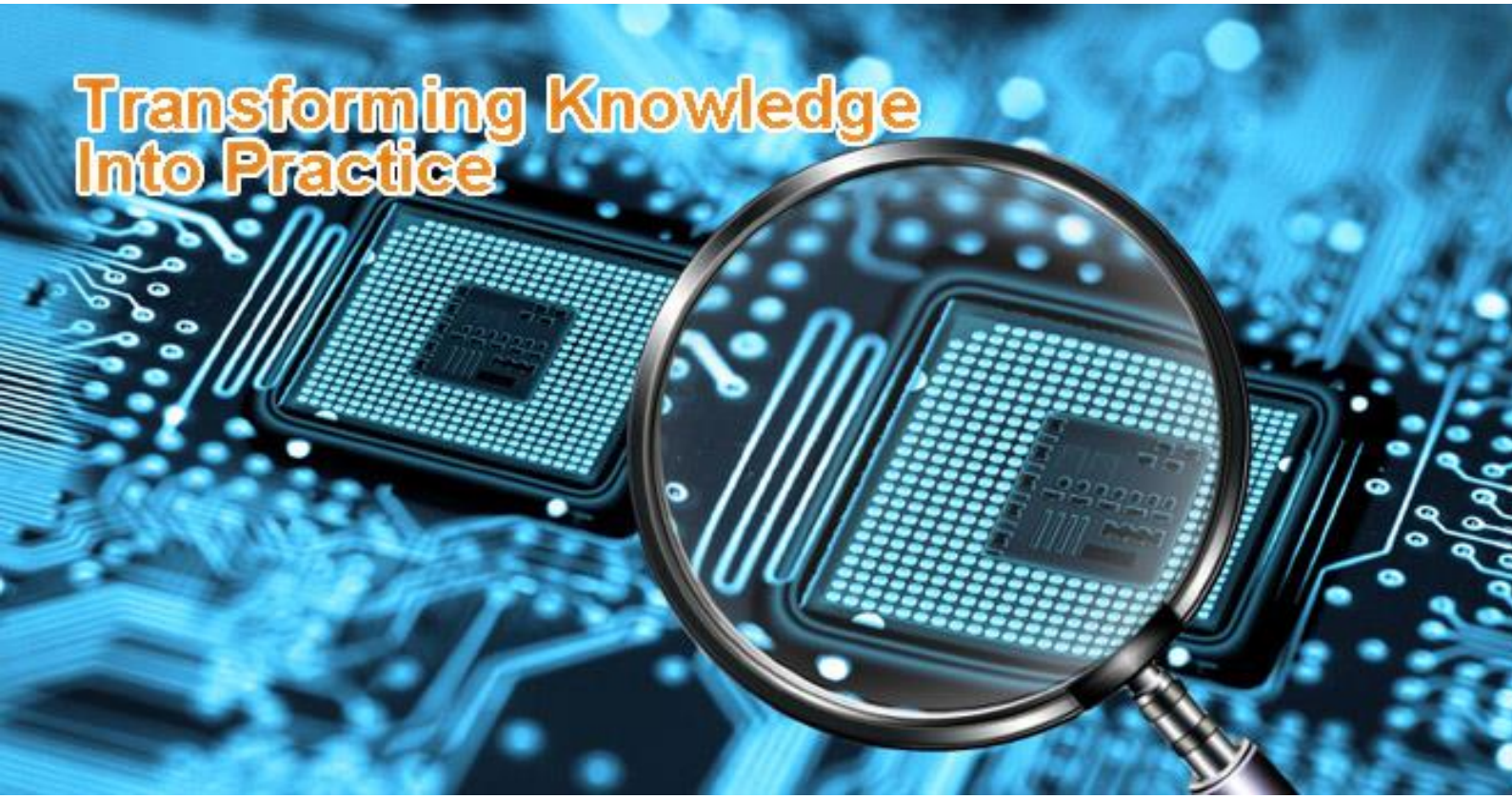

Annual Report on

Knowledge Transfer for 2014-2015

CityU
香港城市大學
City University of Hong Kong
專業 創新 胸懷全球
Professional·Creative
For The World

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1. Technology Licensing

In response to the University's Initial Statement 2012-15, the Knowledge Transfer Office (KTO) of City University of Hong Kong (CityU) devised a licensing strategic plan for this triennium called "IDEA", an acronym for **I**ntellectual Property and New Technology Scouting, **D**eepening Licensing Network, **E**mpowerment of Technology Transfer and **A**dvancement for Novelties. Driven by this **IDEA** strategy, we are pleased to report that there were 47 licensing agreements active during the reporting year, 13 of which were newly signed, representing a 63% increase over that of last year in terms of the number of new licenses. The total licensing income (on accrual basis) also soared from HK$3.47m to HK$6.57m, recording an increase of 89% over previous year. However, as some deals were concluded close to year end while another one requested for deferred payment, the actual receipt of licensing income was HK$1.76m only.

The table below shows the details of the 13 newly signed licensing agreements. Two of the licences involved technology start-ups founded by CityU students.

	Technologies Licensed	Nature of Business of Licensee	Where the Licensee is Based
1	Ultra-high strength steel	Steel	China
2	Air sensor	Environment	China
3	Power supply	Battery charger	Hong Kong
4	Power supply	Power technology	Hong Kong
5	Power supply	Power electronics	Hong Kong
6	Power supply	Multimedia AV products	Hong Kong
7	LED lighting	Lighting	Hong Kong
8	Motion sensing	Consumer electronics	Hong Kong
9	Anti-phishing	Technology start-up	Hong Kong
10	Ultrathin film nanostructure	Technology start-up	Hong Kong
11	Chemosensing	Biotechnology	Hong Kong
12	Interactive 3D model	Creative culture	Hong Kong
13	Online tutorial	Education	Hong Kong

2. Capacity Building in IP Management and Technology Transfer

2.1 IP Training for Technology Transfer Staff

Technology transfer staff of CityU is encouraged to join various technology licensing and IP related training courses and events to keep abreast of the latest market development, IP and licensing management skills. The below workshops and conferences were attended during the year under review:

- An Interactive Session among Technology Transfer Executives of sister universities hosted by the Knowledge Transfer Office of CityU (Encouraging responses were received and we got feedback that similar exchange sessions should be organized on a regular basis.)
- AUTM Annual Meetings organized by the Association of University Technology Manager in the US and Malaysia
- Mainland, Hong Kong and Macao SARs Intellectual Property Symposium
- "Business of IP Asia Forum" co-organized by the Hong Kong government, HKTDC and the Hong Kong Design Centre
- International Knowledge Transfer Conference at APAC Innovation Summit
- International Intellectual Property Commercialization Council (IIPCC) Hong Kong Chapter Workshop/Seminar Series
- "Innovations in a Changing Intellectual Property World" hosted by an IP firm

2.2 Exchange with Mainland and Overseas Institutions

To enhance our knowledge on the worldwide trends of IP licensing and knowledge transfer, KTO executives had received delegations or visited 20 organizations, from the Mainland or overseas, during the reporting period. These included two visits by Stanford University's leaders in licensing (Director and Associate Director). Through exchanges with their senior administrators, we learnt about the design and implementation of good practices on technology transfer and commercialization. Opportunities for mutual beneficial collaboration were also explored.

2.3 Enhancements in IP Infrastructure and Management

a. IP Management System

Previously, patent and licensing information was handled by in-house designed databases which were fragmented and not versatile enough to suit various reporting requirements. To effectively manage the University's intellectual property and licensing operations which are under rapid expansion, a state-of-the-art comprehensive management information system has been acquired that allows users to manage the licensing processes from invention disclosures to commercial realization. System migration is underway which is anticipated to be completed in autumn 2015. By then the productivity of our patent officer and licensing officers will be greatly improved.

b. Streamlining Patent Processing

Institutional funding has been provided to faculty members since 1997 for patent applications. The previous vetting process involved a routine external assessment of the inventions that often took several months for the assessment. To expedite the filing process as time is of great concern as a result of the revised first-to-file patent application system in the US, administrative procedures were streamlined such that only complicated cases will go through external assessment while straightforward cases will be vetted internally by licensing officers of KTO acting independently. Without sacrificing the stringency of the vetting mechanism, we have successfully shortened the application process from several months to two/three weeks on average.

c. Legal Documents Review

To further improve the infrastructural support for licensing, new agreement templates have been devised including a copyright licensing agreement. To cater for the needs of the Mainland market, bilingual version of the agreement templates are being prepared.

d. IP Conference

CityU hosted a two-day conference on 16 and 17 March 2015 about developing and implementing policies governing student intellectual property. Bringing together professionals from local and overseas institutions, the conference provided a good avenue for exchanging experiences and sharing views on student intellectual property, investigating the current state of student intellectual property management within the modern university setting, and exploring ways in which policies can be produced.

3. Prospecting of Patentable IP

3.1 Invention Disclosure and IP Excavation

The University encourages its faculty and other inventors to report their inventions through the invention disclosure process. To strengthen this practice, KTO proactively approaches academic and research staff members on a regular basis to learn their latest research topics and deliverables. This way, we can discover more inventions at the earliest time. During the year under review, a formal presentation on IP protection and commercialization was given to the College of Business, Division of Building Science and Technology and the Department of Physics and Materials Science (at their annual retreat). Similar visits and presentations will be given to different departments to raise awareness in the area. Also we worked with the Office of Education Development and Gateway Education to deliver "Introduction to IP" sessions to all tech- and entrepreneurship-related classes.

3.2 Patent Prosecution

After a stringent vetting process, inventions of high commercialization value are recommended for patent filing. In the year under review, 70 new patent applications were filed in the US, China and Hong Kong, etc. in various fields of technologies. By June 2015, 238 patents have been granted with a further 366 patents pending.

3.3 Applied Research and Innovation

a. Applied Research Grant (ARG)

The University places a strong emphasis on application-oriented research that brings tangible benefits to the community. Thus the Applied Research Grant (ARG) was launched in 2005-06 to promote applied research initiatives. ARG fosters university-industry links by supporting projects with potential for application or commercialization of resulting outputs. It also supports projects which would lead to ITF applications. In the year of 2014-15, the University provided funding support for 19 ARG projects with a total grant of HK$3.8m.

b. Idea Incubator Scheme

The Idea Incubator Scheme is an initiative built on the Discovery-enriched Curriculum to nurture new ideas and innovations from students and staff. Six rounds of applications have been called and a total of 32 projects received funding support of around HK$12m, spanning a wide spectrum of areas such as social and environment, health, building safety, language learning, and career planning, etc.

c. Knowledge Transfer ("KT") Funding Scheme for Non-technology Disciplines

To broaden KT beyond science and engineering disciplines, funding has been provided since 2011 to support worthwhile KT initiatives proposed by non-science and engineering colleges, including the College of Liberal Arts and Social Sciences, College of Business and School of Law. Every year, each college holds an internal competition to prioritize the applications before submission to Knowledge Transfer Office. Three projects were approved in this reporting year to receive up to HK$0.2m each. They are:

- Serve, Learn and Change – Enhancing Knowledge Transfer Process to Promote Social Changes
- Create a Stimulating Learning Environment for Students with Intellectual Disability
- CityU-HK Consumer Confidence Index (HKCCI)

d. Contract and Collaborative Research

Part of the University's mission is to anticipate and respond to the needs of industry and the community by engaging in applied research with its results used for direct benefit to Hong Kong and beyond. The University continues to maintain close ties with local and overseas industries through various forms of collaboration including contract research. In the year under review, 66 contracts and collaborative research projects totaling $68.6m were approved from the government, industry and other organizations.

Highlights of some contract research projects including development of materials or systems in a wide spectrum of disciplines are set out below:

- Development of an automatic system for a world-class oil sand company, to monitor the efficiency and prevent disruption in oil sand production
- Modelling and Dynamical Analysis of Information Network Topologies
- Research on Next-Generation Internet Design
- Development of High Capacity Battery Materials to Improve Driving Range of Electric Vehicles
- The Application of Positive Education to Nurture Wellbeing and Promote Mental Health of Primary School Students
- Study of Assets Integrity of Railway Materials and Structures

City University of Hong Kong places a strong emphasis on application-oriented research that not only brings true benefits to the community but facilitates knowledge transfer that is conducive to the needs of industries and social bodies. To this end, faculty members are encouraged to engage in contract and collaborative research to contribute to the University's pursuit in knowledge transfer.

4. Marketing of IP

4.1 Direct Marketing

a. Direct Marketing

Relationship building is an important part of CityU's strategy to promote licensing. Therefore, we sent our technology transfer officers to numerous conferences and exhibitions to expand their social networks in addition to their routine visits to potential licensees. Key members of our licensing team have an *average* of close to 30 years of industry experience, which is greatly leveraged to build our network. This year, we arranged meetings and visits for some 180 corporations to assess how CityU technologies can meet their needs. Among them, over 110 companies or 63% are from the Mainland. We find face-to-face meetings very effective and they often lead to some collaboration either in the form of research sponsorship, donation, student placement/internship or licensing.

b. Exhibitions

To extend our licensing activities to the Mainland and overseas markets, the team participated in a number of exhibitions, including well-known national and international trade shows and technology expositions. The list of participated exhibitions is shown below:

- International CES Asia in Shanghai, PRC
- electronica China in Shanghai, PRC
- China Hi-Tech Fair in Shenzhen, PRC

- Robotics Tech Expo at China Information Technology Expo in Shenzhen, PRC
- The International ICT Expo , Hong Kong
- Hong Kong International Medical Devices and Supplies Fair
- Hong Kong Tech Showcase@IDT Expo
- InnoCarnival organized by the Innovation and Technology Commission of HKSAR Government
- 30 Years of Research and Innovation@CityU (organized by CityU)

c. Forums

To stimulate exchanges between our faculty and industries, technology forums are organized on a regular basis. The following forums were organized during the reporting period:

1. The Emerging Technologies Forum "Waveguide and Wireless Technologies" held in August 2014 was one of CityU's 30th Anniversary celebratory events. The event was supported by the Hong Kong Electronics & Technologies Association, Hong Kong Wireless Technology Industry Association, The Hong Kong Electronic Industries Association, the IEEE (HK) Section and The Institution of Engineering and Technology.

2. The Emerging Technologies Forum "Veterinary Science and Medicine" held in September 2014 was another CityU's 30th Anniversary celebratory event. Veterinarians from Ocean Park and the Hong Kong Jockey Club, as well as academics from Cornell University and Qatar University, were invited to speak on cutting-edge research in animal medicine and laboratory animal science.

3. The CityU Technology Transfer Forum "From Innovation to Realization II" was held in Shenzhen in February 2015. The Forum featured our Innovation to Realization Funding (I2RF) Scheme projects about μIMU-vision fusion technology and Internet of Things (IoT). Co-organizers of the event included Shenzhen Science and Technology Services Association, Shenzhen Venture Capital Association, and Shenzhen Virtual University Park.

4. Technology Forums in six emerging areas (advanced materials, green technologies, information and communications technology, Internet of Things, robotics and translational biomedicine) were held under the APAC Innovation Summit hosted by the Hong Kong Science and Technology Parks (HKSTP) and co-ordinated by CityU. A number of CityU academics shared with senior technology and management executives from industries their views on next mega technology trends at the Tech Forums. Furthermore, CityU experts in robotics were invited to speak at the APAC Innovation Summit 2015 Seminar Series on Robotics.

4.2 Web Marketing

To broaden licensing channels, licensing databases are set up accessible on the KTO website and our partners' websites to allow interested parties to search for University technologies available for licensing.

a. Technologies for Licensing Database

Members of the industrial and business sectors can easily access the *Technologies for Licensing* database at the KTO website to search for marketable patents, technologies and know-how of the University that match their business needs. The database is routinely updated.

b. List of Patents

A *List of Patents*, written in laymen's terms, provides information about University patents and patent applications. The list is updated regularly, and is also available at the KTO website.

c. IP Listing

The University's IP portfolio is listed or linked in local and international IP platforms including the website of Association of University Technology Managers (AUTM), IP Net developed by the University of Manchester Intellectual Property Limited, Asia IP Exchange (AsiaIPEX), an online IP trading platform developed by HKTDC, and websites of global IP traders such as Tynax.

4.3 IP Agencies and Partnership

We have newly appointed a local company as our agent for licensing shape memory materials. Besides, we continue to employ four global IP management firms as our agents overseas, and two mainland institutions as our marketing agents in Mainland China. Furthermore, CityU's technologies in the fields of Internet of Things, holography and printed electronics were presented at the Technology Summit hosted by Hasbro, a multinational toy maker; and we also worked with the Hong Kong Science and Technology Parks Corporation and Isis Innovation (Oxford University's commercial arm) to market the anti-sticking coating technology.

5. Outreach

Through the CityU Business and Industrial Club (CUBIC), we have forged close ties with senior business executives and industrialists. CUBIC regularly organises events (e.g. Technology Transfer Forums, Emerging Technologies Forums, Special Interest Group gatherings, company visits) for its members, and build platforms for industrialists and academics from CityU and other institutions to advance technological development and promote cross-institution collaboration. Newsletters and flagship magazines of the University were also sent to the members regularly. This year, the membership of CUBIC has grown from 1,106 to 1,239, at an annual increase of 12%. The number of CUBIC members coming from the Mainland has also increased from 73 in 2013-14 to 104 in 2014-15, increased by 42%.

During the year, CUBIC has organized two visits to Mainland corporations, six laboratory tours for Mainland government officials, local and Mainland trade associations, three technology forums, as well as two Special Interest Group gatherings. Furthermore, it has joined hands with the International Intellectual Property Commercialization Council (IIPCC) Hong Kong Chapter in co-organizing four workshops/seminars about IP commercialization and entrepreneurship. CUBIC also supported 15 external events in Hong Kong and Shenzhen as a supporting organization. CUBIC functions effectively as a platform for forging industrial liaison and networking.

6. Mainland Research Development

Mainland research development continued to record a steady growth in the year under review. A total of 43 new contract/collaborative research projects were obtained via the research platform in Shenzhen, the CityU Shenzhen Research Institute (CityUSRI). Of the new projects contracted, 21 were funded under the National Natural Science Foundation (NSFC) while 14 were funded by the Science Technology and Innovation Committee of the Shenzhen Municipal Government. The total number of active research projects jumped to 202 with a total research funding of RMB102m.

	2013-14	2014-15	% change
Number of active research projects	161	202	+25%
Total grants of the active research projects	RMB75.77m	RMB101.91m	+34.5%

Seventy-five NSFC applications were submitted in the 2015 round of competition. CityUSRI's success rate for receiving NSFC funding has always been higher than that of the national average as shown below:

	2012	2013	2014
National NSFC success rate	21%	22.5%	24.4%
CityUSRI NSFC success rate	26.4%	37.4%	32.3%

Professor Jian LU, Vice-President (Research and Technology) and Chair Professor in the Department of Mechanical and Biomedical Engineering, received a Shenzhen Government funding of RMB4.5m supporting his project "Air Bearing Fatigue Performance Improvement of Key Technologies (航空軸承疲勞性能提高關鍵技術研發)". This is a major industrial technology research project using the Surface Mechanical Attrition Treatment (SMAT) technology and the residual stress testing technology to improve the fatigue resistance in aviation engine. The research results will provide significant theoretical basis for the development of important technologies in aviation engine in Mainland China.

As of June 2015, there are 4 Shenzhen Key Laboratories and 13 CityU research centres/laboratories housed at CityUSRI.

7. City University of Hong Kong Chengdu Research Institute (CityUCRI)

CityU and the Shuangliu County Government of Chengdu City in the Sichuan Province signed a collaborative agreement on 5 August 2013 for the establishment of CityUCRI, symbolizing an important step towards enhancing the University's presence in Mainland China. CityUCRI is the University's first research institute established in the Western Region of the Mainland, serving as the second strategic platform of the University after Shenzhen for research and development, incubation and innovation, as well as professional education and training.

With support from the Shuangliu government, the Institute is situated in Shuangliu County of Chengdu. A ground breaking ceremony was held on 24 May 2015 officiated by Chengdu and Shuangliu government officials, senior management of CityU as well as other distinguished guests. The first phase of the construction, consisting of four blocks with a total area of over 18,500 square meters, is underway.

The target of CityUCRI in the initial phase is to carry out at least two knowledge transfer/ contract research projects with the local industries every year. Projects planned to be introduced to the Western Region in the near future include the following:

- *Applied Laboratory of Interactive Visualization and Embodiment (ALiVE) directed by Professor Jeffrey SHAW, Dean of School of Creative Media*

  With the help of the Shuangliu government, Professor Shaw is setting up his laboratory in Chengdu within 2015. By collaborating with relevant local industries/sectors, the laboratory will enrich the scene of Chengdu in areas including culture, tourism, education and medical treatment, and will contribute to further project research.

- *Interactive Sensory Program for Affective Learning (InSPAL) developed by Professor Horace Ho-shing IP, Vice-President (Student Affairs) and Chair Professor of Department of Computer Science*

  CityUCRI is working with Professor IP's team in developing a local version of the well-established InSPAL system in Chengdu, to meet local demand for virtual reality technology in special education and psychology.

- *Incubation Projects*

  As an incubation platform, CityUCRI is actively finding ways to attract young entrepreneurs who are looking for resources from and collaboration with the local government or enterprises in the Western Region.

8. Hong Kong – Mainland Collaboration on Technology Transfer

To leverage on Hong Kong's strength as a technology hub, CityU has been working closely with the government of some Mainland cities to establish KT platforms comprising research and development collaboration, technology licensing, and technology consultation for mutual benefits. Renowned overseas universities will be invited to join as a partner and Stanford University has agreed to participate in one of the KT platforms we have formed. Such tripartite collaboration will enhance CityU's and Hong Kong's competitiveness in knowledge transfer. To date, two Memorandums of Understanding have been signed, one with the municipal government of Yangzhou and the other with the Longgang district government in Shenzhen. Similar model will be replicated in other important locations in the Mainland and discussions are underway in Chengdu and Yunnan. We believe these partnerships will strategically position CityU to provide high-quality local and regional KT services.

Recently, CityU also formed a strategic partnership with a Fortune Global 500 company, Amer International Group, headquartered in Shenzhen for collaboration in technology research, product development, promotion of technology application, application of technology projects and academic exchange.

CityU has assisted major technology transfer efforts in Mainland China. Mr David AI, CityU KTO Director, has been invited to join ITTN (International Tech Transfer Network) established under Beijing Municipal Commission of Science and Technology, as an international advisor. Mr Ai attended ITTN conference in Beijing in April 2015, and delivered multiple speeches there.

9. Continuing and Professional Development (CPD) Courses

The School of Continuing and Professional Education (SCOPE) provides part-time continuing and professional development courses to the community. In 2014-15, SCOPE delivered 1.39m student contact hours with $160m income in knowledge transfer activities. It has been one of the major providers of part-time top-up degree programs in various disciplines. In addition, SCOPE offers continuing and professional development courses as corporate training to private and governmental organizations. Its strategic direction is to expand corporate training activities using a Business-to-Business (B2B) approach, through strengthening the relationship with professional organizations and trade associations.

SCOPE also actively seeks to support University initiatives. Partnering with the School of Veterinary Medicine, it succeeded in bidding a substantial government tender on Waste Management and Meat and Foods Inspection for health inspectors of Food and Environmental Hygiene Department in 2014. It will continue to explore opportunities in knowledge transfer activities through collaboration with other units of the University.

10. High-level Consultancy Services

CityU is committed to contributing its expertise to support industry, commerce and the community. To achieve this goal, the University promotes high level consultancy and professional services, and encourages its faculty members to engage in such activities for the benefit of the society as well as the University. In the year 2014-15, the University solicited 57 consultancy projects with a total contract value of $5.34m.

11. Technology Transfer through Spin-off Companies

Research incubation and commercialization of research outputs are important knowledge transfer activities of the University. Established in 1991 as a wholly owned subsidiary of CityU, CityU Enterprises Limited (CityUE) has played an important role in these areas through establishment of subsidiary companies formed with faculty members. However, witnessing the success of Vitargent (International) Biotechnology Ltd. which is a technology start-up commercializing CityU's transgenic fish technology but formed and run by CityU students (now became alumni), we have realized that this new model of business incubation perhaps contains the magic ingredients to success. Over the years, we have reorganized the CityUE as start-ups formed with faculty members have graduated and left. In the future, CityUE will focus on incubating promising business ideas/ventures primarily from the students and young alumni. The role of faculty members in the business ventures will mainly be on technology consultation instead of day-to-day management as in the past. An incubation fund under CityUE is in the planning pipeline which will complete the entrepreneurship ecosystem portrayed by the University soon.

A report on CityU's entrepreneurial progress would be incomplete without an update on Vitargent (International) Biotechnology Limited. Vitargent evolved from a proposal in a business plan competition on campus, with three undergraduate students striving to commercialize CityU's transgenic fish technology for testing product safety in food and cosmetics. With coaching and support from the University, the trio won the HSBC Young Entrepreneur Regional Awards 2009-2010. They also came third in the 5th Lee Kuan Yew Global Business Plan Competition. These global awards together with the incubation funding support and venture capital investments set up Vitargent for healthy growth. In April 2015, it clinched the Grand Prix of the 43rd Geneva International Exhibition of Inventions of Geneva, for its first-in-the-world "transgenic medaka" and "zebrafish fish" embryo toxicity (FET) testing technologies, to enhance global product safety testing standards. The Geneva International Exhibition of Inventions is considered the world's most renowned invention show with exhibition of around 1,000 inventions developed by 750 companies and institutions from 48 countries. Both co-founders are CityU graduates who licensed CityU developed technology as the cornerstone of Vitargent.

12. Creating a Conducive Environment to Support Student Innovation and Entrepreneurship

12.1 Innovation Commons

Under the Discovery-enriched Curriculum (DEC), every student will be able to make an original discovery or invention during his/her study at CityU. To expand the University's capacity to bring intellectual property created by students to the marketplace, a one-stop service centre for innovation and entrepreneurship – "Innovation Commons" (IC), was set up in 2014. Modelled after Stanford University's similar program, IC is more than a static collection of books and information. Most importantly, IC is a cradle for young entrepreneurs to brew up their creative ideas leveraging on the mentor network and pitching opportunities provided. Seasoned professionals in law, venture capital investment, start-up operations, etc. host free consultation sessions known as "Expert Corner" on a weekly basis to provide advice and guidance. Professional staff from KTO also provides coaching for IP development.

Below are major student entrepreneurship related talks and activities organized in 2014-15 by, or at, IC:

- Sponsoring students to join HKUST Innovation and Entrepreneurship Training Camp 2014 (14-20 July 2014)
- InnoHunt Challenge (8-10 October 2014)
- Technology Start-up Support Scheme for Universities (TSSSU) Briefing Session (22 October 2014)
- Start-up Funding and Incubation Program (30 October 2014)
- Sponsoring students to join the Business of IP Asia Forum (4-5 December 2014)
- A Taste of Entrepreneur Thinking: How to Turn Your Idea into Business Plan in 5 Hours (12 and 19 January, 2 February 2015)
- Technology Start-up Support Scheme for Universities (TSSSU) Briefing Session (23 January 2015)
- TSSSU Face-to-face Coaching (3 February 2015)
- Venture Capital / Angel Funding for Your Start-up (3 March 2015)
- Intellectual Property (IP) (13 March 2015)
- Teaser Training (25 March 2015)
- Sponsoring students to join the TiE Hong Kong Start-up Matrix (26 March 2015)
- An Afternoon with Mobile Advertisement Experts from Youmi (30 March 2015)
- Start-up Funding and Incubation Program (27 April 2015)

Inspired by the flipped classroom concept, the University has commissioned to develop a CityU on-line guide with expert annotations to Web resources in innovation and entrepreneurship (I/E), to serve as a "virtual Innovation Commons". A prototype of the on-line guide was completed in June 2015 with further enhancement work ongoing. Unique characteristics of the on-line guide include the selection of the top 10-20 most useful Web resources on each major topic of I/E and most important of all, provision of expert comments to the Web resources to help users manage the vast amount of information available on-line. This cross-disciplinary collaborative project pools together expertise from KTO, CityU Apps Lab, CityU Library, and a faculty member specializing in entrepreneurship education and his research team.

12.2 Start-up Funding Schemes

With funding provided by the Innovation and Technology Commission of the HKSAR Government, the University is running a start-up funding scheme to support our students, alumni and faculty members to commercialize their innovative ideas or research results. Two annual rounds of funding have been allocated. A total of 16 young start-ups received funding support amounting to HK$8m. As a way to inspire and stimulate more promising entrepreneurs and to expand the upstream pipeline, we are contemplating to launch another funding scheme to support innovative ideas on a project basis. Together with the incubation fund to be rolled out by CityU Enterprises Ltd., these three funding schemes will shape the basic entrepreneurship landscape of the University to support start-ups in the early stage, formation stage, and mature stage. Other entrepreneurship partnership programs are under discussion with technology support organizations. We expect these new initiatives to be materialized in the next academic year and we will be able to provide more details in the next report.

12.3 CityU Apps Lab

With the mission of creating a stimulating environment where students can develop apps for smart communication devices, the CityU Apps Lab (CAL) aims to encourage and nurture students from different disciplines to develop apps, thereby enhancing their interdisciplinary knowledge and skills. The apps may also be turned into real applications for the benefit of

society at large. The apps developed by members of CAL cover broad areas ranging from health, lifestyle, music, shopping, etc. Notable examples include:

- Posture Check App - Get a Preliminary Postural Assessment in 1 Minute
- Get Close - Better On-line Shopping Experience by Virtual Fitting
- Robot-controlling App - Control the Motion of Humanoid Robots
- Organ Donation App - An Enhancement of Public Awareness to Organ Donation
- Heartbeat Monitor - A Non-contact Real-time Visual Feedback System for Heartbeat Signal

Not only can the students benefit from CAL, the general public is also welcome to receive free coding training via the Hour of Code Hong Kong Campaign offered by CAL since December 2014. Free coding workshops are run initially on the last Sunday of each month on campus, now extended to two more days in different locations to reach out to the community. Kids/youths and their parents, primary and secondary school teachers, and even elderlies can learn to code for free. By June 2015, around 1,200 participants have received coding training from CAL.

13. Knowledge Transfer by Students

13.1 IP Registration

Under the Discovery-enriched Curriculum, students are encouraged to be creative and innovative. They have developed attitude and ability to create innovative ideas that may lead to new business ventures. In 2014, two short-term Hong Kong patents arising from students' work were filed with details below:

Student Status	School / College	IP Title	Country Filed	Type of Registration
Undergraduate	College of Business	A Protective Anti-slip Fringe for Electronic Device	Hong Kong	Short-term patent
Undergraduate	College of Business	A System and Method for Translating a Sign Language to a Vocal Language	Hong Kong	Short-term patent

Furthermore, five student projects have been identified by KTO having potential to create IP. Coaching for IP development is underway.

13.2 Start-up Funding Received

13.2.1 Cyberport Creative Micro Fund (CCMF)

In addition to IP registration, student achievements on innovative business ideas were recognized by external bodies providing funding support to implement their innovative ideas. In 2014-15, seven teams of students succeeded in getting seed funding under Cyberport Creative Micro Fund – Hong Kong Programme (CCMF-HKP) and Cross-border Programme for their innovative projects. A grant of HK$0.1m in cash was awarded to each team in a 6-month project period for proof of concepts and/or prototype development. All the projects were derived from their personal discovery. Cyberport Creative Micro Fund (CCMF) is a highly competitive seed fund

set up to encourage innovation and creativity by sponsoring high potential start-up projects or business concepts in ICT-related areas.

Student Status	School/College	Project Title
Undergraduate / 2014 Graduate	College of Science and Engineering / School of Creative Media	E-ceipt
Undergraduate / 2014 Graduate	College of Science and Engineering / College of Business	HabiToStep
Undergraduate	College of Science and Engineering / School of Creative Media	Help Around
Undergraduate	School of Creative Media / College of Business	Mini-D
Undergraduate / 2014 Graduate	College of Science and Engineering / School of Creative Media	PiVoice
Undergraduate / 2014 Graduate	College of Science and Engineering / School of Creative Media	Storehouse and Lab Manager
Undergraduate / 2014 Graduate	College of Science and Engineering / School of Creative Media	WeTee

13.2.2 Technology Start-up Support Scheme for Universities (TSSSU)

The Technology Start-up Support Scheme for Universities (TSSSU) was newly set up by the Innovation and Technology Commission (ITC) to provide funding support to encourage students, alumni and professors of local universities to start up technology businesses and commercialize their ideas. Sixteen teams of CityU students/alumni/professors received TSSSU funding support in 2014-15 and 2015-16 totaling HK$8m with details given below.

Team	School/College	Company Name	Year of Award
Alumni	College of Science and Engineering	Cinme Tech Ltd.	2014-16
Professors	College of Science and Engineering/School of Creative Media	Kung Fu Motion Ltd.	2014-16
Undergraduate students	School of Creative Media	Spreadfast Interactive Ltd.	2014-16
Alumni	College of Business	The Worldpath Ltd.	2014-16
Alumni	School of Creative Media	Animae Technologies Ltd.	2014-15

Alumni	School of Creative Media	C4Cat Entertainment Ltd.	2014-15
Alumni	College of Liberal Arts and Social Sciences	Clothclip International Ltd.	2014-15
Undergraduate students	College of Business	GlobeXchange Co. Ltd.	2014-15
Alumni	College of Liberal Arts and Social Sciences	Hong Kong Bilingual Learning and Translation Studies Association Co. Ltd.	2014-15
Alumnus	College of Science and Engineering	Air Button Technology Ltd.	2015-16
Alumni	College of Science and Engineering	BeVoid Ltd.	2015-16
Undergraduate student/alumni/ professors	College of Science and Engineering	Jacky Instruments Ltd.	2015-16
Postgraduate student	School of Law	New System Technologies Ltd.	2015-16
Postgraduate student	College of Science and Engineering	NoPhish Technology Ltd.	2015-16
Undergraduate students	College of Science and Engineering	ProHub Ltd.	2015-16
Alumnus	College of Science and Engineering	Teorema Ltd.	2015-16

13.3 Student Consultancy Projects

While the student consultancy project scheme allows students to put to use classroom knowledge, the participating organizations may also benefit from fresh ideas brought by the students. For this reason, the Department of Marketing (College of Business) has been running the Marketing Company Consultancy Project for over 20 years, and more than 30 Mainland and Hong Kong companies have benefitted from the programme. The Department of Accountancy, also of the College of Business, runs a similar programme and partnering organizations include NGOs and social enterprises.

13.4 Student Placement and Internship Schemes

The University places strong emphasis on student placement and internship, since such opportunities offer two-way knowledge transfer between the students and industry.

The number of student placements and internships in 2014-15 totaled 2,254, which was 13% increase over the previous year.

College/School	Number of Student Placements and Internships
College of Business	584
College of Liberal Arts and Social Sciences	926
College of Science and Engineering	529
School of Creative Media	34
School of Energy and Environment	27
School of Law	154
Total	**2,254**

14. Impact Cases

Highlighted below are examples of significant knowledge transfer endeavors of the University carried out during the year under review.

14.1 Interactive Sensory Programme for Affective Learning (InSPAL)

An innovative virtual reality (VR) programme developed by Professor Horace IP Ho-shing and his research team from the Centre for Innovative Applications of Internet and Multimedia Technologies (AIMtech Centre) is being used to help severely intellectually disabled (SID) students overcome learning challenges.

Funded by the Quality Education Fund, this VR programme known as "Interactive Sensory Programme for Affective Learning" (InSPAL) helps to strengthen pre-learning abilities and promote self-awareness through learning scenarios that focus on repeated training. The research team has developed InSPAL over the past three years in collaboration with the Mental Health Association of Hong Kong-Cornwall School.

InSPAL is a unique psycho-educational programme that creatively combines virtual reality technologies, 3D motion capture and devices that release scents, bubbles and artificial snow under the principles of psychotherapy and relevant pedagogy. An example of the learning activities involves watching animated footage of a flowing river in virtual reality using 3D glasses. Students learn to balance and coordinate their bodies while virtually moving across the water towards a sandy beach.

The initial training sessions involved eight classes of SID students scheduled over an 18-month period. Before the sessions, each class went through a preparatory programme that allowed the SID students to get accustomed to wearing 3D viewing glasses. Then they went through 32 training sessions to experience four scenarios of two of the learning domains.

The training has had a significant impact on the behaviour and learning of participants. There is evidence to show that participants have increased interest in learning and advanced the level of concentration.

Since the programme was launched, local centres for senior citizens have showed interests in using the system to train older members of society with mobility impairments. In addition, Cornwall School has opened an InSPAL resource facility centre that other organisations can

access. A local version of the InSPAL system is also being set up in Chengdu to meet local demand for virtual reality technology in special education and psychology.

14.2 Novel Ultra-high Strength Steel

With the rapid development of modern industry and defense, high-strength steel is becoming more and more important in industries like aerospace, defense, power plants and aviation, etc. Ultra-high strength steel is a specialized kind of high-strength steel with tensile strength ranging from 1400 to 2000 MPa. It has been widely used for making rocket engine casing, aircraft landing gear, bullet-proof steel, etc. In recent years, ultra-high strength steel is becoming more popular in traditional industries such as construction, machinery manufacturing, automotive industry, etc. Many military and even civilian equipment nowadays is made of ultra-high strength steel.

Prof LIU Chain Tsuan, University Distinguished Professor at CityU, is a world leader in the field of intermetallic and metallic materials. He has discovered an innovative way to manufacture ultra-high strength steel combining nanocluster-strengthening with traditional strengthening methods. The nanocluster-strengthened steel has an ultra-fine grained microstructure, and it is mainly strengthened by a high concentration of uniformly distributed particles. This ultra-high strength steel has many advantages over materials made of conventional methods in terms of toughness, weldability, and corrosion resistance, etc.

The technology has been licensed to a high-tech steel machinery manufacturer in Mainland China whose steel products are widely used by more than 70 large and medium sized steel plants in China. It has also successfully entered into overseas markets like India, Brazil and Saudi Arabia.

Machinery manufacturing is only one of the potential applications of the novel ultra-high strength steel. CityU is actively exploring other applications in order to broaden its impact on the society at large.

14.3 Vietnam Caves Expedition

To embrace the University's Discovery-enriched Curriculum (DEC) introduced in 2012, Associate Professor Mr Scott HESSELS of the School of Creative Media has designed the course on Media Art and the Environment to construct the context where a discovery could be made. The learning model taps into skills required at different stages of a larger project, for example, starting with a challenging journey to the planet's inaccessible sites and closing with a demanding exhibition which required the students to use emerging media technologies to creatively share their discoveries with the public.

The destination for 2014-15 academic year was wild jungle caves in Vietnam which were only discovered three years ago. These caves are one of the last untouched places on the planet and home to a variety of plant and animal life that appear nowhere else. Vietnam is struggling with how to develop tourism in the area while also protecting this fragile resource. School of Creative Media's student team is the first group of artists and designers to see many of these amazing underground formations, and the exhibition as a result of the trip helped to foster a larger conversation about finding the right balance.

The exhibition, Fade to Black, was held at the Run Run Shaw Creative Media Centre (CMC) from 3 to 13 June 2015. The 14 artworks were presented in the form of videos, interactive films, generative animations, dome-based movies, installations and projections, among other formats.

The end-products were exciting and original. For example, one student recorded loud bursts of sounds within the caves and then computationally analyzed them for reverberation. The pattern was then processed and visualized as generative animation to contrast the sounds of silence in overcrowded cityscapes in Hong Kong.

Another student measured colours in the light inside the caves and represented them graphically in 3D. The interactive display increased in colour as more audience members approached the screen. The work conveyed the message that pollution and human-induced influence was nearly undetectable; even artificial lighting had an environmental impact.

The Vietnam Caves project is not just emblematic of what the DEC is designed to accomplish but also proved to be an effective outreach tool for environmental awareness and the University's publicity. The students attained social network followers and the media coverage has been extensive and showed how tremendously the project has impacted society.

14.4 The Carbon Trade Game Programme under the City-Youth Empowerment Project – Bringing Participatory Learning Experiences on Environment and Sustainability to Local Schools and Communities

City-Youth Empowerment Project (CYEP) was established in 2005 by Dr Elaine AU of the Department of Applied Social Sciences as a non-credit bearing service-learning project open to all CityU students, mobilizing them to serve the underprivileged, enhance civic and social commitment, and integrate community practice-oriented knowledge to the academic field. The Carbon Trade Game Project was an initiative under CYEP and was funded by the UGC KT Earmarked Fund. The Project leveraged on the student volunteers of CYEP to provide a long-term education program for the public at large using the 'Carbon Trading Game' designed by Teng Hoi Conservation Organization and other interactive educational tools designed by CityU.

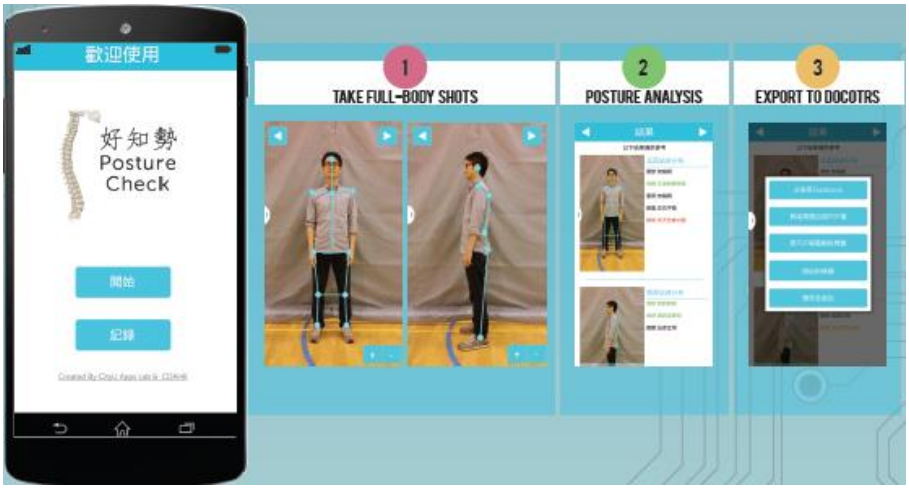
The Carbon Trade Game project intends to:

- Enhance the learning of environmental protection and sustainable development for underprivileged school children who have little access to environmental knowledge and information.
- Provide an Other Learning Experience for school children on Climate Change issues and prepare them at a young age for this complex challenge.
- Train our CityU volunteers to be proactive, adaptive, and creative thinkers and problem solvers as part of liaising with schools to set up and run the Carbon Trade Game.
- Through participating in service design and coordination, to educate volunteers on the complex climate change issues and encourage them to explore sustainability in their own community and their future career.

Sixteen Carbon Trading Games and all sorts of environmental related activities, such as farming, recycle paper workshops, visiting Zero Carbon Building, Ocean Park Rainforest and North Pole behind-the-scene tours were organized. Throughout the whole year from September 2013 to July 2014, CYEP Carbon Trading Game service had mobilized 241 CityU CYEP volunteers, engaged more than 406 service recipients from a diverse background, and accumulated 673.5 service hours for the whole project. The game has proven to be a great tool for environmental education and in enhancing social development in primary and secondary schools. The social development aspect of Carbon Trade Game is shown as effective when it is run in underprivileged communities. The game has helped to enhance communication, teamwork and sense of belonging to the communities. While the game has been introduced to a number of underprivileged communities (e.g. low income and new arrival children and parents, youth with disabilities), Band 3 secondary schools, and brought environmental knowledge to these groups, pre- and post-test questionnaires revealed that participants have gained more environmental awareness and deeper learning strategies after engaging in the activities. Not only did the service recipients benefit from the services, the student volunteers also gained invaluable experience and were trained to be proactive, adaptive and creative thinkers and problem-solvers when liaising with schools.

14.5 Posture Check App Designed by an Undergraduate Student in Cooperation with the Chiropractic Doctors' Association of Hong Kong (CDAHK)

Good posture is an easy and very important way to maintain a healthy mind and body. To arouse public awareness of spinal health and good posture, an undergraduate student, Rayne KWOK (Department of Electronic Engineering), in cooperation with the Chiropractic Doctors' Association of Hong Kong (CDAHK), designed a posture check app that can render a preliminary assessment of one's posture and produce an assessment report within one minute. After taking a front view and side view of one's standing position, the Posture Check App will do an analysis and generate a report to see if any postural problems are identified. The report can be sent to a chiropractic doctor for consultation at the tip of one's finger. It can also be saved in the App to keep track of the postural problems. CDAHK and chiropractic doctors have been using Posture Check App to offer free spinal screening to students and the general public to raise awareness of spinal health. The App is available on Google PlayStore for free download.



15. Summary of Knowledge Transfer Performance Indicators

(Amounts are in Hong Kong dollars)

Performance Indicators	**2013-14**		**2014-15**	
No. of patents filed in the year	[1]116		**70**	
No. of patents granted in the year	[1]22		**25**	
No. of active licenses during the reporting year (inclusive of newly granted ones)	Type	[2]No.	Type	**[2]No.**
	Exclusive	12 (2)	Exclusive	**13 (2)**
	Non-exclusive	32 (21)	Non-exclusive	**34 (15)**
	Total	44 (23)	Total	**47 (17)**
Income generated from intellectual property rights	$0.79m		**[3]$1.76m**	
Expenditure involved in generating income from intellectual property rights	[4]$6.3m		**$7.6m**	
No. of economically active spin-off companies	7		**6**	
Net income generated (or net loss arising) from spin-off companies of the University	$0.93m		**[5]$2.5m**	
No. of collaborative research projects and income thereby generated (inclusive of ongoing and new projects)	22 / $24.22m		**33/$21.96m**	
No. of contract research projects (other than those included in "collaborative researches" above), and income thereby generated (inclusive of ongoing and new projects)	128 / $38.03m		**147/$43.17m**	
No. of consultancies, and income thereby generated	56/$7.35m		**57/$5.34m**	
No. of student contact hours in short courses or e-learning programmes specially tailored to meet business or CPD need	1.22m		**1.39m**	

[1] *Adjustment has been made due to a time delay in receiving formal notification from patent offices.*

[2] *Figure in bracket indicates the number of licenses of IP not protected by patents.*

[3] *The licensing income on accrual basis was $6.57m while the actual received was $1.76m only because some deals were concluded close to year end while another one requested for deferred payment.*

[4] *Adjustment has been made.*

[5] *Financial data of some companies cannot be obtained and is not included in the report.*

No. of equipment and facilities service agreements, and income thereby generated	222/$0.42m	**153/$0.3m**
Income received from Continuing Professional Development (CPD) courses	$156m	**$160m**
No. of public lectures/symposium/exhibitions and speeches to a community audience (seminars and workshops are included)	641	**665**
No. of performances and exhibitions of creative works by staff or students	120	**107**
No. of staff engaged as members of external advisory bodies including professional, industry, government, statutory or non-statutory bodies	286	**320**
No. of student placement/internship	1989	**2254**

16. Self-evaluation of Performance in 2012-15 Triennium

The year 2014-15 marked the end of the 2012-15 (second) triennium of Knowledge Transfer Earmarked Funding provided by the University Grants Committee. With a great deal of efforts during the first triennium to build up capability in knowledge transfer, CityU began to reap the fruits in the second triennium, as evidenced in how the strategic plans laid down in the Second Initial Statement were successfully accomplished.

The four strategic objectives were:

a. Strengthening infrastructure for technology transfer and adopting proactive approaches to new IP identification;

b. Promoting KT in non-technology disciplines;

c. Nurturing a culture of entrepreneurship particularly among students; and

d. Expanding KT into the Mainland.

In the area of technology transfer, a new state-of-the-art IP management system is replacing the old system for more effective IP management. More significantly, the University IP policy was revised and the patent application mechanism was streamlined, thereby resulting in a big jump in the number of patent applications from an annual target of around 50 as laid down in the Second Initial Statement to an annual average of 80 in the past three years, over-reaching the target by 60%. The improvement in IP inventory was also attributed to the proactive efforts of our licensing staff in maintaining close dialogues with our faculty members and departments which facilitated IP excavation.

Six years ago when KT was first introduced, the concept was alien to many faculty members in the non-technology disciplines. Satisfactorily, our College of Liberal Arts and Social Sciences now has the Excellence in Knowledge Transfer Award (since 2012) offering recognition to KT accomplishments; it also boasts a college statement detailing KT aspects including the scope and strategies of developing KT, an annual KT symposium, a dedicated college website promoting KT information and KT accomplishments. Furthermore, the University is running a funding scheme supported by the KT Earmarked Fund to support worthwhile KT projects proposed by researchers from non-science and engineering disciplines, with a view to promoting KT in these disciplines.

In the area of student entrepreneurship, new initiatives including the Innovation Commons, a start-up funding scheme, an On-line Innovation and Entrepreneurship Guide, and the CityU Apps Lab are now in place to support this area of work.

Lastly, apart from setting up a technology transfer centre in Shenzhen to support technology transfer in the Mainland, strategic partnerships with Mainland governments were made to establish KT platforms comprising research and development collaboration, technology licensing, and technology consultation for mutual benefits.

Moving into the third triennium, more emphasis will be put on nurturing student KT development such as patenting and business venturing apart from the usual KT endeavors.

Report prepared by the Knowledge Transfer Office and approved by

Professor Jian LU
Vice-President (Research and Technology)

Date : 31 July 2015

Knowledge Transfer in College of Business

The College of Business (CB) and its member departments have been involving in a wide range of KT activities. These KT activities typically include (i) community engagement such as delivering public lectures, media interviews, press conferences and workshops; (ii) involvement in external advisory bodies including professional, industrial and the government; and (iii) student placement and internship. There are around 600 students taking part in student placement and internship programs during the reporting period.

Highlights of KT Activities of Member Departments

Department of Accountancy – The department has been running student consultancy project scheme for many years which is well received by participating organizations. Fresh ideas from fresh eyes sometimes produce very promising results. Worth mentioning here are two examples of these projects.

- *Knowledge Transfer Social Enterprise Consultancy Project one: Poverty Alleviation through Training and Education*, in which a team of four accounting students under the supervision of a senior social enterprise management consultant and Dr Sidney LEUNG apply their accounting and finance knowledge in consultancy work for a Continued Education Centre of St. James' Settlement. The project team helps to review the existing operation and financial plans for the Centre and propose recommendations for efficient operation.

- *Knowledge Transfer Social Enterprise Consultancy Project two: Social Enterprise Restaurants.* Four accounting students will help a social enterprise running three restaurant branches develop a sustainable financial plan and business model to achieve best synergy in cost saving and income generation.

Department of Economics and Finance - Different kinds of KT activities were conducted, including one granted patent about investment portfolio optimization system which also gave rise to a new start-up; a seminar and four conferences. In addition, a number of faculty members were engaged as members of External Advisory Bodies and over 100 students participated in the placement/internship schemes. The department will keep up its efforts on organizing these activities to improve its KT performance in the coming year.

Department of Information Systems - A Technology-Centric Portfolio-Based Research Strategy that consists of research grants, conference and journal publications, community leadership, and in particular knowledge transfer is collectively used. It aims to achieve excellence in research and to strengthen the effort of building knowledge transfer capabilities for impactful influence in the community. The overall research strategy is unique because the faculty has strong IT expertise and work in the forefront of Internet technologies for business excellence and enterprise transformation.

Department of Management - Two major KT activities worth mentioning are: (i) student placement/internship scheme into professional settings; (ii) Forum on Chinese Strategic Leadership. While the internship placements continue to be effective sources of knowledge transfer, the Department of Management introduced the new Forum on Chinese Strategic Leadership this year which was well received by the general public. In order to build up its knowledge transfer offerings, the department will continue to shuffle its resources and time to launch more activities in the coming year.

Department of Marketing - During the reporting period, considerable effort has been made to organize the China Marketing International Conference which was held at Wuhan, China in July 2014. It was co-organized by the Department of Marketing of CityU, Huazhong University of Science and Technology, University of South Carolina, and National Taiwan University of Science and Technology. The department successfully invited about 245 scholars from over 20 countries, along with about 100 practitioners. The Conference has attracted wide media exposure in Mainland China as well as overseas. In addition, a significant amount of media exposure has been produced in various media including local newspaper, magazine and radio to give an advice on admission interview, job interview and marketing strategy. The faculty members were actively engaged in external advisory bodies. For example, two professors served as a guest editor for a special issue of the Journal of Business Research and Industrial Marketing Management. A large proportion of faculty members have served as editor-in-chief, editorial member, or ad hoc reviewer for various international academic journals. Several professors have served as honor professors or adjunct professor at various universities in Mainland China. For student placement/ internship schemes, the department applied for the central fund and successfully obtained a donation from The Chinese General Chamber of Commerce (CGCC) to support the students to participate in the summer internship programme. In summer 2014, they had 89 BBA China Business and Marketing major students working as full-time interns in Hong Kong and China for about 2 months. The department will continue to hold a joint International Marketing Conference with US and European universities and the top Chinese universities to develop our collaboration with various audiences. They will continue to encourage and contribute to the student internship programme that motivates our students' participation.

Department of Management Sciences - Over the years, the department has been encouraging knowledge transfer via providing consultancy services to the public/private organizations, academic activities, student internship and media interviews. There is a good track record in knowledge transfer activities in the department. The Statistical Consulting Unit (SCU) and the Energy and Environment Policy Research Unit are well-established core centres for developing and bringing knowledge transfer into full play. The Centa-City Property Price Index and Hong Kong Consumer Confidence Index (HKCCI) are notable examples of community engagement. In addition, Faculty members also actively take up honorary consultant roles in the committees of the public/private organizations, hence directly providing professional comments and advices to the community. The department, on the other hand, plays an important role in coordinating student placement internship which benefits both students and the partner employers in terms of career and manpower resources. Planning for the coming year, the department will keep its uniqueness of knowledge transfer and explore more aspects such as social events, community engagements, publications etc.

Knowledge Transfer in College of Liberal Arts and Social Sciences

The College of Liberal Arts and Social Sciences (CLASS) has been actively engaged in a wide variety of activities.

CLASS continues to show a steady growth in KT activities this year. Its faculty members conducted 468 KT activities during the reporting period (an increment of 4% over 2013-14) through delivering public lectures, performance, exhibitions, media interviews, press conferences, newspaper articles, radio shows, community services and workshops etc. Seventy-nine faculty members (an increment of 46% from 54 in 2013-14) served as members for approximately 290 local and overseas external advisory bodies, for example the Home Affairs Bureau of HKSAR Government, Hong Kong Examinations and Assessment Authority, Hong Kong Housing Authority, Hong Kong Social Workers Association, Radio Television Hong Kong, Correctional Services Department, Chiang Ching-kuo Foundation for International Scholarly Exchange, China Computer Federation Big Data Task Force, International Phonetic Association, Australian Housing and Urban Research Institute and Equal Opportunities Commission. They offered external advice and led as Chair or Director of various major organizations around the globe, including the Firetree Asia Foundation Hong Kong, Hong Kong Association of Classical Poetry, Hong Kong News-Expo Limited, Chartered Institute of Housing Asian Pacific Branch and Hong Kong Association of the Deaf.

CLASS also organized internationalization activities for students including international exchanges, professional internships and overseas summer schools. More than 900 student placements/internships were offered by CLASS and the departments in different industries such as hotel, public policy, publishing, media, public relations, marking, education and social services.

In addition, CLASS has publicized a College Statement on KT describing the scope and strategies of developing KT in CLASS via College website to enhance KT in CLASS at the College, departmental and personal levels. In view of CLASS broad ranges of community engagement activities, CLASS was invited to discuss the collection of KT data at the University level on 13 February 2015 and shared the views on developing the University's KT database.

Knowledge Transfer in College of Science and Engineering

In the year under review, the College of Science and Engineering (CSE) and its member departments continued to actively participate in a wide range of KT activities to transfer their professional knowledge and research results into practical applications to benefit industry and society. A substantial portion of the KT outcomes reported in section 15 was attributed to the concerted efforts of CSE faculty members. Below are KT activities of individual member departments.

Department of Architecture and Civil Engineering (ACE)

ACE is active in consultancy and contract/collaborative research with strengths in wind tunnel testing and fire loading study. There were a total of seven on-going departmental-based consultancy projects amounted to HK$2.97m, three consultancy projects amounted to HK$0.38m, and 17 Mainland funded research projects amounted to RMB16.4m undertaken by ACE staff. Besides, nine contract research projects amounted to HK$5.83m were awarded and progressing well. In addition, ACE colleagues also conducted research projects under the Innovation and Technology Fund, Health and Medical Research Fund and Public Policy Research funding schemes to facilitate the formulation and development of government's policies in the respective disciplines.

Notable consultancy projects included wind test for aerodynamic wind availability study for housing sites in Yuen Long South; pressure testing and wind testing for hotel buildings in Colombo, etc. The research results generated from these projects will be of practical use to professionals and researchers involved in the design of high rise buildings and urban planning.

Another consultancy project for the study of the correlation between fire load and movement on passenger flow in Sheung Shui and Lo Wu stations of the Mass Transit Railways was completed during the reporting period. The project team has developed an agent-based pedestrian flow simulation model – CityFlow to study pedestrian/crowd flow in the MTR stations. A comprehensive database, prediction of passenger flow pattern in stations and the associated areas have been established. The results are expected to be used for planning of the fire protection strategy at these stations and for improvement in station design.

Department of Physics and Materials Science (AP)

AP colleagues are active in KT activities which contribute to different aspects in the society including government advisory bodies, professional institutions and tertiary education sector, etc. in additional to the traditional KT activities. Examples of these include Council member and Professional Assessment committee assessor of Hong Kong Institution of Engineers, Member of Radiation Board and Radiological Protection Advisory Group (Food and Health Bureau, HKSAR Government), etc. There are also AP colleagues serving as Scientific Advisors for major scientific research programmes in Australia. In the reporting year, the department accepted the invitation from a local TV channel and sent colleagues to appear on popular science programmes broadcast locally.

Colleagues in the department initiated a Croucher Summer School series on Neutron Scattering and Gordon Research Conference on Neutron Scattering in Hong Kong to raise the awareness as well as the overall level of knowledge in the relevant field among the academia and local R&D community.

The department strongly encourages colleagues to reach out and contribute directly to the society. The department will work towards maintaining high-level and high-quality capabilities and external

links for KT.

Department of Biomedical Sciences (BMS)

Department of Biomedical Sciences carries out internationally competitive and cutting edge research in biomedical sciences, promotes inter-disciplinary and multi-disciplinary collaborations, and facilitates the translation of basic research to industries. The research focus/expertise of the current faculties in the department includes: (1) Cancer Biology; (2) Regenerative Medicine; (3) Neuroscience; and (4) Nanomedicine.

There are 90 ongoing research projects, of which 20 projects received funding of HK$1m or above. Notable examples included two Collaborative Research Fund (CRF) projects on "Development of Cell Manipulation Tools for Probing Functional Mechanism of Hematopoietic Cells: Robotics, Optical tweezers, and Hematopoiesis" and "Four Dimensional Live Imaging of Zebrafish Embryonic Development Using Light Sheet Microscopy and Biocomputational Tools" (HK$2.4m funding); and an Innovation and Technology Fund (ITF) project entitled "Development of Anti-cancer Therapy with Externally Activated Nanomedicine" (HK$2.1m funding).

Department of Electronic Engineering (EE)

Knowledge transfer has been continuously encouraged amongst faculty members. The department continued to maintain its momentum on knowledge transfer activities by producing respectable paper publications in top-notch journals such as IEEE transactions/ magazines (281), publications of books/ book chapters (8), delivering talks or keynote speeches (121), organizing technical seminars/ workshops (95), licensing, patent application (133), as well as providing consultancy services (13 projects amounting to HK$2.94m) and contract researches (HK$15.5m from 17 on-going and newly-approved projects). Faculty members are also sitting on different professional positions such as being Member of the Engineering Panel of RGC, Deputy Chairman of the HKIE Accreditation Board; Advisory Board Member of the Sensor Networks International Scientific Advisory Committee (SNISAC), Melbourne University, Australia; Assessor of the Australian Research Council; Member of the Hong Kong Construction Industry Council Course Advisory Panel, etc. Furthermore, a faculty member has close interaction with the government in legislative formulation, and development of policy in his capacity of the District Councilor of Kowloon City District Council. Meanwhile, the department continued to pay concerted effort on building close relationship with the industry, keeping itself abreast of the latest trends in the market and make necessary change in its major curriculums to cope with the fast- and ever-changing world development in technologies. Since 2010-11, the department has launched the Industrial Placement Scheme which offers 60-80 additional placement opportunities to EE students every year.

Department of Mathematics (MA)

Faculty members of MA are actively involved in research projects which are expected to have significant impact on the society. Prof. Daniel W.C. HO's recent research "Cooperative Control and Estimation in Networked Systems with Distributed Event-Triggered Communication Protocols" investigates an emergent technology to be applied to multi-agent systems with the aim of saving energy resources in the operations. The research would have both theoretical and practical significance in advancing technologies of networked complex systems. Prof. Benny Y.C. HON works with doctors from Union Hospital and Queen Elizabeth Hospital, local and mainland Universities in his research "Computer Aided Diagnosis/Detection System for Liver Transplantation" aiming at developing a feasible and efficient computer aided system for the detection of the main factors (quality, size, vascular and biliary anatomy) of the liver from CT or MRT images. This will help utilize split graft process and shorten the operation time of patients, thereby enabling new technological developments to promote new approaches to learning and

training. Dr. Guo LUO is working on a research project with Prof. Oscar P. BRUNO (California Institute of Technology, USA) on "Efficient Implementation of an AMR-type Adaptive FC-WENO Hybrid Solver to develop an adaptive-mesh-refinement (AMR) type PDE solver based on the method of Fourier continuation (FC) and weighted essentially non-oscillatory (WENO) schemes. The solver can be applied to simulate and analyze a wide range of problems which are important in aircraft design and manufacturing or non-invasive medical treatments of cancers. Prof. Dingxuan ZHOU has devoted his efforts in his project on "Approximation Analysis of Information Theoretic Learning and Ranking Type Learning Problems" to explore managing big data in science and technology. It is expected that this project would establish mathematical foundations for some efficient methods in information theoretic learning and ranking type learning algorithms to analyze and process big data.

To promote inter-departmental collaboration and interdisciplinary research, Prof. Felipe CUCKER is working with Dr. H. RODRIGUEZ (SCM) in the project "Art and Mathematics" and as a member of the Center for Robotics and Automation, Prof. Daniel W.C. HO continues to work with EE colleagues in developing and disseminating new knowledge, systems, methods and technology to integrate cyber-infrastructure with engineering systems aiming at enabling new technological developments to promote new approaches to learning and training.

Department of Mechanical and Biomedical Engineering (MBE)

The department has made knowledge accessible to the community by publications, delivering talks or speeches and organizing technical workshops/seminars. During the reporting year, 11 technical symposium, forum, and seminars were organized by the department or co-organized with local, mainland, and overseas institutions. In particular, ITF projects commercialization workshop on "Anti-sticking Coatings for Plastic Injection Molding Applications" and CVD technology forum on "Development of Zero-defect Coating Technology for the Watch Industry" certainly reap substantial benefit for local industry and company. The department has also built close connections for KT activities with the society through providing consultancy services and contract research. There are a total of 19 on-going consultancy projects (including contract research, donations, ITF, Germany/Hong Kong Joint Research Scheme and NSFC/RGC Joint Research Scheme) at a total value of HK$30.74m undertaken by MBE researchers, with six newly-approved projects in 2014-15 totalling HK$6.92m. Mainland grants of a total of RMB6.56m were also granted to five MBE researchers in the recording year. In 2014-15, there are 10 companies providing a total of 20 internship places (including 50% of students from the Total Quality Engineering (TQE) major co-hosted with SEEM) through the Co-operative Education Centre's Co-operative Education Scheme and Industrial Attachment Scheme to the students. Recently, a workshop of production procedure and recipe for nano-diamond film coating using hot-filament chemical vapor deposition (HFCVD) equipment was successfully organized by Dr. Lawrence LI.

Department of Systems Engineering and Engineering Management (SEEM)

The department of Systems Engineering and Engineering Management (SEEM) actively involves in knowledge transfer activities. SEEM engages in various contract research projects. Industrial collaborators include Syncrude Canada Ltd, The Boeing Company, Towngas, Huawei Technologies Co., Ltd., Hysan Place, SAE Magnetics (HK) Ltd., etc. SEEM's faculty members successfully developed an effective transduction system and algorithms to diagnose the health of pipes and to evaluate the severity of corrosion. The research work has helped Towngas to detect the corrosion in natural gas pipes covered by walls in the residential buildings in Hong Kong.

SEEM organized and hosted the third International Conference on the Interface between Statistics and Engineering (ICISE) in December 2014. The conference attracted 150 international scholars and provided a platform for innovative creation, development, and dissemination of research ideas

and results on the interface between statistics and engineering for the support of complex system design and operation, quality and reliability improvement, and optimal proactive decision-making. Scholars discuss topics such as applied statistics, data mining, quality and reliability engineering, among others.

Knowledge Transfer in School of Creative Media

In the reporting year, the School of Creative Media (SCM) has achieved notable outcomes in knowledge transfer through reaching out extensively to the public, gearing research towards excellence in cultural heritage conservation and visualization as well as driving effective initiatives within the School. Either being an organizer or a supporting organization, SCM has put together numerous world-class exhibitions and conferences including Fleeting Light and the 20th International Conference on Virtual Systems and Multimedia (VSMM), in which the public was exposed to the latest developments in media arts. Fleeting Light, which was well-received far and wide, exemplified the School's knowledge transfer by bringing together renowned and budding international and local artists to exchange art practices and experience as well as challenging the public's visual perception on art and cityscape.

The research centre's project Hong Kong Martial Arts Living Archive introduced Kung Fu traditions to the public by visualizing them with cutting-edge 3D motion capture technology, through which knowledge is transferred and tradition perpetuated. SCM's award-winning festival, CityU 2014 – Year of Art & Culture, engaged the University members, the art community and the public with a diverse variety of high-quality art exhibitions and symposiums.

By involving staff and students in home-grown events with international participation - exhibitions, performances, symposiums and conferences - SCM has continued to expand the knowledge transfer capacity of staff and students by keeping a vibrant ambience for idea exchange and collaboration. The School has spearheaded the University's initiatives for knowledge creation and transfer among students and faculty members under the Discovery-enriched Curriculum (DEC). The Vietnam Caves Expedition and SCM course SM3703 Media Art and the Environment, designed and implemented by Mr Scott HESSELS, is considered exemplary of what DEC is set to achieve. In the expedition, 14 SCM students went to explore the unique characteristics of Tu Lan Caves in Vietnam by applying the interdisciplinary approaches and perspectives they learned in the classroom. In the end, they transformed the scientific data collected there into artworks to raise the public's awareness about the extinct environment.

The total figures of participants in knowledge transfer activities can be summarized as below:

No. of Faculty Engaged in Knowledge Transfer Activities	21
No. of Posts of Faculty's Participation in External Advisory Bodies	73
No. of Students Participating in Internship Programmes	34
No. of Companies Participating in Internship Programmes	24

SCM faculty's extended knowledge transfer capacity in the reporting year was demonstrated by their active participation in up to 73 posts in a variety of external advisory bodies. Half of these different advisory capacities were entrusted to the faculty by invitation from overseas organizations or institutes. Through these external responsibilities, SCM's influence has been made prominent in society through advising education curriculum, reviewing academic publications, pioneering research development, formulating best practices for industry, developing policies and shaping art development directions of various institutes and art organizations.

The internship programmes in SCM engage with various digital and traditional media, art, cultural companies and organizations, including those in the fields of games, animation, visual effects, graphic design, 3D modeling, interactivity, TV and film production, script writing and editing, arts administration, art and film research, art and media education, etc. The interns transfer their knowledge learned through their studies at SCM (for example, cutting-edge technologies in media

and animation) to the industries. The industries, in turn, can benefit from aligning their technologies with world-class standards.

In addition, the faculty has undergone knowledge exchange by a variety of means such as engagement in consultancies, research, artistic partnerships, initiation and development of international exchange and internship opportunities for students. These kinds of knowledge transfer are of key significance in shaping the foundation of the creative media industry and education.

Knowledge Transfer in School of Energy and Environment

The School of Energy and Environment (SEE) is the first and the only one in Hong Kong. SEE was founded in July 2009 with the mission to perform cutting-edge research and provide professional education in energy- and environment-related issues. The faculty staff in SEE is proactive in participating in knowledge transfer activities, like contract research, school consultancy, community services, external advisor bodies, etc. which developed interactive exchanges with government, collaborators, related organizations, and society in general.

SEE worked with Metro Daily and South China Morning Post by contributing articles to promote SEE and the respective research areas of faculty staff, and also inspire the general public to care and recognize the importance of energy and environment issues, so as to promote CityU's excellence in research and professional education, and care for the community and environment. Prof. Johnny CHAN, Dean of SEE, contributed monthly articles on different topics to the education column of Metro Daily while the faculty staff in SEE contributed periodic articles on a particular subject to the Young Post (South China Morning Post) as well.

Faculty staff in SEE has been interviewed by various media, such as Wenweipo, Mingpao, South China Morning Post, Sing Tao, and other newspaper publishers on innovative research and technology that help transfer innovative knowledge to the general public.

Outstanding Knowledge Transfer Initiatives

To promote academic and commercial exchange in sustainable energy policy and technologies with international experts, world renowned experts gathered together at CityU for "5th International Conference on Energy – Sustainable Energy Policies and Technologies" hosted by SEE on 15-17 October 2014. Ir Dr Otto POON, Chairman of Conference Steering Committee, delivered a welcome remark while Mr WONG Kam-sing, Secretary for the Environment, HKSAR Government, delivered a keynote address. Participants enjoyed the individual talks by the international energy experts for knowledge and experience sharing so as to improve the knowledge of the latest technologies and policies while discussing future challenges and developments.

To broaden the knowledge of the younger generation in the fields of energy and environment, ever since 2010, SEE has delivered a number of talks on various topics to secondary school students. The expert talks were conducted on 2 and 4 July 2014 with around 200 participants from six schools. SEE also offers a number of expert talks which can be conducted on the CityU campus or the secondary schools as requested.

SEE also received a group of students from the PLK Camões Tan Siu Lin Primary School on 19 January 2015. Being interested in the topic of Typhoon, the students interviewed Professor Johnny CHAN. They had also video-taped the interview so that they could share information with their fellow students.

Knowledge Transfer in School of Law

Two of the major forms of knowledge transfer by universities and academics are through contract research and provision of consultancy services, which enable universities/individual scholars to transfer their expertise to the necessary organizations/institutions, the broader society at large, or even internationally. Below are some examples of contract research and consultancy services performed by the Law School's colleagues during the reporting period:

- Prof WANG Guiguo provided expert advice for reviewing and revising the Chinese Law on financial matters in the case of Asian Development Bank, served as an Arbitrator in a commercial dispute resolution in the case of South China International Economic and Trade Arbitration Commission, provided expert legal opinion against Sanum Investment Ltd. before the High Court of Singapore.
- Prof GU served as an Arbitrator for Respondent in the case of SHEN M2013226.
- Dr Priscilla LEUNG led the NGOs on commenting on the policies in relation to the environmental protection and the public policy.
- Prof Geraint HOWELLS acted as Advisor to European Consumer Association in their training project COJEF II.

In addition to their excellent achievements in teaching and research, colleagues of the Law School also engage in knowledge transfer through serving as members of professional bodies, government bodies, statutory bodies, and being given visiting or adjunct appointments by other universities, for example, during the reporting period:

- Prof GU Minkang is member of the Maritime and Aviation Fund (MATF) and the Tripartite Taskforce and member of the Editorial Board of the Hong Kong Lawyer;
- Prof HOWELLS is advisor of the Legal Education Fund Company Ltd.;
- Prof LIN Feng member of the Overseas Lawyers Qualification Examination (OLQE) Committee, Director of the Hong Kong Foundation for Legal Studies, member of the Law Reform Commission;
- Prof WANG Guiguo is adviser of the Ombudsman of HKSAR Government, member of the Telecommunications (Competition Provisions) Appeal Board of HKSAR Government.

To facilitate academic exchange and to provide a platform for disseminating legal information and knowledge to academics, students, practitioners, as well as the interested general public, conferences and public lectures/seminars are organized on a regular basis.

During the reporting period, the School of Law, together with the three research centres under it, namely the Centre for Chinese and Comparative Law (RCCL), the Centre for Judicial Education and Research (CJER) and the Hong Kong Centre for Maritime and Transportation Law (HKCMT), has organized 10 conferences and 25 public lectures/seminars.