

**Annual Report on
Knowledge Transfer for 2016-2017**

to

University Grants Committee



香港城市大學
City University of Hong Kong

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Executive Summary

In the reporting period, City University of Hong Kong (CityU) has made significant progress in many areas of knowledge transfer. First and foremost is the capacity improvement area, where CityU has fostered technology transfer in building external partnerships with leading universities, so that a much larger and more comprehensive portfolio of technology solutions can benefit CityU's own technology marketing efforts. On the market development side, CityU has expanded our reach into inland market, establishing new relationships with inland government agencies. CityU's new Chengdu Research Institute was also unveiled in 2017, to help CityU innovations reach into the vast Southwestern regions of China. Such strategic alliances and inland marketing programs highlight CityU's and Hong Kong's unique gateway status and expertise for sophisticated international technology transactions, and they offer CityU's innovators better understanding and direct access to the market, as well as collaboration opportunities with the world's leading innovators and institutions.

CityU's strengthened IP management process has also produced tangible results. In the last two years in a row, CityU was ranked among the top 100 universities worldwide for receiving the most number of granted patents by US Patent and Trademark Office. In the calendar year 2016, CityU also received the highest number of US patents in Hong Kong.

In the outreach and community impact area, CityU successfully led a planning committee to deliver an extremely successful international technology transfer conference, AUTM Asia 2017, in April of 2017. This conference, attended by more than 600 academic technology transfer practitioners from around the world, brought a Nobel laureate and multiple presidents of leading universities worldwide together, and facilitated intimate working relationships between Hong Kong knowledge transfer (KT) professionals and their international counterparts.

At CityU, the concept of knowledge transfer is not limited to technology domains. The highly successful Annual KT Award for Non-technology Disciplines has recognized outstanding KT efforts in the areas of law, business, liberal arts and social sciences since 2011. With UGC's strong support, CityU plans to expand the scope to encourage even broader participation in the coming year.

Another concept that is well established at CityU is our innovation and entrepreneurship ecosystem. As we continued to promote the three funding schemes seamlessly designed for the early, mid-, and late stages of startup lifecycle, we are happy to report the first successful VC investment into Vitargent, a CityU spinoff, by the late stage CityUE Investment Fund materialized. In addition, another major milestone was accomplished when HKSTP opened up the joint incubator Lion Rock 72 in Kowloon Tong, following CityU's collaboration with HKSTP on the structure, format, and legal framework on the joint incubation scheme for more than 18 months.

Finally, CityU set up additional infrastructural cornerstones in the area of CityU Scholars, which is a searchable web portal to showcase CityU research outputs. Also in the current reporting period, CityU opened up additional exhibition space which hosted a number of acclaimed art/cultural exhibitions. On the Internet, CityU has established three MOOC courses, to further round out our capacity to impact learners beyond our students on campus.

1. Fostering Technology Transfer

1.1 Forming Strategic Partnership with Leading Universities for Technology Transfer in the Mainland and Expanding Capacity of Innovations under Management

Since 2014, CityU has been placing increasing emphasis on establishing strategic partnership with licensing offices of leading universities abroad. Leveraging on the strengths of Hong Kong being a technology and knowledge hub between East and West, the University proactively formed strategic partnership with Stanford University, Cedars-Sinai Medical Center and Arizona State University (new) in the US, McMaster University in Canada, King Abdullah University of Science and Technology in Saudi Arabia (new) and Shanghai University in the Mainland (new). Such partnerships enable us to pool together state-of-the-art technologies from CityU as well as its partners for the vast market in the Mainland. Likewise, these strategic partners also help us identify licensing opportunities in their home countries for win-win collaboration.

To expand our marketing reach for the growing innovations under CityU's management, technology transfer (TT) collaboration programmes have been set up in the Mainland. Apart from the three mainland collaboration programmes (Shenzhen, Yangzhou and Jiangsu) reported last year, we have successfully expanded our technology transfer collaboration programmes to Nanjing, Chengdu, Yunnan, Beijing, and Tianjin with an aim to creating a comprehensive network of TT platforms covering strategic locations in China for synergistic effect. These TT programmes are also in line with China's overall economic development as laid down in its 13th Five-Year Plan, and goes a long way to demonstrate Hong Kong's strategic contribution to China's technological advancement.

1.2 Strengthening IP Management

The University has in place a well-established administrative framework and policy protecting the intellectual property generated from research activities. After a stringent vetting process, inventions of high commercialization value are pursued for patent filing. In the year under review, 109 new patent applications were filed in the US, China and Hong Kong, etc. in various fields of technologies with 51 patents granted during the same period. By June 2017, 328 patents have been granted with a further 437 patents pending.

After years of cultivation, we begin to reap the fruits of patenting. With 43 US patents granted in calendar year 2016, CityU's ranking jumped from 76th to 54th in The Top 100 Worldwide Universities Granted US Utility Patents, out-performing Hong Kong University of Science and Technology which ranked 76th and came third only after Tsinghua University and Peking University in China and Hong Kong region. We hope to sustain this leading position and continue to excel in this area.

Apart from utilising a state-of-the-art comprehensive IP management system, INTEUM, to help managing our growing IP portfolios, a set of guidelines has been promulgated and approved by the Knowledge Transfer Committee to govern the renewal of patents. Regular review of our IP portfolios helps to reduce maintenance cost both in terms of renewal fees and administrative costs.

1.3 Building Hong Kong's TT Leadership Position in Asia: AUTM Asia 2017 in Hong Kong

The Association of University Technology Managers (AUTM) is the largest non-profit organization by academic technology transfer professionals worldwide, with more than 3,200 TT members from more than 300 leading universities and research institutions. CityU chaired the organizing committee for one of the most successful AUTM Asia conferences with some 600 attendees and a long list of luminary speakers which included a Nobel Laureate gathering at Hong Kong Science Park in April 2017. The Conference included three one-day pre-conference TT workshops, a two-day conference and a day-trip visiting the techno-preneurship ecosystem in Shenzhen which is

dubbed the Silicon Valley of China. Having invited all knowledge transfer (KT) offices of leading institutions in Hong Kong and Macau to join the AUTM Asia planning committee, we managed to create a strong sense of community among us. Leveraging on the success of the Conference, we intend to bring more lasting changes to Hong Kong's TT community through building connections with AUTM, bringing more international speakers, seminars, training programs to Hong Kong to highlight our status as the KT hub in Asia.

1.4 Outreach

Through the long-standing 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 and 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 are also sent to the members regularly.

In 2016-17, the membership of CUBIC has grown from 1,352 to 1,547, at an increase rate of 14%. The number of CUBIC members coming from the Mainland has also increased from 184 to 252, increased by 37%. During the year, CUBIC has coordinated company visits to Yakult and Jin Long Yu Oil in Guangzhou with Hong Kong Productivity Council. We organized a seminar about Belt and Road Innovative Technology Transfer Projects, a Special Interest Group gathering on Smart City, and eight laboratory tours for mainland government officials, local and mainland trade associations. CUBIC also participated in five external events in Hong Kong and Guangdong as supporting organization. CUBIC also functioned effectively as a platform for industrial liaison and networking via promoting the CityU projects at AUTM Asia 2017, CleanEnviro Summit Singapore and EmTech Hong Kong.

2. Broadening Knowledge Transfer beyond Science and Engineering Disciplines

2.1 Knowledge Transfer Award 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 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. Five projects were approved in this reporting year to receive up to HK\$0.2m each. They are:

- A Tale of Three Cities: Public Attitudes towards Corruption and Anti-corruption Policy
- "Achieving Mutual Empowerment" – Bi-directional Knowledge Transfer to Enhance Students' Development through Community Participation
- Bioethics & Public Policy Discipline
- Mine•Museum – Exploring Hong Kong History and Culture through Creative Curatorship
- Hong Kong Fintech: Opportunities, practices and risk issues

To encourage KT initiatives for the entire campus beyond technology sectors, cross-disciplinary and international KT projects will be encouraged in future rounds of application.

2.2 Recognition of Excellence in Knowledge Transfer

To encourage knowledge transfer and nurture a KT culture in non-science disciplines, Excellence in Knowledge Transfer Awards was launched since 2011. The Awards give recognition to faculty members in the College of Liberal Arts and Social Sciences (CLASS) who have made outstanding achievement in applying their knowledge for creating high social impacts. In the year of 2016-17,

three winning projects were rigorously selected as follows:

Project Title	Department	Recipient
Excellence in Knowledge Transfer Award		
2016 Hong Kong Rugby Sevens Green Ambassador Scheme	Department of Public Policy	Dr. Wanxin Li
Certificates of Merit		
The Pioneer Study of Innovation Treatment for Reducing Aggressive Behaviour through Chinese Martial Arts and Ethic Program	Department of Applied Social Sciences	Dr Fung Lai Chu Annis
Digital Multimedia Resource for Legal English: An interdisciplinary project	Department of English	Dr Christoph A. Hafner

In order to promote KT in the College, CLASS Awards Day was held on 19 May 2017 to present prizes to the KT awardees and recognize their outstanding achievement in knowledge transfer. A workshop was held and Dr Wanxin Li, the winner of Excellence in Knowledge Transfer Award shared her innovative approach in knowledge transfer with the participants. CLASS also invited guests from the Knowledge Transfer Office of Hong Kong Baptist University, and the Office of Research Support of the Lingnan University, to share their KT experiences in the workshop and before the Award Ceremony. All the KT-awarded projects were displayed at the exhibition. The CLASS Awards Day was held to increase the visibility of KT of CityU. CLASS continued to publish the College magazine “CITY CLASS” bi-annually to report knowledge transfer and research, as well as academic achievement. The magazine is able to reach a wide range of readers including academics, potential donors, prospective students, alumni, CityU supporters and the general public.

3. Upholding Research Excellence

3.1 Research Excellence

Part of the University’s mission is to anticipate and respond to the needs of industry, commerce 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 its close ties with local and overseas industries through various forms of collaboration including contract research. In the year under review, 60 contract and collaborative research projects totaling \$61.6M were approved from government, industry and other organizations. Highlights of some contract research projects are development of materials or systems in a wide spectrum of disciplines as set out below:

- Small Size Detector for Lead in Drinking Water
- Electronic Sensors for Onsite Testing of Seafood
- No Agro-Waste: Innovative Approaches to Turn Agricultural Waste into Ecological and Economic Assets
- Online Harmonic Filter and Network Monitoring System
- Building a Big Social Media Data Analytics Platform for Mining User Preferences
- Study on Factors Leading to the Development of Corruption-free Hong Kong

An exhibition on the theme “Frontier Research and Innovation@CityU”, showcasing CityU’s research achievements, product development and advanced technology was held on campus from 11 to 13 April 2017. Over 30 CityU research centres, including two State Key Laboratories and

one Chinese National Engineering Research Centre, participated in the exhibition, to share CityU's research achievements and excellence with the CityU community, our partners and collaborators, secondary schools, and the general public. The exhibition featured an array of research projects demonstrating CityU's innovation and research quality, including the following:

- “*Hakka Kung Fu – Pose Matching*” by the Centre for Applied Computing and Interactive Media;
- “*Interactive Learning – VR*” by the Centre for Innovative Applications of Internet and Multimedia Technologies;
- “*Flying Robot*” by the Centre for Robotics and Automation; and
- “*Underwater Remote Control Surveillance System*” by the Centre for Advanced Structural Materials.

The 3-day event also included nine technology forums in three research focuses namely One Health, Digital Society, and Smart City.

3.2 Research Breakthroughs

Noteworthy to report here are some of our research breakthroughs.

In collaboration with Nanjing University of Science and Technology, Professor Liu Chain-tsuan, University Distinguished Professor, made groundbreaking development in new aerospace material. The new titanium-aluminum nickel-base single crystal alloy his research team has created can withstand temperatures of up to 900°C, allowing it promising application in the aerospace industry because of its light-weight and resistance to heat. It can be used for turbine blades and widely applicable in aerospace manufacturing industry. Professor Liu's achievement has attracted much attention in academic circles and has been published as a cover story in the internationally acclaimed journal *Nature Materials*.

Another ground-breaking advancement in materials research was achieved by Professor Jian Lu, Chair Professor of Mechanical Engineering, and his research team at CityU. The invention of new advanced material, supra-nano magnesium alloy, is 10 times stronger than conventional crystalline magnesium alloy and has super-deformation capacity two times higher than that of magnesium-based metallic glass. The supra-nano-dual-phase glass-crystal alloy has a dual phase structure smaller than 10nm. It can be applied in biodegradable implants, and can be used to extend the life of micro-electro-mechanical systems and smart phones. It can be a good substitute for conventional magnesium alloy as it can sustain pressure of more than 300 kilogramme force per square millimetre. The innovation has been featured on the cover page of the top academic journal *Nature*, exemplifying CityU's excellence in research.

4. Expanding Research Platform and Technology Transfer into the Mainland

4.1 CityU Shenzhen Research Institute

Mainland research development recorded a significant growth in the year under review. A total of 59 new research projects were obtained via the research platform in Shenzhen, the CityU Shenzhen Research Institute (CityUSRI) (Breakdown: 29 were funded by the National Natural Science Foundation of China (NSFC), 17 were funded by the Shenzhen Science, Technology and Innovation Commission (SZSTI), 2 were funded under the Major Program of the Ministry of Science and Technology of the People's Republic of China). CityUSRI's NSFC grants received topped other research institutes set up in Shenzhen by other sister universities.

	2014-15	2015-16	2016-17	% change from 15-16 to 16-17
Number of active research projects	202	223	264	+18.4%
Total grants of the active research projects	RMB 101.91m	RMB 130.90m	RMB 185.43m	+41.7%

Outstanding new projects:

- a. Setting up Shenzhen Key Laboratory for Pre-stressed and Surface Engineering of Aerospace Materials and Components (This fifth Shenzhen Key Laboratory made CityUSRI the top among Hong Kong universities in terms of the number of Shenzhen Key Laboratory.)
- b. New Technology of Key Components for Millimeter-wave CMOS Transceiver to develop and test a new CMOS chip used in high-speed data communications and radar sensing
- c. Small Animal Whole Body High Speed Photoacoustic Molecular Imaging: Instrument Development and Applications to develop new equipment for the high-speed imaging of small animals

4.2 CityU Chengdu Research Institute

The construction of City University of Hong Kong Chengdu Research Institute (CityUCRI) building has been completed and the inauguration ceremony was held on 13 May 2017. CityUCRI houses the below centres and laboratory:

- Centre for Applied Computing and Interactive Media Chengdu (ACIM|Chengdu)
- Centre for Innovative Applications of Virtual Reality Technologies (ViRtech Centre)
- Environmental Chamber for Advanced Air Distributions
- Centre for International Technology Transfer (Chengdu)

5. Nurturing Inno-preneurship Ecosystem

The conducive environment reported last year to support innovation and entrepreneurship formed the backbone of the inno-preneurship ecosystem of the University which was further evolved to include the below to enlarge capacity for entrepreneurship.

5.1 Funding Schemes to Provide Seamless Financial Support at all Stages of Innovation and Entrepreneurship

To support different stages of discovery and innovation, three funding schemes are in place:

- a. Student Early Entrepreneurship Development Scheme (SEEDS) to support early stage idea validation, feasibility and marketing studies on a project basis. With seed funding from the University, SEEDS is supported by donation money from our alumni and friends. In the second round of application, 31 teams of students submitted applications, with five teams eventually beat out others to win a maximum funding of HK\$200,000 per team. The project duration is 18 months at most. After two rounds of application, SEEDS has granted about HK\$2m funding to 11 student teams.

- b. Technology Start-up Support Scheme for Universities (TSSSU, a funding scheme launched by the Innovation and Technology Commission and administered by local universities) to commercialize business ideas at pre-seed start-up stage, moved into its fourth year, and the second triennium, of its operation. 19 applications were received in the 2017-18 round of application. 11 teams were shortlisted for selection and pitching training was provided. Eventually, 9 teams were approved by ITC for receiving a total funding of HK\$4 million. After four rounds of application, TSSSU has provided funding support to 23 start-ups with a total grant of HK\$16m for our students/alumni/faculty members to chase their entrepreneurial dreams.
- c. CityUE Investment Fund, is a venture-capital-style investment mechanism to support CityU spinoff companies in exchange for stock ownership. We are happy to report that the first successful VC investment into Vitargent, a CityU spinoff, materialized.

5.2 CityU-HKSTP Incubator and Pre-Incubation Programmes

After more than a year of discussion and preparation, CityU's partnership with the Hong Kong Science and Technology Parks Corporation (HKSTP) produced a joint university incubation programme. Lion Rock 72, located in InnoCentre, Kowloon Tong, announced its official opening in October 2016. Selected CityU teams can be located at Lion Rock 72, enjoying access to HKSTP's incubation program with financial subsidies and mentorship, and also enjoying the value-added services from both CityU and HKSTP, or be located at the Hong Kong Science Park. Two CityU TSSSU recipients were admitted to the CityU-HKSTP Incubator Scheme while three other teams received conditional offer. This joint incubation programme was later extended to include two other sister universities, Hong Kong Baptist University and The Hong Kong Polytechnic University.

Further to the above, CityU-HKSTP Pre-Incubation Programme is the second collaboration with HKSTP and is one step further in nurturing entrepreneurial spirit at CityU. The Programme was launched in March 2017, with 10 student teams comprising 28 participants shortlisted and granted access to the co-working space "Lion Rock 72" at InnoCentre.

5.3 Start-up Competitions

No business plan is perfect right at its inception. It is usually through numerous refinements that the successful business plan is evolved. Hence, we strongly encourage our innovators to participate in start-up competitions where they can learn from their peers and judges in refining their plans. During the reporting year, CityU co-organized with HKSTP a start-up competition known as "IDEA BATTLE", for CityU students and alumni who could team up with students/alumni of other universities in Hong Kong. The three award recipients then went on to showcase their start-ups in an Innovation and Entrepreneurship Forum jointly organized by the Science and Technology Bureau of Chengdu City (PRC), Shuangliu County Government of Chengdu City and CityU for attracting VC investment there in November 2016.

CityU also organized three student teams to compete in a National Entrepreneurship Competition (創青春全國大學生創業大賽) held in November 2016 in Chengdu. The biennial competition attracted around 110,000 projects from more than 2,200 higher education institutions in the Mainland. To qualify for the national competition, the three CityU teams had to beat other Hong Kong teams in a regional competition. The three teams performed extraordinarily well in the National Entrepreneurship Competition and clinched a Gold Award, Silver Award and Bronze Award respectively.

As usual, CityU students participated actively in the annual flagship event of Cyberport – Cyberport University Partnership Programme (CUPP) which aims at nurturing promising young tech and entrepreneurial talents in Hong Kong. Of the 20 competing teams from six local

universities, five came from CityU. The programme offers a unique opportunity for participants to gain insights into the global market, and receive top-notch training through company visits in Silicon Valley and a customized one-week entrepreneurship boot camp at Stanford Graduate School of Business, plus mentorship in Hong Kong and overseas. The highlight of the programme is the Demo Day on which the participating teams have to present their ideas and business models after going through the entrepreneurial training to compete for seed funding. Of the five teams we nominated, two successfully won start-up funding of HK\$100,000 each.

5.4 Inno-preneurship Mentoring Scheme

No entrepreneurial journey will be a straight path. For sure it will be filled with ups and downs, successes and failures. To make the journey less painful and frustrating, a mentoring scheme was launched in November 2016. The Inno-preneurship Mentoring Scheme has matched 17 student teams with seasoned professionals/entrepreneurs to guide them through the challenging entrepreneurial journey.

5.5 I&E Training and Pitching

Training and pitching on I&E is indispensable to supporting a healthy inno-preneurship ecosystem. A series of pitching workshops and training seminars were organized. A team with good mix is the pre-requisite for success. Hence, an activity called “Start-up Speed Dating” was organized for the first time to help our students form cross-disciplinary teams to start their entrepreneurial journey. There are also regular monthly gatherings for the CityU inno-preneurship community including students, alumni and staff in order to nurture innovation and entrepreneurship. Encouragement and recognition also play an important role in cultivating a healthy inno-preneurship ecosystem. To honor and give due recognition to our young innovators, CityU Inno-preneurship Fest was held in May 2017 on which recipients of TSSSU and SEEDS funding were presented with certificates of honour. Their start-up projects were showcased and an entrepreneur experience sharing session was held during the event.

6. Strengthening Infrastructure for Technology/Knowledge Transfer

City University has in place infrastructural support in a diverse dimension to support and encourage technology/knowledge transfer. Below are highlights of some recent developments.

6.1 CityU Scholars: A hub of research excellence

Launched in mid-2017, *CityU Scholars* is not only a searchable web portal showcasing our research excellence including our researchers, research outputs, projects, patents, etc., it also serves as an information management system for research management, analysis, and reporting both internally and externally. The System provides a single source of validated data for research output data submission externally to the Research Grants Council as well as internally for the annual appraisal reporting. *CityU Scholars* is an integrated interface to help simplify work flows, reduce duplication of efforts in data collection, and support customized data analysis to meet research management needs. It also enhances the University’s visibility and promotes research collaboration and knowledge transfer.

Further to the above, a *Central Knowledge Transfer Data Repository* has been developed to streamline reporting on external advisory appointment and social, community and cultural engagement. Again, the Repository provides a single source of validated data for KT reporting to the University Grants Committee as well as internally for annual appraisal reporting and management review on KT performances.

6.2 CityU Exhibition Gallery

Exhibition galleries/museums play a pivotal role in cultural exchange with society. Over the past few years, City University has championed the ground-breaking use of creative media and engineering technology to exhibit new expression to cultural heritage and historical paintings. These highly popular exhibitions have included cutting-edge creative media works on the outstanding Mogao Grottoes at Dunhuang; the Italian painter Giuseppe Castiglione and his cross-cultural art; and the cultural legacy and future of Hakka kung fu. To further advance CityU's cultural development, we are developing collaborations with major international and local institutions to support a university museum, CityU Exhibition Gallery, which is housed on the 18th floor of the Lau Ming Wai Academic Building. A recent exhibition on show was the *Roofs of Paris* organized in collaboration with Le French May from 26 May to 23 July 2017. The exhibition offered to the audience an artistic journey through Paris featuring its magnificent roofs, and highlighting the city's metamorphosis from a dark, medieval city into the "City of Light". The CityU Exhibition Gallery is a hub for artistic and cultural excellence, creating cutting-edge, technology-rich, and cross-disciplinary exhibitions at the intersection of art, science and technology.

6.3 MOOC – Disseminating CityU Courses all over the World

MOOCs, a recent development in online education, enable open access to cutting-edge courses delivered by renowned universities via the internet. To expand the marketing reach of our courses so that learners from all over the world can take our courses for free, CityU has made arrangement with FutureLearn, a company that is part of the Open University in the UK, to use their platform for CityU's MOOCs. The first such course entitled "Foundation of Innovation and Entrepreneurship in China" was kicked off in September 2016 and met with overwhelming response with around 2,000 enrolments from 135 countries in the first month, with learners from as far as Africa and South America signing up. The second one on "Discovering Socially-Engaged Art in Contemporary China" offered by the School of Creative Media also attracted overwhelming response. With the MOOC platform in place, CityU is well positioned to be a global destination for professional education in the 21st century.

7. Impact Cases

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

7.1 Smart Real-time Battery State and Health Diagnostic System

Imagine what a headache it will be if you experience a premature battery failure of your electric vehicle when you are on the road hurrying for an important meeting.

Battery storage systems have been widely used in residential, commercial, and industrial applications. As many of them are located in unattended or remote sites, operators have to conduct on-site visual inspection of the service condition of the batteries regularly. Thus, unexpected premature battery failure cannot be discovered easily and accurately. To ensure serviceability, the batteries have to be replaced after a few years of service, depending on the site condition and the maintenance practice and experience of the operators. Prof Henry Chung from the Department of Electronic Engineering has developed a diagnostic system for battery state and health that can conduct a real-time estimation of the state-of-charge (SOC) and state-of-health (SOH) of the batteries to determine the optimal charging profile, discharging control, and capacity balancing scheme for extending the lifetime of the batteries. The system allows operators to monitor remotely the battery state and health, and conduct replacement exercise at an optimal time before any failure or incident occurs, saving resources on regular site inspection and reducing undesired electronic waste. The technology has been licensed to a power technology company.

7.2 Construction and Structural Health Monitoring System for Super-tall Buildings

Heights fascinate many people, and super-tall buildings have become an icon of economic advancement. However, ensuring the safety of these skyscrapers has become a great concern in particular in the typhoon-prone areas like Hong Kong. Professor Li Qiusheng from the Department of Architecture and Civil Engineering is an expert in wind engineering, structural dynamics and computational mechanics. By combining and applying field measurement, wind tunnel testing, numerical simulation and theoretical analysis, his research team has made significant contributions to enhancing building safety through the systematic study of boundary layer wind characteristics and wind effects on structures. These earned him the 2016 Jack E. Cermak Medal by the American Society of Civil Engineers which is the highest honor in the field of wind engineering and industrial aerodynamics. Prof Li is the first Chinese scholar in the world to receive this prestigious award.

The Wind and Structural Health Monitoring Systems developed by Professor Li's research team were installed in a number of super-tall buildings including Ping An International Finance Centre in Shenzhen (640m high), International Finance Centre Two in Hong Kong (420m), Citic Plaza in Guangzhou (390m), and Guangzhou West Tower (432m). The systems can monitor wind action and pressure from typhoons on curtain walls and buildings as well as structural responses, which provide reliable scientific information and guidelines for the wind-resistant design of super-tall buildings. Based on long-term measurements from numerous monitoring means, the profiles of wind speed and turbulence parameters within the atmospheric boundary layer over various terrain conditions have been established for the wind-resistant design of super-tall buildings. Prof Li and his research team have made significant achievement in safeguarding the lives and assets of many people through ensuring building safety.

7.3 Exhibition on 300 Years of Hakka Kung Fu – Digital Vision of its Legacy and Future

The 300 Years of Hakka Kung Fu exhibition was a journey through time, to explore the origin, development and future of Hakka martial arts. It merged technology into creativity and cultural heritage by our School of Creative Media (SCM)'s digital means, highlighting the value of the martial arts and their historical context, and by pioneering a fresh way of presenting martial arts. In collaboration with the International Guoshu Association Hong Kong, this project undertook extensive data capture (MOCAP) and spherical video recording to document this form of intangible cultural heritage and thereby created a unique Hung Kuen archive. The Re-Actor installation by SCM's Sarah Kenderdine and Jeffrey Shaw showed these motion-captures in 3D from six different points of view. It provided a panoptic virtual reality environment within which the kung fu master's performances were re-enacted and re-envisioned. Each of its six viewpoints had an interactive control panel that allowed visitors to select six different visualization styles that elucidated the underlying dynamics of the movements. In a further video work by Tobias Gremmler, motion graphics were used to provide an artistic interpretation of these motion-captured recordings of Hakka kung fu masters, providing new insight and beauty to their movements. The Exhibition has preserved the traditional kung fu cultures and re-vitalized Hakka martial arts into visual stimuli at the cutting edge of media technology.

7.4 Innovative Virtual Reality Programme Benefits Autistic Pupils

Led by Prof Horace Ip, Vice-President (Student Affairs) and Director of CityU's Centre for Innovative Applications of Internet and Multimedia Technologies, a multi-disciplinary team consisting of medical and educational experts has developed a virtual reality based training programme (vPAD) to enhance the social adaption and emotional skills for school-aged children with Autism Spectrum Disorder (ASD) who have problems adapting to different social situations and responding appropriately.

Funded by the Government's Quality Education Fund, the team has designed six unique learning scenarios for school-age students with ASD. These immersive learning scenarios are enabled by multi-projection VR technologies that provide an authentic, immersive, situated, safe and controllable educational environment. One scenario focuses on relaxation strategies, four simulate social situations, and one facilitates consolidation and generalization. The scenarios

have been designed and developed together with the corresponding psychoeducation procedures and training programmes.

An assessment involving 125 children from 17 schools diagnosed with ASD showed that those who have received vPAD training scored higher on social interaction and emotion expression, and showed significant improvement in emotion recognition. They were able to reflect their understanding through interaction with classmates, and were able to take note of changes in their classmates' facial expression and understand their emotions. vPAD has effectively improved autistic pupils in social interaction and emotion expression.

7.5 2016 Hong Kong Rugby Sevens Green Ambassador Scheme

The 2016 Hong Kong Rugby Sevens Green Ambassador Scheme is the winning project in the Excellence in Knowledge Transfer Award 2016-17 organized by the College of Liberal Arts and Social Sciences and has been selected as one of the flagship projects presented at the Climate Change Stakeholder Engagement Forum held by the Hong Kong SAR Government in July 2016. The project offered an opportunity for students to engage in service learning and to gain hands-on experience on plastic waste recycling management in collaboration with different stakeholders. It also developed students' innovation for tackling low public awareness on plastic waste recycling through redesigning plastic waste recycling bins. Through collaborating with the Environmental Protection Department as well as the Leisure and Cultural Services Department of the Hong Kong SAR Government, Hong Kong Rugby Union, and HK Recycles, the project enhanced public awareness on plastic waste recycling and environmental protection and promoted a positive change in the public's behavior in handling plastic waste.

The principal investigator of the project is Dr Li Wanxin from the Department of Public Policy who led three students to launch the 2016 Hong Kong Rugby Sevens Green Ambassador Scheme. During the 3-day annual match, the students led a team of 35 student volunteers (Green Ambassadors) to promote recycling of plastic waste, conduct waste audit, and complete a survey with the spectators. The programme has successfully engaged our students in a meaningful environmental community project through which valuable experience has been gained.

Summary of Knowledge Transfer Performance Indicators

(Amounts are in Hong Kong dollars)

Performance Indicators	2015-16		2016-17	
No. of patents filed in the year	¹ 85		109	
No. of patents granted in the year	¹ 44		51	
No. of active licenses during the reporting year (inclusive of newly granted ones)	Type	² No.	Type	² No.
	Exclusive	10	Exclusive	9
	Non-exclusive	29	Non-exclusive	31
	Total	39	Total	40
Income generated from intellectual property rights	\$3.85m		\$0.79m	
Expenditure involved in generating income from intellectual property rights	\$8.02m		\$7.75m	
No. of economically active spin-off companies	4		7	
Net income generated (or net loss arising) from spin-off companies of the University	³ N/A		³ N/A	
No. of collaborative research projects and income thereby generated (inclusive of ongoing and new projects)	39/\$25.94m		46/\$28.93m	
No. of contract research projects (other than those included in “collaborative researches” above), and income thereby generated (inclusive of ongoing and new projects)	157/\$49.87m		167/\$65.34m	
No. of consultancies, and income thereby generated	48/\$3.78m		55/\$5.42m	

¹ Adjustments have been made due to a time delay in receiving formal notification from patent offices.

² Figures reported include licenses of IP not protected by patents. Adjustments to the number of active licenses have been made as agency/marketing/framework agreements were included in previous reports. The correct number of active licenses should be: 21 (2009-10), 25 (2010-11), 34 (2011-12), 34 (2012-13), 37 (2013-14), 40 (2014-15), 39 (2015-16)

³ Financial data of the companies cannot be obtained.

No. of student contact hours in short courses or e-learning programmes specially tailored to meet business or CPD need	⁴ 1.10m	⁵ 1.15m
No. of equipment and facilities service agreements, and income thereby generated	119/\$0.29m	86/\$0.16m
Income received from Continuing Professional Development (CPD) courses	\$163m	⁵ \$170m
No. of public lectures/symposium/exhibitions and speeches to a community audience (seminars and workshops are included)	867	752
No. of performances and exhibitions of creative works by staff or students	104	79
No. of staff engaged as members of external advisory bodies including professional, industry, government, statutory or non-statutory bodies	309	346
(New) Number of startups formed by our students/alumni/faculty members which have received CityU funding support	19	23

⁴ Adjustment has been made after year-end.

⁵ A forecast based on information as of May 2017.

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.

Highlights of KT Activities of Member Departments

CB Exchange Team – In Summer 2016, CB’s Internationalization Team organized a summer programme “Multi-Cultural Collaboration Community Service Project – SHAWCO” for our business students. This 4-week programme provided students with experiential learning on the concepts of Social Enterprise (SE), Social Entrepreneurship and Social Innovation, through pre-trip research, structured classes, placements and post-trip exhibition, while providing a full cultural immersion.

Our students, after attending the classes at University of Cape Town and doing placement at real local SEs/NGOs, they shared their unique experience and what they have learnt with the general public via radio interview and with the CityU community via a 10-day exhibition on campus upon returning to Hong Kong.

Department of Accountancy – Our KT effort focuses on using the professional accounting and business knowledge of our staff and students to serve professional accounting bodies, business community, and social enterprises/NGOs. We undertook two initiatives this year as part of the departmental efforts in knowledge transfer.

The first one is Knowledge Transfer Social Enterprise Consultancy Project one: Red Cross – Humanitarian Education Centre. This centre is funded by Hong Kong Red Cross. The objective was to cultivate humanitarian vision and support humanitarian actions. The project team reviewed and evaluated the financial performance of the centre, and reviewed the operation details from the perspectives of both Red Cross and its customers. The centre has both school programmes and corporate programmes, but the team needed to analyse the costs and benefits of these programmes. Finally, based on the financial analysis, the team made specific recommendations in improving the sustainability and performance of the centre.

The second KT project is Knowledge Transfer Social Enterprise Consultancy Project two: Greenprice Social Enterprise. Four young entrepreneurs had an idea to save the food which is still good to consume but beyond the “Best Before” date. In France, the controversial best-before label on non-perishable foods such as dried pastas, rice was abolished. The label has been criticized for confusing consumers and eventually leading to food waste. Greenprice in HK is starting this movement, and is getting lots of media attention. The project team studied and reviewed the financial performance of Greenprice.

Department of Economics and Finance – During the reporting period of 2016-17, the faculty of the Department of Economics and Finance (EF) continued to serve on prestigious local and overseas advisory boards of academic, professional, governmental and industry organizations, for instance, CESifo of Munich (CESifo), Methods in International Finance Network (MIFN), Globalization & Monetary Policy Institute of Federal Reserve Bank of Dallas, HKMA, HKSAR Government - The Treasury, and Hong Kong Institute of Bankers.

EF organized three well-attended international conferences for the academic, professional and industry communities in relation to current economic and financial issues, namely the conference on “Exchange Rate Models for a New Era: Major and Emerging Market Currencies”, the 2017 CityU of Hong Kong International Finance Conference on Corporate Finance and Financial Markets, and Conference on Real Estate and Financial Stability. Two of the conferences were co-organized with esteemed international research institutions, Journal of International Money and Finance (JIMF) and Hong Kong Institute for Monetary Research (HKIMR).

EF faculty also shared their insights with local and overseas academic, professional and industry communities through workshops, media interviews, and public lectures.

Department of Information Systems - The research of our 25 regular academic faculty members in the Department of Information Systems (IS) have been supported by governmental funding agencies in Hong Kong and China as well as corporations. More than seven IS faculty members served or are serving as Senior Editor or Associate Editor of the top journals of the IS discipline. In addition, many IS faculty members are currently serving on the editorial boards of major SCI/SSCI-listed IS journals, with some serving as Senior Editor or Editor-in-Chief. IS department is a pioneer in research innovations and is recognized globally as one of the best information systems departments in the world. The department is ranked No. 2 based on the Association of Information Systems’ top-eight journals (2009-2013) and No. 3 in the UT Dallas List’s three IS journals (2013-2016).

The academic and teaching staff members in IS department have been active in the engagement of knowledge transfer to the local communities. Activities included giving public speeches on various up-trend IS topics, such as big data, Fintech, blockchain technology; as well as being the judging panel member for external competition/vetting committee, i.e. 2017 HKICT Awards (organized by Hong Kong Information Federation), The 3rd HK Digital Advertising Industry Fresh Graduate Support Scheme (organized by Hong Kong Association of Interactive Marketing).

Department of Management – The Department of Management (MGT) offered courses for the Elderly Academy. In Semester A, there was an enrolment of 5 adults in CB2300 and 5 adults in GE2204. In Semester B, there was an enrolment of 5 in CB2300, 10 in GE1216 and 5 in GE2204.

MGT professor Muammer Ozer delivered a public lecture on 16 January 2017 in conjunction with the CityU DBA programme and the four leading engineering societies in Hong Kong, namely the Hong Kong Branch of Institution of Mechanical Engineers, the Mechanical, Marine, Naval Architecture and Chemical Division of Hong Kong Institution of Engineers, the Hong Kong Branch of The Institution of Engineering and Technology, and the Hong Kong Waste Management Association. 150 participants attended the event from the Engineering and Business sectors in Hong Kong. This was a technology transfer related event.

Prof Muammer Ozer also delivered a DBA Research Sharing Seminar on Effective Leadership in Project Environment on 19 January 2017 which was in conjunction with the Project Management Institute (PMI). The event was attended by 50 people and was a technology transfer related event.

Dr Emily Liaw Chya-Yi has contributed to *Capital Magazine* in January 2017 entitled 貿易保護與自由化之分水嶺.

Professor Ziguang Chen delivered a public lecture for the 香港城市大學商學院 2017 城商智匯講堂 on 31 March 2017 to an audience of 120 people. The event, organised by the Department of Management, was free of charge.

Professor Ziguang Chen also delivered a public lecture for the 香港城市大學 EMBA 名師講堂(臺灣) on 2 May 2017 which was attended by 50 people. The event which was also organised by the Department of Management, was free of charge.

Dr. Long Wang delivered a public lecture at the EdukCircle International Visit on Entrepreneurship on 28 to 29 June 2017.

Department of Marketing –In the area of community engagement, colleagues from the Department of Marketing (MKT) have contributed well to the community. More than 25 media interviews (e.g., RTHK Economic Journal and South China Morning Post) were completed and more than 10 workshops were provided to secondary schools. Some colleagues served as advisory board members for government agencies and local organizations such as HKSAR Government - Agriculture, Fisheries and Conservation Department and Scout Association of Hong Kong. In addition, colleagues contributed to the success of various community events in different capacities: Judge of Panel of Hong Kong Insurance Awards 2017; Honorary Advisor of PVCBS Honorary Advisor of PVCBS (香港商業專業評審中心第六屆榮譽顧問); Panel Judge of 《香港商場體驗行銷大獎 2016》 by Metro Radio. Invited talks have been given to local companies such as LION Club HSBC (Global IT Center) and Phillipine Navy.

In the area of professional services, our members have taken up the roles of conference organizer and speakers in international conference and public lectures. Examples of international conferences organized by faculty members include “China Marketing international Conference” hosted by China University of Petroleum. Our colleagues were invited to conduct public lectures in different Chinese and overseas academic institutions, including Wuhan University, Xiamen University, Beijing Foreign Language College, Southwestern University of Finance and Economics, and Victoria University of Wellington. They are known as key and comprehensive universities. Moreover, a large proportion of our faculty members and teaching staff have served as reviewers and ad-hoc reviewers for journals such as *Industry Marketing Management*, *Journal of International Marketing*, *Journal of Business Research* and *Strategic Management Journal*. Apart from this, some colleagues served as editorial board members, e.g., *Asia-pacific Journal of Management*, *Journal of Management*, *Journal of International Marketing*, *Journal of Marketing Science* and *Strategic Management Journal*. One colleague is appointed as Panel member in Research Grants Council Competitive Research Funding Schemes for the Local Self-financing Degree Sector and Specialist of the Hong Kong Council for Accreditation of Academic and Vocational Qualifications (HKCAAVQ).

In the area of consultancy, MKT has provided consultancy service for more than 20 companies through the final year projects of both undergraduates and Master students. The companies include Hong Kong Airlines, Wisdom Communications Ltd, Swire Resources Ltd, Country Garden, and HKT Ltd.

Department of Management Sciences - During the reporting period, the two units in the department, Statistical Consulting Unit (SCU) and Energy and Environment Policy Research Unit (EEPRU), continued to contribute significantly in knowledge transfer. Being the original developer of the City-Centa Property Index, some colleagues continued to contribute in maintaining the index update. The Hong Kong Consumer Confidence Index (HKCCI) is an explicit example of the community engagement contributed by SCU. It has also conducted contract research for the Roadshow Media Limited, Canon HK, and HK & Kowloon Ferry during the reporting period.

EEPRU promoted knowledge transfer via the media interviews. Recent news reports included:

- 1) 學者促政府訂立資訊法 要求油公司提高運作透明度 on RTHK on 4 May 2017 (<http://news.rthk.hk/rthk/ch/component/k2/1328614-20170504.htm>);

- 2) 學者指競委會報告未能釋除油公司合謀定價疑慮 on TVB.com on 4 May 2017
(<http://news.tvb.com/local/590b055b6db28c300942c5ef/>)
- 3) 未開放電網 長遠勢加電費 on Apple Daily news on 26 April 2017
(<http://hk.apple.nextmedia.com/news/art/20170426/20002286>);
- 4) 學者稱中電不減電費 避免日後加幅過大 on RTHK on 13 Dec 2016
(https://hk.news.yahoo.com/學者稱中電不減電費_避免日後加幅過大-115144740.html)

The department also promoted knowledge transfer to the community and the public by organizing academic activities, student internship, providing consultancy services and academic professional advice to the community and external public and private organizations. Undergraduate and postgraduate students collaborated with companies and provided them with consulting services e.g. 759 online shop, Starbucks, Cathay Pacific Catering Services (HK) Ltd. With the available resources and manpower, the department would coordinate more activities and collaborate with external organizations and committees.

Knowledge Transfer in College of Liberal Arts and Social Sciences

The College of Liberal Arts and Social Sciences (CLASS) is the first College in the University to launch the Excellence in Knowledge Transfer Awards in 2011 and this has become an annual event of CLASS since then. In order to promote KT in the College, CLASS Awards Day was held on 19 May 2017 to present prizes to the KT awardees and recognize their outstanding achievement in knowledge transfer. A workshop was held and Dr Wanxin Li, the winner of Excellence in Knowledge Transfer Award, shared her innovative approach in knowledge transfer with the participants. CLASS also invited guests from the Knowledge Transfer Office of Hong Kong Baptist University, and the Office of Research Support of the Lingnan University, to share their KT experiences in the workshop and before the award ceremony. All the KT-awarded projects were displayed at the exhibition. The CLASS Awards Day was held to increase the visibility of KT of CityU.

CLASS continued to publish the College magazine “CITY CLASS” bi-annually to report on knowledge transfer and research, as well as academic achievements. The magazine is able to reach a wide range of readers including academics, potential donors, prospective students, alumni, CityU supporters and the general public.

Departments of CLASS were also actively engaged in various KT activities. To give some examples, faculties and staff in the Department of Asian and International Studies (AIS) were active in providing their expert opinions for different political, social, and cultural issues in local media such as Ming Pao, Sing Tao, and South China Morning Post and international one such as CNN, Wall Street Journal, CNBC, The Guardian, and New York Times. AIS scholars appeared 47 times in the media in 2016-17. The Department of Media and Communication engaged in the production of a documentary on the 100th anniversary of the Russian Revolution: “A Hundred Years of Revolution: Siberia” shown on Phoenix TV and the documentary was aired on Phoenix TV - Information Channel on 25 February 2017. Coached by the faculty in the Department of Public Policy, a student group from POL3900 Social Innovation and Public Policy won the Gold Prize in The Challenge Cup in Mainland China and Runner Up in Hong Kong (for social enterprise category). Furthermore, the project Eastern and Western Conceptions of Oneness, Virtue, and Human Happiness located and supported by the Center for East Asian and Comparative Philosophy in the University, produced two major monographs that currently are in press, one of which will be published in the coming year by Oxford University Press. Besides, the Department of English organized Learning the Language of the Law: An Interdisciplinary Symposium for Legal and Language Practitioners. This conference was co-organized by Deacons, three law schools in Hong Kong and EN. The event attracted around 60 participants. As for the Department of Applied Social Sciences, 5 international conferences were held last year including NGO forum, Youth outreach, Counselling, Innovative Social work practice, and Organized Crime along ‘One Belt One Road’ in collaboration with other academic collaborators, institutions and professional bodies. Moreover, the Department of Linguistics and Translation (LT) developed the Jyutping Learning Portal (<http://jyutping.lt.cityu.edu.hk>) to promote the use of Jyutping among the general public. LT staff members also provided a training workshop for ethnic minority interpreters at the Centre for Harmony and Enhancement for Ethnic Minority Residents under the Hong Kong Christian Service.

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 Appendix 1 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 providing consultancy service and contract/collaborative research for the public and private organizations. There were a total of four contract research projects, two consultancy projects amounted to HK\$1.58m and 24 Mainland funded research projects amounted to RMB 24.3m undertaken by ACE faculty members. Besides, four research projects amounted to HK\$3m under the Innovation and Technology Fund, and Environmental Conservation Fund were awarded to facilitate the formulation and development of government policies in the respective disciplines. ACE's research activities are supported by a range of the state-of-the-art equipment including the Wind Tunnel Facility, an experimental water flume (i.e. 12.5 meters long test section), a 600 ton MTS Universal Testing Machine and a well-equipped Indoor Air Quality Laboratory to facilitate the multi-disciplinary research approaches and activities.

Department of Physics and Materials Science (AP)

AP colleagues are active in KT activities which contribute to different aspects in the society including local and overseas government advisory bodies, professional institutions, tertiary education sector, technical companies, etc. in addition to the traditional KT activities. Examples of these include Materials Discipline Advisory Panel member and Professional Assessment committee assessor of Hong Kong Institution of Engineers, Chairman of Radiological Protection Advisory Group (Food and Health Bureau, HKSAR Government), auditor for Quality Assurance Council (Hong Kong University Grants Committee), etc. These activities have direct influence in policies and regulations in the respective disciplines. There is also an AP colleague serving as Scientific Advisor for Australian Centre for Neutron Scattering, as well as member of the Overseas Assessment Panel of Chinese Academy of Sciences. They are also invited to review research grant proposals for overseas research funding agencies. A lot of AP colleagues serve as Editor or editorial board members for prestigious scientific journals. Several AP colleagues serve as External Examiners for degree programme in an overseas university and for local tertiary education sector, while some other colleagues serve as Board Member or Technical Advisor for private companies in relevant technology fields. One AP colleague is a Project Leader of the 'CoolThink@JC' scheme, which intends to inspire digital creativity for Hong Kong students, funded by The Hong Kong Jockey Club Charities Trust.

Department of Biology and Chemistry (BCH)

The Department of Biology and Chemistry strongly encourages staff members to be involved in knowledge transfer activities, especially external advisory appointments and community engagements. During the reporting period, with reference to the Central Knowledge Transfer Data Repository (CKTDR), a total of 20 BCH faculty members had been invited to serve on over 250 committees of the Government, professional bodies and non-profit making organizations. For example, Prof. Paul Lam was the Chairman of the Advisory Council on the Environment, Environment Bureau, HKSAR Government and Prof. Nora Tam was the Chairperson of the

Strategic Sub-committee under the Council for Sustainable Development, HKSAR Government. Ten BCH faculty members also engaged in community service in over 40 events such as exhibitions, public lectures, workshops, and community/social services.

In addition, Dr. S G Cheung’s research on “Conservation of horseshoe crabs in Hong Kong” is receiving a very encouraging response from the HKSAR Government. It has finally agreed that horseshoe crabs require immediate conservation actions and an action plan will be prepared under the Hong Kong Biodiversity Strategy and Action Plan 2016-2021.

Department of Biomedical Sciences (BMS)

The Department carries out internationally competitive research and promotes interdisciplinary collaboration in biomedical sciences. Its research programmes aim to understand fundamental mechanisms of biological processes and diseases, and translate new knowledge into the development of novel diagnostic and therapeutic strategies for prediction, prevention, and treatment of human diseases.

Its departmental research focuses on three strategic areas: systems neuroscience, cancer biology and regenerative medicine. Multidisciplinary approaches are employed and supported by a wide range of state-of-the-art equipment with cutting-edge techniques in areas including molecular and cell biology, genetics and genomics, physiology and pharmacology, systems biology and bioinformatics, microbiology and immunology, and biotechnology and nanotechnology.

Department of Computer Science (CS)

The Department of Computer Science has received worldwide recognition for its outstanding research and pedagogical development. Ranked 9th globally by the US News & World Report, 18th by H-index citation score and 19th by citation per paper score in the QS World Rankings, CS is engaged in an on-going pursuit of excellence.

The Department conducts world-class fundamental and applied research. With more than 150 research projects in progress with total funding of over HK\$86m, the vital areas covered include multimedia coding/analysis, data science, cloud computing, machine learning and bioinformatics. The CityU-led research application “Security and Privacy-enhancing Technologies for Cloud Storage of Big Data”, coordinated and supported by CS research team (Prof Xiaohua Jia and Dr Cong Wang), has been awarded HK\$5.98m in the Collaborative Research Fund (CRF) from the Research Grants Council (RGC) in the 2016-17 exercise, exemplifying CS’s research excellence.

CS regularly hosts major international conferences and workshops such as COCOA 2016, RFIDSec 2016 and IEEE SMC 2015. CS staff members have been serving as journal editors, committee members of international conferences, judging panels & committees for government, learned societies and professional bodies (e.g. Fellow Evaluation Committee of IEEE Computational Intelligence Society; HKIE Accreditation Committee Members for Computer Science; Engineering Panel Member of Joint Research Schemes of Research Grants Council; Vice President of IEEE Systems, Man and Cybernetics).

CS endeavors to foster a close tie with industry by encouraging researchers to have collaborations with leading institutions and companies, resulting in fruitful partnerships with additional funding source in support of the on-going research work. Examples included:

Principal Investigator	Project Title	Amount (HK\$)
Dr Chi Yin CHOW	Building a Big Social Media Data Analytics Platform for	3,107,800

	Mining User Preferences	
Dr Gerhard Petrus HANCKE	Relay Resistant Communication For RFID Transactions	1,552,600
Dr Howard Wing-ho LEUNG	Smart Handwriting Analysis and Recognition Platform	2,750,000
Dr Chee Wei TAN	Development of Viral Marketing Techniques in Online Social Networks for E-commerce automated by Data Analytics Software	1,714,141
Dr Jason Chun XUE	近數據計算-ISC 關鍵技術合作項目 (In Storage Computing for SSD)	1,567,000
Dr Jason Chun XUE	手機存儲 IO 棧優化合作項目 (Mobile I/O Stack Optimization)	1,130,000

CS recognizes the importance of nurturing students' entrepreneurial spirits in leveraging the knowledge to applicable business practices. With assistance and support from Dr. C.W. Tan, four final year students were awarded HK\$0.2m from Student Early Entrepreneurship Development Scheme (SEEDS) for the project "Ed-tech on Gamification to Learn Mathematics" to develop a gamification software and big-data analytics platform for children to learn Mathematics. Our efforts in promoting entrepreneurship have reaped fruits with a number of recent BScCS graduates setting up their own companies.

Graduate (Name, Programme & Year)	Name of Company
WONG Shek Fei Duncan (BScCS 2015)	HoTechie Limited
CHAN Chung Ngok (BScCS 2014)	Innothink Tech Limited
WONG Ka Wai (BScCS 2013)	Algo Tech Limited

Since its introduction in 1988, our IT Professional Placement (at least 9 months) has constituted a fundamental and strong component of our undergraduate BScCS programme - allowing our students to gain experience within a workplace and transfer their knowledge learned to the industries. The number of organizations participating in the IT Professional Placement programme has increased every year since its inception, and there were around 96 local companies offering placement in 2016-17. They included some very prestigious companies like HK Electric, HSBC, IBM, Siemens, Hutchison, Jardine Matheson, Hospital Authority, with extension to overseas institutions in recent years. Through expanded liaison with industry partners and enhanced administrative support, we successfully placed 123 students and received an average score of 3.99 out of 5 rated by employers in 2016-17.

Department of Electronic Engineering (EE)

The Department actively participated in various knowledge transfer activities which were manifested in the number of paper publications in top-notch journals such as IEEE transactions/magazines (275 in 2015-16), publications of books/book chapters (15 in 2015-16), technical seminars/workshops organized (94 in 2016-17), licensing, patent granted (121 in 2015-16), as well as consultancy services provided (9 projects amounting to HK\$2.12m in 2016-17).

In the reporting year, there were a total of 93 on-going external research projects (GRF/ ECS, CRF, TRS, ITF, NFSC-RGC, other-RGC joint schemes, AoE, CROU, donations, various mainland funding schemes, contract research) at a total value of HK\$141.3m, of which 10 were contract research projects (HK\$3.09m from three newly approved projects in 2016-17 and HK\$10.38m from seven on-going projects), seven were Innovation and Technology Fund (ITF) projects (HK\$6.25m from four newly approved projects in 2016-17 and HK\$3.65m from three on-going projects) and seven were collaborative research projects (HK\$50.61m). A notable example is the newly approved HK\$28m-funded project by the RGC Theme Based Research Scheme (TRS) on

the topic “A Compact System for Terahertz Imaging and Spectroscopy”. It is also noteworthy that another project titled “TD-LTE Small Dielectric-Resonator Based Station Antennas Development and Industrialization” has been granted more than HK\$11m from the National Science and Technology Major Project funded by the Ministry of Industry and Information Technology of the People’s Republic of China.

In addition, faculty members also actively contribute to professional practice, engage in various government advisory panels and community services, hence directly providing professional comments to the community. For example, a number of faculty members have been serving as editors or editorial board members for prestigious journals and a faculty member is actively involved in the government legislative formulation and its policy development in his capacity of District Councilor of Kowloon City District Council.

Department of Mathematics (MA)

The Department of Mathematics has continued its effort in pursuing creativity and professional knowledge transfer during the reporting period. Faculty members’ endeavor in knowledge transfer was evident through their active participation in government, industry and professional advisory bodies such as Beta Alpha Technology (expert team), Chinese Association of Automation, European Center for Living Technology, Hong Kong Association for Science and Mathematics Education (Education Bureau), Hong Kong Automatic Control Association, Hong Kong Examinations and Assessment Authority Council, Hong Kong Gifted Education Teacher Association, Hong Kong Institute of Sciences, La Gaceta (the Bulletin of the Spanish Royal Mathematical Society), Real Academia de Ciencias y Artes de Barcelona, Research Grants Council, Society for the Foundations of Computational Mathematics, The Gifted Education Section of the Education Bureau of HKSAR, The Hong Kong Mathematical Society and The Society for the Foundation of Computational Mathematics.

To contribute efforts in community engagement activities, some faculty members served as selection/advisory committee members for mathematical awards and competitions such as Academic Advisory Board of International Mathematical Modeling Challenge, Advisory Group for the Simon Marais Mathematics Competition, Interdisciplinary Contest in Mathematics and Young Scientist Awards. A faculty member also assisted in organizing a University programme “A Pilot Programme to Nurture Gifted Students in HK” which offered summer courses for gifted secondary school students with the aim of enhancing the engagement with the society and improving gifted students’ ability, skills and creativity. With a key role in a Special Committee of Education Bureau, a faculty member spent much effort in helping the Committee to review the senior secondary Mathematics curriculum. The committee formed a consultation group which visited several universities and collected comments, and exchanged professional dialogues with constructive suggestions so as to establish better mathematics curriculum to expand students’ academic development and career pathways.

Among the 77 on-going research projects by our staff, some of which have direct significant impact on the society such as projects to study mechanical behaviors of soft material shells and derive strain shell theory which could have broad applications for soft materials such as pattern formations in soft materials due to mechanical forces. Research direction of another project focuses on studying cell polarization processes through modeling the system of cell polarization proteins in budding yeast aiming to extend understanding for the cause of abnormal cell development and provide a potential treatment of clinical studies.

There are other working projects such as focusing on factors that relate to various abnormal developments of embryos so as to advance the general understanding of prognosis and treatment for the abnormal growth of human beings, developing an adaptive-mesh-refinement type PDE solver to help simulate and analyze problems which benefit aircraft design, telecommunication

industry and evolution of high intensity focused ultrasound waves that plays an increasingly important role in non-invasive medical treatments of cancers.

Department of Mechanical and Biomedical Engineering (MBE)

During the reporting period, 23 faculty members indicated that they were engaged as members of external advisory bodies including professional, industry, government, statutory and non-statutory bodies, such as the Institute of Electrical and Electronics Engineers (IEEE), Chinese Academy of Engineering, The Research Grants Council of Hong Kong, JUPAS Board of Management, UGC's Quality Assurance Council, Hong Kong Council for Academic Accreditation and Vocational Qualifications, Innovation and Technology Commission of Hong Kong, Environment Bureau of Hong Kong, and so on. In addition, to improve related KT developments and practices, MBE also started to enhance the pool of patented innovations and technologies with commercialization potential. MBE has also made knowledge accessible to the community by research publications, delivering talks or speeches and organizing technical workshops/seminars. It has built close connections for KT activities with the society through providing consultancy services and contract research. There were a total of 26 on-going consultancy projects (including CRFs, ITFs, contract research, donations, Germany/Hong Kong Joint Research Scheme, NSFC/RGC Joint Research Scheme, and Croucher Foundation Research Grants) at a total value of HK\$53.38m undertaken by MBE researchers during the reporting period, including contract research projects with Asahi Group Co. Ltd., AREVA, Beijing Institute of Technology's Shenzhen Research Institute, and so on. A mainland contract research project on "Experimental study of electro-explosive device based on high thermal resistance polymer microheater and energetic material" with the China Academy of Engineering Physics' Institute of Chemical Materials has been approved during the reporting year.

In particular, Prof. Jian Lu, Chair Professor of Mechanical Engineering, and his research team have recently developed the first-ever supra-nano magnesium alloy which is 10 times stronger than conventional crystalline magnesium alloy and has super-deformation capacity two times higher than that of magnesium-based metallic glass. Details can be referred to section 3.2.

Department of Systems Engineering and Engineering Management (SEEM)

The Department of Systems Engineering and Engineering Management (SEEM) has continued its effort in knowledge transfer activities by engaging in various contract research projects. SEEM faculty members have established a strong network of industrial linkage worldwide. Industrial collaborators include companies and organizations in diversified industries such as public utilities, transportation, healthcare, government, etc.

SEEM proactively hosts and organizes international conferences and workshops, bringing together international academics, industry experts, CityU faculty and students to share their knowledge and research ideas. In 2016-17, SEEM organized and hosted the International Research Conference on Systems Engineering and Management Science 2017 in Xi'an, China which provided a platform for academic and researchers to share their experience and research findings in systems engineering and management science. SEEM also hosted two workshops on high-speed railway, disseminating research ideas and results on high-speed rail and metro systems with local, regional, and international professionals from government, academia and private sector for safety and reliability.

Knowledge Transfer in School of Creative Media

Introduction

School of Creative Media (SCM) has been implementing knowledge transfer vigorously at two levels. The School's community and public engagement through organization of art events and exhibitions have been central to its knowledge transfer effort. On the personal level, SCM faculty members have served as active agents of knowledge transfer to influence the society through delivering lectures, publishing research results and participating in external advisory bodies. Their artworks exhibited around the globe have successfully articulated the School's pioneering leadership in media art research, development and education.

Summary of Knowledge Transfer Activities

In this reporting year, SCM has achieved significant outcomes in knowledge transfer through organizing exploratory study tours and interdisciplinary exhibitions for students and the public, applying media technologies to preserve cultural heritage as well as reaching out to global learners via online education platforms. As either a host or a collaborator, SCM has presented numerous world-class exhibitions including *300 Years of Hakka Kung Fu – Digital Vision of Its Legacy and Future*, which allowed visitors to travel in time to learn about the Hakka kung fu styles from its origin to some modern presentations afforded by top-notch motion capture technologies. Travelling to Vienna after its premiere in Hong Kong in 2015, *The Age of Experience* exemplified SCM's knowledge transfer by providing a platform to exchange on art practices and experience as well as marking SCM's appearance at a major venue in the European art world.

SCM's flagship discovery-enriched programme, *Extreme Environments*, took selected students to study the scientific data in Malaysia's marine environment and Solomon Islands' ecosystem. The students returned to make compelling artworks which have impacted the society by raising public awareness of environmental conservation. Joining the established *Massive Open Online Course (MOOC)* platform, SCM has made socially-engaged art in China ever more accessible by offering to interested public free introductory classes on the web.

By involving staff, students and alumni in home-grown events with participation from international audience -exhibitions, performances, symposiums and conferences-SCM has continued to expand the knowledge transfer capacity of staff and students.

SCM faculty's knowledge transfer capacity in the reporting year was evidenced by their active participation through 72 posts in various external advisory bodies. Their advisory responsibilities were required in industries, institutions, renowned publishers, editorial boards, and professional and government bodies. Half of these different advisory capacities were entrusted to the faculty by invitation from overseas organizations or institutes. This gives credit to SCM faculty's recognition in the global arena. Some of the faculty members have continued with their commitment for up to 10 years, which is testimony to their good rapport with and strong recognition in the corresponding field and industry. 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 faculty have not only produced research publications, conference proceedings and/or refereed journal articles based on their research interests, but also developed reference materials of high

importance to artists, art professionals, educators and administrators. They have undertaken 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) was founded in July 2009 with the mission to perform state-of-the-art research and provide professional education in energy- and environment-related issues. The faculty staff in SEE is enthusiastic in participating in knowledge transfer activities, like contract research, community service, external advisory bodies, etc. which developed interactive exchanges with government, collaborators, related organizations, and society in general.

Outside Practice

Faculty staff in SEE has organized contract research with different institutions like Risk Management Solutions, Inc., Hong Kong Federation of insurers, Black & Veatch Hong Kong Limited and L'Oreal, from 1 July 2016 to 30 June 2017.

Efforts to build up KT capabilities

1. SEE worked with 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. Faculty staff in SEE also contributed periodic articles on a particular subject to Skypost from 1 January to 30 June 2017.
2. Faculty staff in SEE has been interviewed by various media, such as ViuTV, Yahoo, South China Morning Post/Young Post, Sky Post, Ming Pao and other newspaper publishers on innovative research and technology. The interviews help transfer innovative knowledge to the general public. Dr. Carol Sze Ki LIN successfully obtained research grants related to biomass energy from Innovation and Technology Fund, and was interviewed by South China Morning Post, Yahoo and Ming Pao on the topic of biomass recycling during the period.

Outstanding knowledge transfer initiatives

1. A pioneering system for predicting the landfall of seasonal typhoons with greater accuracy to be developed by Professor Johnny Chan Chung-leung in SEE has received a grant under the European Commission (EC) and Research Grants Council (RGC) Collaboration Scheme. It is the first of its kind to predict with more precision than before the number and intensity of tropical cyclones that will make landfall in a season.
2. To promote outreach/knowledge transfer on forming synergies in air pollution control and low carbon development in China, SEE co-organized a workshop with the Department of Public Policy on 13 June, 2017. Prof. Chak K. Chan and Dr. Zhi Ning were invited as speakers to share related outreach experiences with audience.

Knowledge Transfer in School of Law

Below are highlights of knowledge transfer activities that School of Law and/or its colleagues carried out during the reporting period:

i) Research Contracting/Consultancy

- Prof Geraint Howells acts as Advisor to European Consumer Association in their training project Consumer Justice Enforcement Forum II (COJEF II);
- Prof Lin Feng serves as Court appointed expert (High Court);
- Prof Gu Minkang serves as People’s Adjudicator (The People’s Court of Nanshan District, Shenzhen).

ii) Professional Services

- Prof Geraint Howells is advisor of the Legal Education Fund Company Ltd and member of the Standing Committee on Legal Education and Training;
- Prof Lin Feng is member of the Law Reform Commission and member of the Telecommunications (Competition Provisions) Appeal Board;
- Dr Priscilla Leung is (1) a member of ICAC Complaints Committee, (2) Executive Council member of Chinese Judicial Studies Association formed by Civic Affairs Ministry under the Supreme People's Court of PRC, (3) Arbitrator of China International Economic and Trade Arbitration Commission, and (4) Adjunct Professor of Law School, Renmin University of China, Beijing;
- Ms Stella Leung is a member of the Standing Committee on Legal Education and Training.

iii) Community Engagement Activities

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), have organized 14 conferences / workshops / symposiums and 38 public lectures/seminars. Some of these events are worth highlighting:

- Symposium on “Data Protection Law Development in the Information Age”
- Conference on “Conversations on Convergence”
- Conference on “Consumer Protection in Asia – Past, Present”
- Conference on “Research in Private and Market Law – Challenges for the 21st century”
- Conference on “Judicial Reform in China”
- Roundtable Conference on “Reasons for Different Judgement in Similar Cases under the Current Round of Judicial Reform in China”

iv) Mooting

By participating in mooting competitions, students not only learn substantive legal principles related to different moots but also develop oratory and advocacy skills. These skills equip students for future learning and their pursuit of a legal career. Below were our students’ participation during the reporting period:

- The International ADR Mooting Competition 2016 (5 - 9 July 2016)
- The 2017 Philip C. Jessup International Law Moot Court Competition (Hong Kong Regional Round: 18 February 2017)
Hong Kong Regional Round – First Runner-Up
Hong Kong Regional Round – Best Respondent Memorial
Hong Kong Regional Round – Best Overall Memorial
- Fourteen Annual Willem C. Vis (East) International Commercial Arbitration Moot (26 March – 2 April 2017)
Honorable Mention for the Claimant’s Memoranda
- Seventh Annual Budapest Pre-Moot for the Twenty Fourth Annual Willem C. Vis International Commercial Arbitration Moot (3 – 6 April 2017)
Quarter-Finals
- Twenty Fourth Annual Willem C. Vis International Commercial Arbitration Moot (7 – 13 April 2017)
Advanced to the top 64 out of 338 teams
Honorable Mention for Eric E. Bergsten Award Team Orals
Wong Suet Yee Shelley: Honorable Mention (Martin Domke Award for Individual Oralists)
- Manfred Lachs Space Law Moot Court Competition 2017 (18 – 21 April 2017)
First Runner-up
Second Best Memorial
Chung Chun Wai: Oralist Award
- International Criminal Court Moot Court Competition 2017 (14 – 19 May 2017)
Quarter-Finals

v) Training for Mainland Judges

As a result of the agreements between the National Judges College and the Supreme People’s Court of the PRC, the School of Law has been providing postgraduate courses for Chinese judges since the inception of its Programme in 2009. Mainland judges sent to the Law School under these agreements will enrol in one of the following three programmes: the Common Law Stream of the LLM Programme; the Doctor of Juridical Science Programme — the curriculum specifically designed for Mainland judges; and the Advanced Programme for Chinese Senior Judges.

As of May 2017, there are 168 graduates from the Master of Laws (Common Law) Programme. Ten rounds of Advanced Programme for Chinese Senior Judges were held from May 2009 to October 2016, and a total of 302 senior Mainland judges joined the Programme. A total of 81 Chinese judges, out of which 77 are senior judges in mainland China, have been admitted under the Doctor of Juridical Science Programme.

Through offering these programmes to mainland judges, the School of Law facilitates mutual knowledge transfer between mainland China and Hong Kong, or even other parts of the world.

vi) Student Placement

Legal placement enhances students’ hands-on experiences apart from their theoretical learning in Hong Kong. Given its significance, legal placement is offered as one of the electives for our LLB and JD students. The elective consists of 160 hours of legal placement work in law firms, barrister chambers, international banks, insurance companies as well as courts both in Hong Kong and in the PRC.

Knowledge Transfer in School of Veterinary Medicine

In July 2017, City University strategically integrated the School of Veterinary Medicine and the Department of Biomedical Sciences to establish the College of Veterinary Medicine and Life Sciences (the “College”). The College aspires to pursue excellence and innovation to benefit society, particularly in the prevention of infectious diseases, the study of physiological and pathological processes, and the development of veterinary and human disease diagnostics and therapeutics for improving our quality of life.

As a member of the Expert Committee on Antimicrobial Resistance of the Hong Kong Special Administrative Region Government, College Dean Professor Michael Reichel contributed his expertise to the local policy formulation. The Expert Committee serves to provide practical and science-based advice to assist in the formulation of territory-wide action plans against Antimicrobial Resistance (AMR) under the “One-Health” framework.

Besides, the College initiated a project to scan and 3D-print the whole skeleton of a beached Omura’s whale, a recently discovered species in 2003, in ½ scale which is likely to be a world’s first. The 3D-printed model provides a replacement model for research and education uses. The 3D-printing files will be made available so the skeleton model can be printed worldwide without geographical constraints.

Professor Dirk Pfeiffer, Chair Professor of One Health, served as the Senior Lead Trainer on Veterinary Epidemiology in the China Field Epidemiology Training Program for Veterinarians (CFETPV) of China’s Ministry of Agriculture and the Food and Agriculture Organization of the United Nations (FAO). He shared his knowledge, expertise and experience with veterinary epidemiologists who are in China’s Government Veterinary Service. The knowledge transfer contributed to the capacity building in the government agencies in China and provided them with field veterinary epidemiologists who can respond effectively and rapidly to animal disease events.

Established in October 2016, the Centre for Applied One Health Research and Policy Advice (OHRP) of the College aims at preventing and controlling infectious animal diseases affecting human health and animal production, welfare and health. Various research projects have been carried out such as investigating the influence of the structure of poultry trade networks and the behaviours of traders and consumers on the risk of avian influenza virus spread in Bangladesh; role of free-grazing ducks in the spread of avian influenza in Vietnam; tuberculosis related mortality in wild meerkats; causal link between the development of early animal farming and the emergence of zoonotic disease; and the quantitative assessment of the risk of release of foot-and-mouth disease virus via export of bull semen from Israel.

The College also established a Centre for Animal Welfare with an aim to taking a leading role in monitoring and advancement of Animal Welfare standards in Asia. The Centre and the Library together have organized the ‘Animal Welfare Series 2016’ with the first talk started in February 2016. The theme of this year’s Animal Welfare series focused on Animals as Pets and Companions to People. The aim of the Series is to raise awareness of animal welfare among the CityU community and public in general.