the president and five senior members of the China Technology Center of a multinational corporation, focusing on big data and applications. The corporation first made a presentation on industrial Big Data from their prospective and explained their new initiatives related to industrial internet and advanced manufacturing that involves big data. Six faculty members presented their recent works, which range from medical image analysis, crowd-sourcing on social networks, probabilistic databases, web data management, database modelling, data mining, system software for cloud computing, cloud-based mobile augmented reality, cloud/distributed computing, and others. Follow-up actions are being taken to formulate suitable collaborative projects between the two organizations.

Biomedical Engineering Industry Day

A group of 20 members of the Hong Kong Medical and Healthcare Industry Association (HKMHDIA) joined the Biomedical Engineering Industry Day on 4 April 2014. The event was designed and conducted in such way that exchange of latest research outputs and technology challenges were facilitated between researchers at HKUST and members of the HKMHDIA. 6 technical topics were covered that are related drug delivery, portable PCR, non-invasive medical devices and new drug screening platform. Expression of interest from several local companies and regional representatives of multinational companies to further develop these HKUST technologies to meet the market needs have been received and are being followed up.

Science for Lunch

The HKUST Science-for-Lunch Talks introduce state-of-the-art R&D to society and business leaders. It is a town-and-gown event held once a month during lunch time in Central by invitation. Science-for-Lunch is one of the community engagement programs initiated by the University to share the scientific discovery and innovative technologies of HKUST with the community. 8 sessions were organized in 2013-14 which cover a wide range of topics from social media, neurodegenerative disease, human language and machine translation, new fluorescent material, sustainable energy technology, 5G wireless systems to genetic technology, and attracted over 300 attendees.

2.2 Strategic Industrial Partnership

Knowledge transfer is the process to couple innovations with industry, community and government's needs in a timely manner. As of today, University's researchers have actively undertaken world-class applied research with both local and international industrial leaders. 41% of Top-100 Global Innovators and Corporations as selected by Thomson-Reuters in 2013 in the world have had collaboration and partnership with HKUST.

HKUST-Huawei Joint Innovation Laboratory

The joint efforts continue to upscale from short-term projects into multi-year collaborative research initiatives among various groups in Huawei and HKUST's Departments of ECE and Computer Science and Engineering (CSE). The research areas cover big data and analytics, wireless network, multimedia standard (HEVC/H266), multicore network-on-chip, cloud-computing architecture, high-performance networking and etc. During 2013-14, 16 frontier research initiatives have been identified with funding provided solely by Huawei to support HKUST's researchers' innovation and knowledge generation towards industrial benefits in those sectors.

Research-Tech Transfer Ecosystem Development for IC Design Group

HKUST's IC design groups have been actively collaborating with local and worldwide industrial IC leaders on advancing knowledge and best practice in IC research, design, development and fabrication. During 2013-14, with the credibility built up from the previous decade of IC research works and talents nurtured in HKUST, IC groups were able to develop a better ecosystem to support local IC design & engineering activities in Hong

Kong by the collaborations that cover power semiconductor, analog/power IC design, RF mixed-signal, CMOS sensors and high-speed silicon photonics. On the downstream, IC groups collaborate with foundries around the world to obtain the state-of-art fabrication process, the exposure in latest design practices, and the commercialization channels for silicon IP licensing. On the upstream, IC groups work with leading corporations to co-develop mutually-interested research initiatives. Through these activities, world-class IC design talents are being nurtured, innovative Silicon IP are being generated and high-impact joint research projects with leading industrial partners are being fostered.

HKUST–Thales Collaboration

HKUST and French company Thales have signed a collaborative agreement on 19 May 2014, marking a milestone in the joint efforts to boost innovation, nurture young engineering innovators, and serve the development of smart cities in the region. Under the agreement, HKUST and Thales will work closely on collaborative research projects including next-generation information technology on aeronautical, space, defense, transportation, and security. The agreement will also see the exchanges of researchers and mutual visits, student internship and co-nourishment of engineers.

HKUST Technology Implemented in Household Appliances to Improve Indoor Air Quality

A Hong Kong-based leading producer in household appliances has been supporting HKUST through donation, student internship, scholarships and research collaborations. Researchers from the Department of Chemical and Biomolecular Engineering at HKUST has been working closely with the company for over 10 years, in the area of environmental applications for home appliances with successful implementation of photo-catalytic oxidation (PCO) technology for air remediation in air purifiers from the company. The company and HKUST is continuing their collaborative relationship and is currently working towards commercial applications in smart cleaning and air purification.

Industrial Collaborations in Aerospace Engineering

HKUST has identified Aerospace Engineering as its strategic area of development in sync with the rapid development of aerospace engineering in Asia Pacific. At the start of the 2013 academic year, the Mechanical Engineering Department changed its name to the Department of Mechanical and Aerospace Engineering. With increased efforts on both research and education in aerospace engineering, HKUST initiated a cluster of aerospace engineering projects by partnering with the Aviation Industry Corporation of China (AVIC), Hong Kong Aviation Industry Association, and etc. With HKD\$15M of awarded Innovation and Technology Fund, HKUST was able to kick off five projects, namely CMOS Imaging Sensor Chip for unmanned aerial vehicle navigation, composite materials for advanced aircraft structures, aeroelastic design of aircraft turbine blades, and advanced machining for aerospace engineering.

HKUST-Qualcomm Joint Innovation and Research Laboratory

Established by HKUST and Qualcomm Inc., the Joint Laboratory officially opened on 11 Sep 2013, with specific focus on talent development and R&D for Next-Generation Internet Infrastructure. The aim of the Joint Lab is to sponsor research and talent development under the broad theme that is of particular interest to both Qualcomm and HKUST. The pilot theme under the Joint Research Program will be “Enabling Technology for Next-Generation Internet Infrastructure”.

2.3 Efforts Towards Community Engagement

Partnership with the UNESCO-IHE Institute of Water Education for a Water Project in Cuba

HKUST has formed a partnership with the UNESCO-IHE Institute of Water Education (UNESCO-IHE) under an international consortium to undertake a three-year water-saving project, including the adaptation of HKUST’s innovative urban water management system for Cuba. Prof Damir Brdjanovic, Head of the Environmental Engineering and Water Technology Department, UNESCO-IHE said: “The innovative seawater-based treatment technologies developed by HKUST is one of the most energy efficient and economical ways for water-saving in coastal cities and islands around the world. We are pleased to bring this new urban water management concept to Cuba with help from HKUST and collaboration of local Cuban partners.”

Traditional Chinese Medicine (TCM) Quality Control Service to Industry

The Testing Laboratory for Chinese Medicine (TLCM) has been established in 2012 by The Hong Kong University of Science and Technology (HKUST) and The University of Hong Kong (HKU). The laboratory is funded by The Hong Kong Jockey Club Charities Trust and led by Prof. Karl WK TSIM (Director), Prof. Chi-Ming CHE (Associate Director) and Prof. Nancy YY IP (Associate Director). It has collected the fingerprint of chemical components, the content of toxic ingredients in the toxic TCM, and the median lethal dose (LD50), and has analyzed the correlation between toxic ingredients and pharmacological toxicity of TCM, with the established analysis methods. It has investigated the clinical safety consumption limit. With the use of biomarkers identified in different TCM, the Laboratory has implemented a new method for TCM quality control in the local nutraceutical industry, which was applied to the production line of a commercial nutraceutical product, and successfully helped to reduce the cost of raw materials while keeping the finished product at good quality based on key identified biomarkers. Additional research projects are ongoing with the company on other nutraceutical products. The Laboratory, by partnering with World Health Organization and the Department of Health, HKSAR, organized a three-day training workshop on the quality control of herbal medicines to equip regulators and inspectors with the skills and capacity to develop herbal medicine standards and implement the quality control of traditional medicines.

The Center for Global & Community Engagement

To engage HKUST students in making contributions to the community with knowledge transfer in the mind, HKUST has established the Center for Global & Community Engagement (GCE) led by Prof. Tim Woo. Students are encouraged to participate in international competitions as well as to use their engineering knowledge in community projects. In 2013-14, GCE has supported over 50 self-initiated students to participate various competitions, namely ABU Robocon Competition, MATE ROV Underwater Robot Competition, Freescale Cup Intelligent Car Racing Competition. Locally, these students provided training workshops for children in the Ebenezer School and Home for the Visually Impaired in Hong Kong. Under the mentorship of the HKUST students, the team from Ebenezer School won 1st Runner-up in Scout Class in the competition. In addition to Braille Embosser - a user-friendly tool to raise the efficiency of turning text in Braille for the visually-challenged and Embedded Cognitive Therapy in Digital Photo Frame aiming to enhance the cognitive power of the elderly, Auditory and Speech Training App (精靈小耳朵) was created in collaboration with the Hong Kong Society for the Deaf, which revolutionized current paper-based auditory training tools by using Android-based mobile app technology and won the Gold Award in the Web Accessibility Recognition Scheme 2014 on 14 April.

2.4 Technology Dissemination and Marketing

International Conference & Exhibition of the Modernization of Chinese Medicine & Health (15-17 August 2013)

The exhibition provides a leading global platform for the latest TCM, health-care products and services. HKUST showcased the research and development achievements on Chinese medicine and seek for networking opportunities and potential collaboration.

Eco Expo Asia (28-31 October 2013)

The Fair is an international trading platform showcases the latest innovations in environmental protection industries from around the world. HKUST showcased green technologies and seek for networking opportunities and potential collaboration.

China High-Tech Fair (16-21 November 2013)

Organized the participation of HKUST units to the 15th China Hi-Tech Fair showcasing available technologies and research achievements, and seeking for networking opportunities and potential collaboration. HKUST has actively participated in CHTF since the Fair's inception in 1999.

InnoAsia 2013 (4-7 December 2013)

InnoAsia is a forward-thinking event gathering technology leaders in the region to identify challenges and solutions that affect our living. HKUST was the strategic partner for InnoAsia 2013. With the theme of "Towards a Smart Green City Agenda", InnoAsia 2013 kicked off with the Main Conference featuring speakers sharing sustainable approaches to achieving smarter, more livable cities and communities. Prof. Tony Chan, President of HKUST, chaired the panel discussion in the Main Conference to discuss the challenges facing the Smart Green City agenda with the Chief Architect for Barcelona City Council, and executives from Schneider Electric, IBM and Corning Incorporated. Six Forums on important topics under the theme of "Towards a Smart Green City Agenda" continued on Day 2 and 3, in which HKUST organized three Forums on Smart Lighting and Display, Renewable Energy and Waste Management, and Smart City – Applications towards a Smarter City. On 6 December, a parallel full day forum, InnoAsia@PRD 2013, was held in Guangzhou, with the aim to facilitate idea exchange and cooperation in the PRD region. Six HKUST professors presented their research works to a wide audience from local and overseas industries, academia, governments and investment community. Overall InnoAsia 2013 enjoyed a tremendous success with a record high attendance of over 2200 attendees.

BIO International Convention (23-26 June 2014)

HKUST has participated the BIO International Convention (BIO) 2014 and exhibited 5 technology clusters, namely, Drug Discovery (Cancer & neurodegenerative diseases, Ophthalmological drug delivery material), Medical Device (Treatment of aneurysm and stroke, Real time glaucoma diagnosis, Gene sequencing and diagnosis), Specialty Chemicals (Bio-imaging, Chemosensor / probe, Biomarkers for standardization), Marine Biologics (Anti-cancer, Prevention of biofouling), and Other medical related technology (sensor technology, big data/data science).

BIO aims at creating an environment that enables the industry to fulfill its vision of bettering the world through biotechnology innovation. During the convention, we have received over 50 requests from Pharma companies looking for new drug leads, technology on drug delivery system and marine biologics. Remarkably, there are requests for collaboration in big data/data science for clinical data analysis. The study mission organized by HKSTP visiting to different companies and academic institutions in Los Angeles, San Diego and San Francisco such as California Institute for Quantitative Biosciences, Stanford Neurosciences Institute and Office of Technology Licensing Stanford University also helped idea exchange and sharing on technology transfer practice with the institutions in those areas.

3. Fostering Entrepreneurial Culture and Ecosystem

Marching towards the objective of creating an entrepreneurial ecosystem at campus and beyond, HKUST has witnessed an exciting year filled up by various kinds of activities that aim to nurture entrepreneurial spirit and culture in the community, including various entrepreneurship education and training programs/workshops, business outreach, networking events, business plan competition, start-up incubation and etc.

3.1 E-Academy



A student-led unit which organized a number of activities involving over 700 students in 2013/14.

3.2 Entrepreneurship Startup Workshop Series



A 64-hour training course which has already offered to over 400 students and alumni.

3.3 One-Million Dollar Business Plan Competition



HKUST President Tony F. Chan (2nd right) presents the award to m-Care Technology Ltd, the champion of 2014.

3.4 Venture Entrepreneurship Festival



To facilitate connections within and beyond the HKUST community to entrepreneurship and venture resources.

3.1 E-Academy

E-Academy, which is a student-led sub-unit of EC with the mission to ensuring student participation, has successfully completed pilot-phase testing. During this reporting period, the E-Academy has hosted 6 activities involving about 700 students, namely the E-Gala, the Batting Cages, the 1st HKUST Hackathon, the Entrepreneur Donut Cart, and the Entrepreneurship Week. On average, there was one cultural/community event each month that classes were in session.

3.2 HKUST Entrepreneurship Startup Workshop Series

The HKUST Entrepreneurship Startup Workshop Series, a 64-hour training course, has been offered to the HKUST community and attracted a total attendance over 400 students and alumni. Similar Workshop Series was also offered to 15 SMEs in Foshan in partnership with the HKUST LED Center at Foshan. This Workshop Series is well received by the nearby universities in the PRD region too. A 6-day annual HKUST Innovation and Entrepreneurship Training Camp will be held during July 2014 at HKUST campus for students and startup entrepreneurs from China, Taiwan, Macau, Hong Kong and overseas. Subsequent to the Training Camp, a cross-strait entrepreneurship competition will be held annually in Guangdong, for which the HKUST Entrepreneurship Startup Workshop Series has been accepted as the official training camp courses.

In parallel to the above effort, the Entrepreneurship Center continues to offer Build Your Own Business (BYOB), previously known as Be Your Own Boss, seminars to increase soft skills of our students and alumni. 7 seminars with over 700 participants were recorded for the year under review. Practically there was one BYOB seminar each month on average.

3.3 One-Million Dollar Business Plan Competition

The 4th annual HKUST Million Dollar Business Plan Competition was conducted on 4-5 June 2014 with improved guidance to competitors, enhanced judging process to increase uniformity and the degree of alignment to external investment community. This year a total of over 110 teams participated which most of the competing teams were composed of HKUST faculty, staff, students and alumni. Judges on the panels of the four round assessments are from leading executives, professional investors and entrepreneurial academics. After rigorous competition of 12 shortlisted teams, following awards were given at the Bankers Club on June 9th Award Dinner:

- President's Prize Winner: m-Care Technology Limited – Provides technology solution to better address the need of remote monitoring systems and physical performance testing in the healthcare industry.
- 2nd Prize Winner: SonoSolution Limited – Low frequency low intensity ultrasound for non-invasive eye drug delivery.
- 3rd Prize Winner: Silicool – An active cooling solution for microprocessors.
- Innovation Prize Winner: Centric Technologies (HK) Ltd – Supply semi-conductor integrated circuit and system solutions for emerging gigabit wireless market for both consumer and enterprise applications.

3.5 Startup Incubation in Entrepreneurship Program



Sane Form is one of the successful applicants in 2014.

3.4 Venture Entrepreneurship Festival

HKUST Venture Entrepreneurship Network (VEN), a student-run cross-disciplinary organization, organized a Venture Entrepreneurship Festival on 2 May 2014 to facilitate connections within and beyond the HKUST community to entrepreneurship and venture resources. The highlight of the festival was the Technology & Idea Showcase and associated networking event. We have invited a variety of faculty representatives, student groups, alumni, and industry representatives to demonstrate & showcase their latest technology and products. HK industry associations (HK Electronics & Technologies Association, HK Institute of Marketing, etc.), angel/venture capital investment community, HK venture organizations (co-workspaces/accelerators), HKUST Alumni Association members, successful student HKUST entrepreneurs, and etc were presented in the event. Four flagship programs: Venture Mentor Service, Venture Link, Tech Link, and Ideation Lab to integrate resources into the HKUST community from different sectors such as the HK entrepreneurship community, professional and business services, investment and venture organizations, technology industries, and local and regional government bodies.

3.5 Entrepreneurship Program

Start-up incubation has been actively pursued and supported through the HKUST Entrepreneurship Program to assist faculty members, staff and students in the establishment of technology-based start-up companies. During the period under review, 1 new startup companies has joined the Entrepreneurship Program. This leads to a total of 35 financially active companies in the Program, including 26 spin-off (which have graduated from the Program) and 9 startup companies (which are currently being incubated in the Program).

4. Looking Forward

Going forward, HKUST will forge ahead with a number of new initiatives under the leadership of the newly appointed Associate Provost for Knowledge Transfer. In particular, a KT&E Task Force and Advisory Board are being formed to assist the University's senior management in establishing a comprehensive approach to achieve our mission and set long-term strategic goals.

Ongoing and new educational entrepreneurship activities will be organized with tighter coordination and interactions to further elevate their impact and to provide a full spectrum of entrepreneurship learning experience for our communities, especially our students and faculties. For example, more couplings and joint efforts will be devoted between the core Minor Degree Programs in Entrepreneurship (offered by our School of Engineering and School of Business Management) and extra-curriculum activities offered by E-Academy and through the VEN.

To nurture HKUST technologies for transfer into society through commercialization, the establishment of an Entrepreneurship Acceleration Hub (EACH) is being planned. EACH will provide a platform to foster very early stage ventures spun out of our research projects and entrepreneurship activities such as, the Hackathon or the One-Million Dollar Competition. EACH will provide professional support during a period that these very young companies are still searching for a viable business model and seeking for private sector funding. The companies must "graduate" from EACH within the acceleration period since the objective of the platform is to provide *each* startup ideas on campus an opportunity to evaluate and formula its viability in becoming a real business. The flow of new ventures must be maintained to keep our innovation environment fresh and vibrant. The "graduate companies" can move on to incubation programs in the region including HKSTP, Cyberport. The EACH platform will work closely with HKUST's mainland platform through our Tech Transfer and Incubation Office (TTIO) to further nurture ventures that can be best incubated within HKUST's platform.

HKUST believes that these new initiatives and programs will further elevate its KT&E capability. The University needs to harness its rich IP portfolio and build on the momentum gained during the past years and continue to work with all stakeholders to ensure that the overall KT&E strategic goals are achieved.

Appendix A – Key Performance Indicators

Performance Indicator		2012-13 (Achieved)		2013/14 (Projection provided in Initial Statement)		2013/14 (Achieved)	
Number of patents filed in the year		149		144		195 ^{Note 1}	
Number of patents granted in the year		80		52		80 ^{Note 2}	
Number of licenses granted		33		32		41	
	1. Exclusive license	21				23	
	2. Non-exclusive license	11				18	
	3. Option	1				0	
Income (on cash basis) generated from intellectual property rights		\$2.8M		\$4.8M		\$4.3M	
Expenditure involved in generating income from intellectual property rights ^{Note 3}		\$5.1M		\$4M		\$6M	
Number of economically active spin-off companies (with breakdown by type)		34 (26 spin-off, 8 start-up)		No projection		35 (26 spin-off, 9 start-up)	
	Companies with institutional ownership and using IP from HKUST	7				7	
	Companies with institutional ownership but not using IP from HKUST	27				28	
Number of collaborative researches, and income thereby generated		46	\$162.6M	74	\$72m	69	\$111.5M
^{Note 4}	With local collaborating organizations	30	\$91.9M			55	\$85.1M
	With Mainland collaborating organizations	20	\$89.5M			38	\$51.1M
	With overseas collaborating organizations	25	\$79.9M			40	\$51.6M

^{Note 1} CDCF Table 65: The number of patents filed is 195 and the number of inventions involved is 149 in the 2013/14 period. Starting from 2013/14, the number reported also including patents filed by satellite campus.

^{Note 2} CDCF Table 66: The number of patents granted is 80 and the number of inventions involved is 61 in the 2013/14 period. Starting from 2013/14, the number reported also including patents granted by satellite campus.

^{Note 3} The expenditure involved was used to support new patent applications in the reporting year and the expenses for all cumulative active patent applications and patents over the years.

^{Note 4} These figures do not add up as some projects may involve a combination of local, Mainland, and/or overseas collaborating organizations.

Performance Indicator		2012-13 (Achieved)		2013/14 (Projection provided in Initial Statement)		2013/14 (Achieved)	
Number of contract researches (other than those included in “collaborative researches” above), and income thereby generated		118	\$52.5M	130	\$51m	154	\$50.6M ^{Note 5}
	Local (Hong Kong)	62	\$17.1M			87	\$18.9M
	China	38	\$19.1M			48	\$22.2M
	International (excluding China)	18	\$16.3M			19	\$9.5M
Number of consultancies, and income thereby generated		75	\$18.7M	75	\$15.8m	53	\$14.2M ^{Note 6}
Number of equipment and facilities service agreements, and income thereby generated		442	\$2.2M	400	\$5m	524	\$2.6M
Number of student contact hours in short courses or e-learning programmes specially tailored to meet business or CPD needs		35,869 hours		50951 hours		30,468 hours	
Income received from Continuing Professional Development (CPD) courses		\$18.3M		\$19.3M		\$22.6M	
Number of public lectures / symposiums / exhibitions and speeches to a community audience		239		200 ^{Note 7}		201 ^{Note 8}	
Number of performances and exhibitions of creative works by staff or students ^{Note 9}		9		17		49 ^{Note 8}	
Number of staff engaged as members of external advisory bodies including professional, industry, government, statutory or non-statutory bodies		94		160		404	

^{Note 5} The total number of new contract and contract value for contract researches agreements signed in the 2013/14 period is 119 and HK\$56.1M.

^{Note 6} The total number of new contract and contract value for consultancy agreements signed in the 2013/14 period is 15 and HK\$6.7M.

^{Note 7} The numbers for 2013/14 and 2014/15 have been revised to 200 after submission of the Initial Statement to reflect a more realistic projection.

^{Note 8} The total number of attendee from all events and income from chargeable events in the 2013/14 period have increased by 73% and 3 times respectively when compared with the figures in 2012/13.

^{Note 9} The numbers reported only include events held at museums and galleries owned by HKUST (as per the Common Data Collection Format (CDCF) requirements).