

# Annual Report on Activities and Advancement of Knowledge Transfer

Supported by earmarked UGC Funding  
FY2015-16



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THE HONG KONG  
POLYTECHNIC UNIVERSITY  
香港理工大學

## Table of Contents

<b>1. Knowledge Transfer @ PolyU .....</b>	<b>1</b>
<b>2. Innovations &amp; Impact.....</b>	<b>2</b>
<b>3. Collaboration &amp; Engagement .....</b>	<b>4</b>
<b>4. Entrepreneurship Practice, Education and Engagement .....</b>	<b>7</b>
<b>5. Performance Measure – Key Performance Indicators .....</b>	<b>10</b>
<b>6. The Way Forward .....</b>	<b>11</b>
<b>Appendix 1: Impact Case History .....</b>	<b>12</b>
<b>Appendix 2: Technology Marketing and Networking Activities .....</b>	<b>19</b>
<b>Appendix 3: Highlighted Cases of Funded Entrepreneurial Ventures.....</b>	<b>23</b>
<b>Appendix 4: List of Patents Granted in FY2015-16.....</b>	<b>26</b>
<b>Appendix 5: Additional Key Performance Indicators.....</b>	<b>28</b>

## **1. Knowledge Transfer @ PolyU**

### **1.1. Review of KT Activities in FY2015-16**

The last funding cycle in FY2015-16, being the roll-over year between two trienniums (FY2012-15 and FY2016-19), provided only one-year of resources for KT activities. Notwithstanding the short cycle period, the understanding and attitude of the administration toward KT and its impact continued to fuel PolyU to enhance its KT operations, especially in efforts to create synergistic alignments of commercialization and entrepreneurship activities, with leveraging community partnership for impact down the KT value chain.

This report summarizes key KT activities and developments of PolyU in FY2015-16. Observations and suggestions from UGC in the past have been duly considered for improving related KT developments and practices.

In FY2015-16, income generated from mainstream KT activities, namely, consultancy, contract research under consultancy, and licensing <sup>1</sup> amounted to \$115.1 million, (LY: \$113.8 million, +1.1%). Meanwhile, the aggregate value of on-going collaborative research projects on hand in FY2015-16 was \$467.5 million. On the enhancement of innovation and entrepreneurship activities, the University had devised different funding schemes over the last few years, targeting at specific market segments and phases of the early stage start-up value chain, most of which were in partnership with government-supported incubation operators / funding agencies like the Shanghai Technology Entrepreneurship Foundation for Graduates (STEF), the Hong Kong Science & Technology Park (HKSTP), Social Innovation & Entrepreneurship Development Fund (SIE Fund). Together with structured angel investments, the 5 funding schemes under the Micro Fund entrepreneurship platform now offers grants close to HK\$10 million per year to support 50 to 60 early stage start-ups and social innovation projects. As of 30 June 2016, PolyU has supported a total of 171 startup ventures. More details are reported under Section 4.

Over the years, PolyU has also been striving to involve industries in mid-stream collaborative research on campus by establishing laboratories and research institutes with strong industrial participation like Research Institute of Sustainable Urban Development (RISUD), Aviation Service Research Centre (ASRC) in collaboration with industry partners, with an aim to foster research collaborations with industries to develop new innovative applications that can benefit the industries. In FY2015-16, several new research centres / institutes were developed like the establishment of the new Institute of Translational Medicine to enable more timely clinical adoption of new medicines for treating patients, and the first MakerBot Innovation Centre in Asia Pacific with MakerBot to create an atmosphere of collaboration and learning about 3D printing, entrepreneurship, and innovation.

### **1.2. KT Culture, Strategies & Practice @ PolyU**

#### **(a) KT as a Core Strategic Direction**

To drive KT in a systematic and disciplined manner, a KT Committee at PolyU's Council level was established in 2010 to advise the management on the overall policy, governance, and strategic advancement of KT and entrepreneurship activities. Under the guidance of this Committee, PolyU has been rolling out various improvement measures to enhance governance for KT in a disciplined manner, while at the same time paying equal attention to market expectations regarding timeliness and time-to-market concerns. Evaluation of the commercial potential of inventions and their downstream commercial exploitation involves both university executives and external experts from the industry in order to gain balanced views on patenting and licensing. Regarded as one of the core supporting areas in the University's Strategic Plan, offices responsible for driving KT aim to (i) manage KT under good governance with discipline, transparency and public accountability to maximize impact, and (ii) foster "Do Well Do Good" ethos in

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<sup>1</sup> Recognized through PolyU's wholly owned subsidiary, PolyU Technology and Consultancy Co. Ltd. (PTeC), contract research income through the Research Office has not been included.

innovation and entrepreneurial practice. Translated into day-to-day operations, both administrators and academic staff would seek to uphold the following:

1. Forge close collaborative partnership with industries and business / entrepreneurship communities in both research and entrepreneurship.
2. Ensure discipline and governance while giving good recognition to KT achievements under a balanced workload concept.
3. Align different research and entrepreneurial operations to maximize their KT potential and impact to community partners and the society at large

To support continuous development and improvement of KT and its relevant upstream operations, the University has earmarked recurrent resources for the next few years for tech transfer training, technology marketing and win-win partnering entrepreneurship programs with strategic partners in the start-up ecosystem.

#### **(b) KT Governance, Practices and Mechanisms**

Under the guidance of the council level KT Committee, PolyU has been implementing various improvement measures to enhance governance without compromising the timeliness and time-to-market requirements of KT operations. Unlike conventional business operations, the emphasis in KT hinges on its potential value and impact instead of on maximizing financial return. As such, related policy makes provision for the free licensing of the University's intellectual properties if this is the best way to create positive impact for the community concerned. The University management also encourages individual departments and schools to come up with their own discipline specific measures of KT performance, since metrics for technology-related industries can be quite different from humanities / service oriented industries. The likely inclusion of impact of research outcome in the next round of Research Assessment Exercise in 2020 certainly adds weight to treating KT as a key component for demonstrating discipline-specific research impacts. Additionally, with increased interest and support in commercializing research deliverables through technology ventures, relevant guidelines for staff involvement in start-ups are being revamped to provide clear mechanisms for staff and students to engage in ventures under sound governance, free of potential encumbrances and conflicts of interest.

With a new chairman guiding the KT Committee since September 2015, the Committee had set off to conduct an overall review of the existing KT practices at the end of the 5-year operation cycle, with particular focus on workload and recognition, spin-offs, entrepreneurship and marketing & promotion. The review aims to identify improvement areas for refining policies and enhancing guidelines that would effectively address both government and institutional objectives at the time. The establishment of the Innovation and Technology Bureau (ITB) in 2015 rendered an excellent timing of the review to bring our practices in better alignment with ITB initiatives.

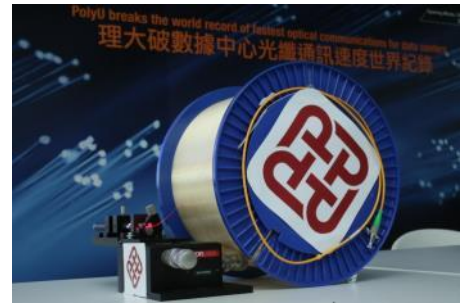
## **2. Innovations & Impact**

In parallel to advancing knowledge through research, PolyU is always committed to innovate and serve the industry and society with its know-how and technology applications. Underpinned by concerted effort in theme-based research centre and units, we have seen in the reporting year breakthroughs in record-breaking high speed optical communication; establishment of the Institute of Translational Medicine; cutting-edge surgical robotic system, scientific advancement in food safety as a selection of our commitment to advancement and use of knowledge to bring positive impact to the society. The rest of this section presents selected examples that would demonstrate our effort and achievement during the year.

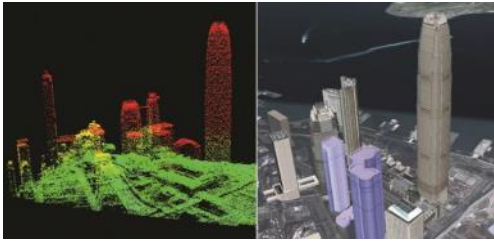
## 2.1. Advancing Innovations and Technologies

### (a) Breakthrough in Optical Communication Speed

The Photonics Research Centre of PolyU has achieved a breakthrough in the research of high-speed optical communications to cope with the increasing demand for higher network communication speed for various applications. The speed of optical communications is affected by distortions of the information signals generated from their interactions with silicon dioxide molecules that make up optical fibres. Based on stochastic modeling of signal distortions inside an optical fibre, our researchers have developed an ingenious software-based approach, integrating multidisciplinary knowhow and technology on optics, statistics and signal processing to demonstrate that the optical network speed can be substantially raised to 240 Giga bits per second over 2 kilometres, 24 times faster than the existing speed available in the market. Instead of using specialized hardware to reduce distortions, conventional hardware components can be used to attain this high speed. Huawei, one of our industrial collaborators, has expressed its interest in bringing this latest technological advancement into practical application.



### (b) 3D Mapping Model for Space Exploration and Smart City



Traditionally, photogrammetry and laser measurement are the two major 3D mapping techniques. The former offers higher accuracy in horizontal direction while the latter shows higher accuracy in vertical direction. When used alone, both methods have their application drawbacks. PolyU research team from the Department of Land Surveying and Geo-Informatics has developed a precise topographic mapping model, by integrating measurement data from these two methods to drastically improve the accuracy in both horizontal and vertical directions. Due to this advancement, the mapping techniques were used in China's Chang'e 3 lunar mission to characterize and select the best landing site on the moon. Back to earthly application, the technology can be readily used for landscape mapping in smart city design and planning.

## 2.2. Innovating for Sustainability & Green Environment

### 3D Spatial Analysis Technology Gives New Insights for Changing Land Development Density

In 2015, the Town Planning Board approved a minor relaxation of plot ratio / building height restrictions for 21 sites in 3 research areas of Kai Tak Development. Our researchers from the Department of Building and Real Estate deployed their proprietary 3D spatial analysis technique to scientifically assess the impact of such relaxation for consideration of approving further relaxations. The findings revealed that such minor relaxation of plot ratio and building heights for Kai Tak Development would not bring material influence on the urban skyline, visual impact, wind ventilation, shadow and solar exposure as well as air temperature, so suggesting a possible relaxation for an additional gross floor area of 156,200 square metres and 119,900 square metres respectively for domestic and non-domestic use beyond the currently approved relaxation by the Town Planning Board. The research findings provided new methodological and theoretical insights for facilitating rational discussion and debates on changing land development density in Hong Kong and other hyper-dense cities.

## 2.3. Promoting Healthy Living & Wellbeing

### (a) Minimally Invasive Surgery with the Novel Surgical Robotic System

Integrating PolyU's knowledge and technology in developing precision instruments for space explorations together with important inputs of expertise in robotic surgery from Bio-Medical Engineering (HK) Limited., PolyU's team of experienced engineers successfully developed a novel surgical robotic system (NSRS) which can be inserted through a single small incision for expansion inside the abdominal cavity to perform various surgical procedures. At present, surgical robots in the market require multiple (3-6) abdominal incisions, which cause more trauma to patients. Also they provide no force or tactile sensation feedback to the surgeons. NSRS is equipped with arms having internal motors that are both small enough and able to generate sufficient force to perform various surgical operations. This new robotic system is capable of up to ten degrees of freedom in movement, paving the way for future non-invasive surgery.



### (b) Establishment of Institute of Translational Medicine



Collaboration in translational medicine is valuable for not only accelerating new medicine development but also enhancing the quality of clinical treatment. PolyU recently signed a collaboration agreement with the Government of Banan District of Chongqing City to establish the Chongqing Banan – PolyU Institute of Translational Medicine. The Institute aims to advance translational medicine research in China through effective transfer of research outputs to this collaborative platform for treatments of diseases through clinical trials. With the synergy between both

parties in their strength and resources on new medicine and clinical research, the Institute will focus on developing medication and diagnostic devices for therapeutic treatment, medical imaging and genetic diagnosis. The collaboration strengthens the international partnership and industry cooperation in translational medicine and offers cost-effective therapeutic solutions to patients.

## 3. Collaboration & Engagement

Collaboration with industry and community continues to be a core commitment that PolyU upholds in its applied research and KT endeavours to align and optimize the impact of our innovation, commercialization, and entrepreneurship outcomes. Meanwhile, both conventional marketing channels as well as online and social platforms are used to disseminate relevant information to targeted trade segments and the general public, advocating PolyU's commitment and capability as a forerunner in applied research and KT in Hong Kong.

### 3.1. Engaging Industries for KT Partnerships

#### (a) Global Invention Expos

PolyU takes pride in its achievements in major global invention expos, which further established its all-round leading position in research and innovation.

The 4 inventions selected for competing at the Seoul International Invention Fair in late 2015 won 7 awards in total. The 2 gold medal-winning projects were later presented to the Consulate General of the Republic of Korea in Hong Kong. In April 2016, PolyU was awarded 14 prizes for its 9 inventions submitted to the 44th International Exhibition of Inventions of Geneva, including 2 grand prizes, 6 gold medals, 1 silver medal, 2 bronze medals and 3 special merit awards.



The delegation was also joined by 9 ISTA member universities from the Chinese mainland, who displayed 28 projects that won 32 awards. Our award-winning projects were showcased in a celebratory event to government officials and industry members, including the Chief Executive, the Consul-General of Switzerland, and the Secretary for Innovation and Technology.



Our post-expo marketing efforts, including showcasing of the winning projects at relevant exhibitions and trade shows in Hong Kong, generated wide media coverage and public awareness. One of the highlight events was “Star Tech Salon 2015-16” staged on PolyU campus, connecting the award-winning inventors to the industry leaders and trade association executives. The event attracted close to 40 exclusive guests, including chairpersons from 19 trade associations and CEO Club members.

### **(b) Trade Shows**

In the year under review, PolyU actively participated in a range of trade shows, demonstrating our research expertise to visitors from various industrial sectors. Just to name a few, in the Hong Kong International Medical Devices and Supplies Fair 2016, PolyU presented a number of advanced healthcare and rehabilitation technologies to industry players. Selected ICT technologies were also featured at the Hong Kong Electronics Fair 2015 (Autumn Edition) and Hong Kong ICT Expo 2016.

Following its success at the inaugural event last year, PolyU participated in the 2nd China Innovation and Technology Fair (2016 中國創新創業成果交流會), attracting prominent guests including the Vice Provincial Governor of Guangdong, and the Chairman of the Chinese Academy of Engineering.

### **(c) Industry-specific Promotion of Technologies**



A number of activities including technology networking seminars, exhibitions and press events were organized to promote PolyU’s research strengths and technologies to targeted industries and trade associations, covering topics like Industry 4.0, the Internet of Things (IoT), and technology-enabled innovations relating to healthcare.

To promote the iWheelchair, a smart system integrating several advanced PolyU technologies for the wellbeing of the wheelchair-using community, two videos were produced. The invention won an award in the Seoul International Invention Fair in 2015. Subsequently in March 2016, a technology launch event together with a press conference was held with 20 industry guests attending and extensive press coverage of around 120 news media reports.

### **(d) Business Matching and Partnership**

As in previous years, we continued to offer professional services to assist the development of the CEO Club. A wide range of activities, including a monthly lunch talk series featuring prominent community figures as speakers, were organized with very positive feedbacks. Speakers invited to CEO events include key industry leaders and PolyU academics, while Micro Fund awardees and PolyU students were also invited to network with the CEOs. A series of technology networking seminars were also organized to enhance industry’s understanding of PolyU technologies and expertise. In addition, enhanced recruitment efforts enticed young executives from different industrial sectors to join the club.

### **3.2. Disseminating Knowledge for Community Benefits**

#### **(a) Publicity, Publications and Online Marketing**

A variety of publicity channels were deployed to communicate PolyU technologies to targeted audiences with an aim of raising awareness of the University's innovations. In the past year, a press conference and a number of press briefings and interviews were aligned with our marketing events to introduce featured technologies to the general public. Our substantive research outcomes were also appeared in feature stories in trade magazines such as Hong Kong Entrepreneurs (a quarterly magazine of the Chinese Manufacturers' Association) and the Clothing & Accessories supplement by Yellow Pages, as well as some target specific foreign online and printed media.

PolyU's innovations were regularly featured in the University's printed or electronic publications, including "Technology Frontier", a monthly e-newsletter. With the phenomenal growth in internet and mobile communities, more efforts and resources were put on on-line marketing in trending platforms and social media such as Facebook, Whatsapp and WeChat.

#### **(b) House of Innovation (HoI)**

Serving as the University's innovation and technology showroom, HoI was robustly promoted to the industry through open days and special tours. Exclusive tours were conducted for various institutions, government officials, the CEO Club, and trade associations. During the period under review, over 230 visits involving 6,400 plus visitors in total were received. Our research breakthroughs were also promoted on Virtual HoI, an online representation of HoI, and HoI Facebook Fanpage.

#### **(c) Thematic Campaign**

In the past year, a thematic campaign on PolyU's green innovations was launched at prominent events including InnoCarnival 2015, China Hi-Tech Fair 2015 and Eco Expo Asia 2015. The University's expertise in green energy, electric vehicles, smart farming and environment monitoring, as well as the Green Deck initiative proposed by PolyU were prominently featured to promote public appreciation of the value and impact of our research. Along this line, a seminar on the Green Deck initiative was organized, and exhibits of green technologies were updated in HoI.



At InnoCarnival 2015, the PolyU pavilion titled "Innovate a Green Tomorrow" was voted as "My Favourite Booth" by the public. In addition, our exhibits attracted many VIPs and media with engaging interactive features, e.g. an electricity-generating bicycle and an automobile suspension prototype that visitors could play with.

#### **(d) Partnership with Other Organizations**

To reach a wider audience, PolyU actively partnered with external organizations in staging various promotional activities. One fine example was the first-ever on-campus Polypreneurs Carnival, a key component of Visionaries Connected, a one-of-its-kind collective brand of talks, sharing and fun programmes focusing on entrepreneurship. Section 4.3 provides more details of this event.

In addition to the carnival, we also collaborated with organizations such as the Hong Kong General Chamber of Commerce in organizing other events for different industrial sectors, covering a broad range of professional and technology areas. Our effort was reflected in PolyU's winning of "SME Best Partner Award" organized by Hong Kong General Chamber of Small and Medium Business, and "The Best Partner of Learning Enterprises Award" presented by The Professional Validation Council of Hong Kong Industries Limited (PVCHK).



## 4. Entrepreneurship Practice, Education and Engagement

Following the establishment of the Innovation and Technology Bureau (ITB) of the Hong Kong SAR Government, the momentum of the innovation and entrepreneurship development gained further steam to reach new heights over the last year. New initiatives and resources from both private and public sectors were availed to support the development of Hong Kong into an innovation and technology hub. Universities, as a major source of new technologies and innovations, face both opportunities and challenges on fostering KT and entrepreneurship to support Hong Kong’s technology and economic development.

Since 2011, PolyU has been fostering innovation and entrepreneurship for its students and young graduates through funding and education programmes, in partnership with key stakeholders in the entrepreneurial community.

### 4.1. Cultivating “Do Well Do Good” Entrepreneurship Practice



PolyU has been facilitating students and young graduates to embrace their entrepreneurial pursuits via funding, mentoring, and business development supports through PolyU Micro Fund series since 2011. Over the last few years, the University enhanced the series with different funding schemes, targeting at specific market segments and phases of the early stage start-up value chain, most of which in partnership with government-supported incubation operators / funding agencies like the Shanghai Technology Entrepreneurship Foundation for Graduates (STEFEG), the Hong Kong Science and Technology Parks Corporation (HKSTP), Social Innovation &

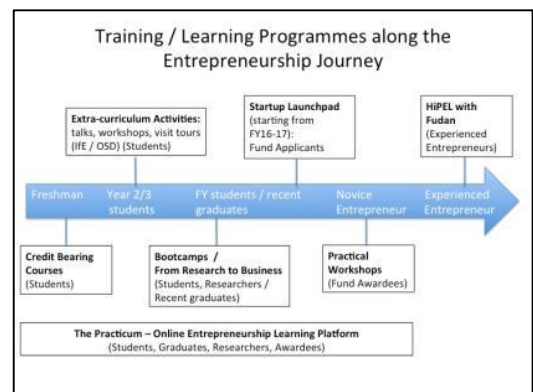
Entrepreneurship Development Fund (SIE Fund). Together with structured angel investments, the 5 funding schemes under the Micro Fund entrepreneurship platform now offers grants close to HK\$10 million per year to support 50 to 60 early stage start-ups and social innovation projects.

As of 30 June 2016, PolyU has supported 171 start-up ventures through the 5 funding schemes, providing related training to over 350 young entrepreneurs and potential entrepreneurs with an aggregate of over 50,000 training hours. The performance of the supported start-ups has been encouraging, with around 70% still under active operation. A good number of them secured further funding support and investment that amounted to more than \$100 million. In addition, the grant recipients collectively won over 80 international and regional awards, including a 2016 “30 under 30 Asia” award by Forbes to the founder of Zealer, one of the PolyU supported start-ups based in Shenzhen.

### 4.2. Nurturing Young People with Entrepreneurship Education

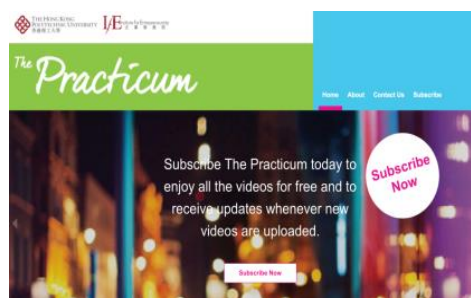
As a higher education institution, PolyU has drawn resources to cultivate entrepreneurship mindset and skills for PolyU students, graduates and research staff through various activities and programmes with different focuses and learning objectives:

**Credit Bearing Courses:** formal courses are being offered in different academic departments with different disciplines and focuses for interested students to learn the basic concepts and knowledge of entrepreneurship.



Extra-curricular Activities: through the Office of Student Development (OSD) and the recently established student-run Entrepreneurship Society, seminars, talks, and visit tours are being organized for students who want to further develop their entrepreneurial mind-sets and skills as part of their personal development. In FY2015-16, tours to Singapore, Beijing and Israel were organized to visit local entrepreneurial related organizations which proved to be an eye-opening experience for the students.

Online Entrepreneurship Learning: to increase the audience reach of entrepreneurship training with limited resources, PolyU embarked on a strategic direction to develop online entrepreneurship learning materials as precursors for the existing line up of off-line training programmes. The online entrepreneurship learning resource centre, titled “The Practicum”, was soft launched in January 2016. To date, it has 4 thematic modules featuring 24 videos. It is planned that 40 additional videos will be developed in FY2016-17.



Entrepreneurship Bootcamps: entrepreneurship bootcamps were run both in Hong Kong and in Shanghai (in collaboration with STEFG, Fudan and Tongji University) to help young students crystalize their innovative ideas into fundable business propositions. In addition, “From Research to Business”, a programme targeted specifically at research students and staff, offers training on technology transfer and entrepreneurship. Some of the participants indeed went on to secure TIF and Micro Fund support to realize their start-up plans.

High Potential Entrepreneurial Leadership Programme (HiPEL Programme): the annual HiPEL Programme, in partnership with Fudan University, has been organized since 2013, with a total of close to 90 uprising young entrepreneurs from both Hong Kong and Shanghai participating in the 10-day course conducted in both cities. Starting from 2016, the programme was expanded to also include 7 young entrepreneurs from Taiwan who joined another 26 participants from Hong Kong and Shanghai to make up the 4<sup>th</sup> HiPEL cohort.



In FY2016-17, a new “Start-up Launchpad” training programme is planned to organize aiming to enrich and enhance the quality of the Micro Fund applicants in terms of their teams, products, market validation and execution capabilities before the grant of the fund.

### **4.3. Partnering and Engaging with Entrepreneurial Community**

Community partnership is always a core strategy at PolyU to engage and forge close collaborations with like-minded partners with aligned value, including the partnership with STEFG, HKSTP, angel investors and NGOs in different funding schemes. The University has also contributed to the development of the entrepreneurial eco-system through supporting many different events and activities in the community. In FY2015-16, the University through IfE has supported 19 entrepreneurial related events, including major ones like Global Entrepreneurship Week in Hong Kong and Shanghai, Google EYE Program, and Global Youth Entrepreneurship Conference.

#### Visionaries Connected – Entrepreneurial Events Connecting Partners

To uplift the vibrancy of the entrepreneurial spirit across the PolyU community, the University has organized a two-day event in January 2016 named Visionaries Connected ([www.visionariesconnected.com](http://www.visionariesconnected.com)) to connect various partners and stakeholders in the eco-system to appreciate and experience PolyU’s entrepreneurship achievements first hand from various perspectives. The event comprised of a Poly-preneur Carnival and an Entrepreneurship Conference.

The 2-day Entrepreneurship Conference demonstrated PolyU's pivotal role in jumpstarting innovation and entrepreneurship in the regional start-up ecosystem, by materially involving key collaborators and stakeholders as supporting organizations. Over 50 regional speakers shared their insights in 10 panel discussions ranging from design innovation to "making it" globally with local stickiness, attracting around 200 participants. A number of affiliated events were also held in parallel to the conference, namely, the launch of "The Practicum", HKSTP-PolyU Tech Incubation Fund award presentation ceremony, Good Seed 2016 Programme Launch Ceremony and Social Enterprise Fair with 22 social enterprises showcasing their products / services.



The Poly-preneurs Carnival was a unique carnival demonstrating how the PolyU entrepreneurial spirit had been upheld across all walks of life, sharing creativity, leadership, passion, tenacity, ambition throughout the carnival. Its diverse activities such as PolyU Start-up Exhibition, Hong Kong Enterprise Showcase (co-organized with the CEO Club), workshops, performances, sport competitions, games and a social enterprise fair (under the Good Seed programme) were staged in a fiesta-like set up, drawing start-ups, established enterprises, CEO Club members, Poly-preneurs

and social enterprises all under a common space for exchange and fun. With the enthusiastic support from 15 sponsors and 30 supporting organizations, more than 5,000 overall visitors came to the outdoor carnival despite the severe weather on the day.

#### Innovation Commons for Entrepreneurship (ICE)

To pivot as a focal point for driving community partnership, PolyU plans to set up an "Innovation Commons for Entrepreneurship" (ICE) in FY2016-17. This dedicated space will facilitate co-creation and entrepreneurial activities, including pre / co-incubation programmes in collaboration with both internal and external partners. It aims to further develop PolyU members' innovation and entrepreneurial capabilities and foster community partnership between the PolyU and the entrepreneurial / business community.

## 5. Performance Measure – Key Performance Indicators

A summary of the key performance indicators for various KT areas is presented in the table below, with figures expressed in HK\$'000:

Performance Indicators	2014-15 Actual	2015-16 Actual	2016-17 Target
<b>Patenting &amp; Licensing</b>			
No. of patents filed	88	79	65
No. of patents granted <sup>Note 1</sup>	73	54	50
Accumulative no. of licenses granted	89	110	125
Income generated from IPR	\$6,882	\$3,558	\$4,000
Expenditure involved in generating income from IPR	\$6,560	\$5,244	\$5,000
<b>Consultancy, Collaborative / Contract Research &amp; Spin-off / JV</b>			
No. of collaborative research, income generated and total contract value <sup>Note 2</sup>	113 \$89,695 \$331,967	193 \$135,316 \$467,492	195 \$136,000 \$470,000
No. of contract research, income generated and total contract value <sup>Notes 3,4</sup>	325 \$69,521 \$213,763	371 \$94,202 \$368,970	375 \$96,000 \$380,000
No. of consultancy projects and income generated <sup>Note 4</sup>	505 \$43,912	570 \$41,758	575 \$42,000
No. of economically active spin-off companies <sup>Note 5</sup>	1	17	25
Net income generated (or net loss arising) from spin-off companies	(\$337)	(\$282)	(\$140)
<b>Other Knowledge Transfer / Dissemination Activities</b>			
No. of equipment and facility service agreements and income <sup>Note 6</sup>	648 \$7,990	291 \$4,838	500 \$6,000
No. of student contact hours for business or CPD needs <sup>Notes 7, 8</sup>	1,066,926	1,473,275	1,500,000
Income received from CPD courses <sup>Note 8</sup>	\$244,880	\$259,929	\$262,000
No. of public lectures / symposiums / exhibitions and speeches to community	497	546	550
No. of performances and exhibitions of creative work by staff or students	97	126	130
No. of staff engaged as members of external advisory bodies	293	325	330

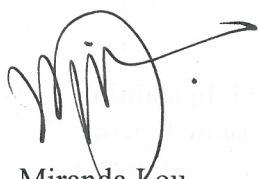
### Note:

1. A detailed list of patents granted is presented in Appendix 4.
2. Collaborative research income generated is on cash-receipt basis from on-going projects in FY2015-16, with an aggregate value of \$467.5 million.
3. Contract research projects are those involving third parties from public, private and NGO sectors. The income generated is on cash-receipt basis from on-going projects in FY2015-16, with an aggregate value of \$369 million.
4. After revisiting the definitions of contract researches and consultancies, some high impact consultancy projects were reclassified as contract research projects to better reflect and align their project natures. As a result there is an increase in both the number and income of contract researches with a corresponding decrease for those under consultancy projects.

5. As licensing is the preferred KT model to taking up equity in spinoff companies, the University will continue to exit from related spinoff companies as minority shareholder pursuant to the 6-year exit rule. Notwithstanding the foregoing, we have also included the number of new start-ups that license PolyU generated IPs with reported net income as proceeds arising from licensing. Subsidiaries set up operating vehicles for specific functional purposes, e.g. PTeC, Hotel ICON and PolyU Base in Shenzhen are not included.
6. The no. of equipment and facility service agreements and income have dropped for 55% and 40% respectively, mainly due to the temporary closure of the Jockey Club Auditorium (since late 2015 until now) for renovation purpose. The rental of the Auditorium represented a major source of income in the past few years (in FY2014-15 it accounted for 46% of the total income in this category).
7. The student contact hours are defined to be the number of enrollments multiplied by the number of contact / course hours.
8. The CPD courses are now defined to include also award-bearing and credit-bearing programmes for learners already in work who are undertaking the course for purposes of professional development / upskilling / workforce development, in addition to short term non credit-bearing training programmes.
9. Additional KPIs on other related KT activities are presented in Appendix 5.

## 6. The Way Forward

Partnering with industry and leaders in the community to leverage the use of knowledge from the University for societal benefit has been a standing heritage of the PolyU. While most of the government resources through UGC have been based on operations concerning teaching and research, PolyU has prevailed in upholding knowledge transfer and related services to the community as an integral part of its mission. The recent advocacy for economic growth through innovation and entrepreneurship has stimulated renewed thinking of the University to support knowledge transfer and entrepreneurship in a holistic manner with sound policy and discipline. At the same time, the likely inclusion of societal impact of research in future research assessment exercise is welcomed by both the University management and the academic peers as an important move to recognize academic efforts and achievement in various KT achievements in the past decades. With a number of concerted initiatives from the newly established Innovation and Technology Bureau to bootstrap knowledge transfer through entrepreneurship and midstream research, the PolyU community will be paying closer attention to see its education and research output making material impact to the society – through expanded university-industry / community partnership with key stakeholders in research collaboration, technology commercialization, joint seeding and acceleration entrepreneurship programs.



Miranda Lou  
Vice President (Administration & Business)

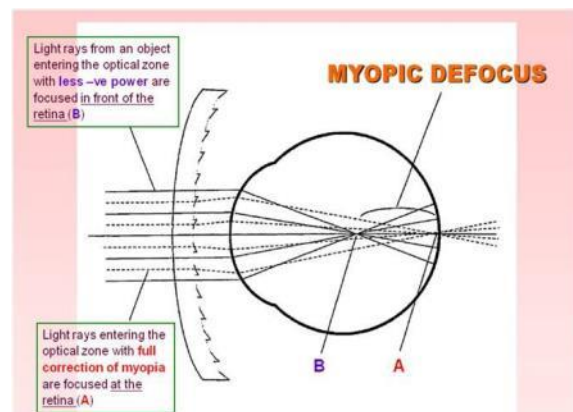
## Case 1: High Impact Case: Defocus Incorporated Soft Contact (DISC) Lens for Myopia Control

### 1. Summary

Myopia (Shortsightedness) is highly prevalent among populations especially in Asian countries. About 70-80% of young adults living in East Asian countries such as Taiwan, Japan, Hong Kong and Singapore have myopia. Prevalence of myopia in Hong Kong is even high in schoolchildren. In a local study, the reported myopia prevalence among Hong Kong Chinese schoolchildren was 18.3% and 61.5% for 6 and 12 years old children, respectively.

The cause of myopia remains unknown, however, the occurrence of myopia is known to be associated with genetic and environmental factors. Urbanization and educational attainment also contributes toward myopia development. Among the affected population, the onset of myopia occurs at a young age, approximately at the time of entering mainstream education. The time of myopia onset is an indication to the progression rate of myopia. The younger the age of onset, the more severe the myopic refractive error. High myopia is frequently associated with retinal degeneration, peripheral retinal breaks and glaucoma.

Recently, the research team from PolyU's School of Optometry has invented a novel technology, Defocus Incorporated Soft Contact (DISC) Lens for myopia control. The DISC Lens is a soft contact lens which simultaneously provides clear vision while correcting their vision. The lens improves vision for children and teenagers naturally and ultimately minimizes the associated risk of irreversible eye diseases. A clinical trial that was conducted by School of Optometry of PolyU showed the DISC Lens decreased myopia progression by about 50% in Hong Kong schoolchildren at the age of 8-13 years old.



The technology is so effective that it has attracted investors for technology commercialization. In addition, the technology can be applied not only to soft contact lens but to spectacle lens to deliver the same function as well. Collaboration has been set up with an international lens company for clinical trial of the defocus spectacle lens. The spectacle lens and soft contact lens will be available in the market after clinical trial and products standardization.

### 2. Underpinning Research

The research and technology development was carried out by the team led by Professor Chi-ho To and Professor Carly Lam from the Centre for Myopia Research under the School of Optometry.



known as 'emmetropization', the eye adapts and shapes to receive focused images as it does for normal

vision. The ‘myopic defocus’ helps balance out the negative impact from extensive close-up focus that cause accommodative lag in the eyes. By reducing the influence from accommodative lag, the specialized lens helps stop excessive elongation of the eyeball that causes short-sightedness.

After the development of the soft contact lens, clinical trial was performed on Hong Kong schoolchildren to evaluate the efficacy. The 50% improvement in myopia progression is a significant number to demonstrate the success of the development, while Professor To is looking forward to 70 or 80 percent improvement or even a reversal of myopia in the further refining phase.



### 3. References to the Research

Selected publications relating to PolyU’s research and development on myopia are listed as follows:

1. Tse, D. Y-Y., Lam, C. S-Y, Guggenheim, J. A., Lam, C., Li, K-K., Liu Q and To, C-H. (2007) “Simultaneous defocus integration during refractive development”, Invest Ophthalmol Vis Sci, 2007; 48: 5352-5359.
2. Tse, D. Y-Y. and To, C-H. (2011) “Graded Competing Regional Myopic and Hyperopic Defocus Produce Summated Emmetropization Set Points in Chick”, Invest Ophthalmol Vis Sci, 2011; 52: 8056-8062.
3. Lam, C. S-Y., Tang, W-C., Tse, D. Y-Y. and To, C-H. (2014) “Defocus Incorporated Soft Contact (DISC) lens slows myopia progression in Hong Kong Chinese schoolchildren: a 2-year randomised clinical trial”, Br J Ophthalmol, 2014; 98: 40-45.

Grants awarded:

Sek-J in Chew Travel Grant, Meeting of the Association for Research in Vision and Ophthalmology (ARVO), 2005

Patents:

1. Tse, D. Y-Y., Lam, C. S-Y. and To, C-H. “A Method for Preventing or Counteracting the Development of Refractive Error by Supplementing Simultaneous Opposite Defocusing”
  - United States Patent, No. US 7506983 B2 (24 March, 2009)
  - Australia Patent, No. 2005289302 (29 July, 2010)
  - China Patent, No. ZL200580041179.4 (22 September, 2010)
  - European Patent, No. 1799166 (29 December, 2010)
  - Japan Patent, No. 4891249 (22 December, 2011)
2. Lam, C. S-Y., To, C-H. and Tse, D. Y-Y. “Optical Method for Retarding the Progression of Myopia”
  - United States Patent, No. US 8950860 (10 February, 2015)
  - China Patent, No. ZL201080069081.0 (3 February, 2016)

### 4. Details of Impact and / or Benefits

Although inherited condition is believed to be the cause of myopia, there is also evidence that myopia is common in people doing a lot of close-up work. Modern lifestyle, education and working environment compels us to spend long hours on close-up activities, for example, using computer, reading papers and watching television. Myopia develops rapidly as children grow. Nowadays, it is common for youngsters having high myopia (over 5.00 diopters) in Hong Kong. Similar phenomenon is reported in other parts of Asia, such as China, Singapore, Korea, India, Japan and Taiwan. High myopia poses a greater risk of acute eye problems such as retinal detachment or glaucoma, or in worse cases, may lead to blindness in later life.

PolyU’s groundbreaking DISC Lens which helps solve the progression of myopia can benefit affected children not only in Hong Kong, but also in the other Asian countries that have similar high rates of myopia. The new invention thus lowers the rate of eye dysfunction derived from myopia.

The DISC Lens is proven as an effective intervention to address the progression of myopia problem for the schoolchildren. The use of DISC Lens avoids the unwanted side effects caused by pharmacological intervention for myopia control. The non-invasive approach of vision correction also prevents the effort to memorizing the time and dosage of applying the eye drops for myopia control.

## 5. References

### Innovation Awards:

- Gold Medal with Congratulations of the Jury – 39th International Exhibition of Geneva, Switzerland, 2011
- Grand Prize of The Technical University of Cluj-Napoca – Romania, 2011

### Newspaper Articles:

Category	Press Date	Author	Newspaper/Magazine	Topic
訪問	17 May 2011	周婷	文匯報	理大 10 層隱形鏡 打救千萬近視童
訪問	17 May 2011	---	東方日報	新隱形眼鏡防近視加深
訪問	17 May 2011	---	蘋果日報	光學離焦隱形眼鏡減度數加深 近視兒童救星 理大全球首創膺國際大獎
訪問	17 May 2011	---	星島日報	減緩兒童近視 Con 全球首創



## Case 2: Advancing Food Safety

### Overview

There have been numerous occurrences of food safety incidents such as food-borne bacteria, bio-toxins, malachite green, cadmium rice, meat additive, tainted milk, gutter oil, fake chicken eggs, and so on. For example, the tainted baby milk scandal unveiled in September 2008 reportedly caused 6200 babies in morbidity<sup>2</sup>.

According to WHO Estimates of the Global Burden of Food Borne Disease, 2015, there were almost 1 in 10 people falling ill while 33 healthy life-years lost as a result of foodborne diseases. Food safety threats have become increasingly complicated with escalating magnitude and frequency around the globe, posing detrimental threats to public health as well as socio-economic degradation.

Novel technologies with high application value provide hopes in dealing with physical, chemical and biological food hazards.

### From education to collaborative platform building – Efforts enhancing food safety

PolyU is home to BSc (Hons) of Food Safety and Technology, the only UGC-supported food safety bachelor programme in Hong Kong since 2008. The Food Safety and Technology Research Centre (FSTRC) has also been established in 2011 as the first university-level research centre on food safety in Hong Kong.

In order to identify the real needs in food safety, PolyU organized the Empowering Global Food Safety Seminar and Workshop on 15 January, 2015, where Prof Jørgen Schlundt, former Director of Food Safety and Zoonoses of the World Health Organization (WHO), gave a public lecture on the most imminent food safety threats and the prioritization of tackling such threats with new global initiatives, the optimization of risk assessments and efficient farm-to-fork (one-health) solutions. The Industry Technology Needs Assessment Workshop that followed involved rigorous exchanges among participants on the current issues faced by the industry and the edge-cutting technologies from the academia. Through the pragmatic exchange initiated by PolyU's devoted efforts, technologies are shaped to be more precise and effective in addressing real problems in food safety. The establishment of this need-addressing technology development model is further promulgated and sustained with the debut of the Food Safety Consortium (FSC) – the first food safety platform in Hong Kong with the aim of creating an industry-academia network and to provide support to the industry with advanced technology and science; enhancing the capability and competence on food safety and related technology development through academic and industrial collaborations.

FSC now hosts over 40 corporate members, including Coca Cola China, General Mills – Hong Kong, Hong Kong Disneyland, Lee Kum Kee, Nestle Hong Kong, Sealed Air Hong Kong, ParknShop, SGS Hong Kong, Shangri-la Hotels and Resorts, and so on. It is managed and operated by luminaries from the industry, academia and the professional institutions from different specific sectors with the common goal of addressing industry technology needs with innovative technologies. At the same time, FSC serves as the only affiliate of the International Association of Food Protection (IAFP) in Hong Kong.

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<sup>2</sup> Tainted-Baby-Milk Scandal in China, TIME, <http://content.time.com/time/world/article/0,8599,1841535,00.html>



On 4-5 February, 2016, FSC hosted the Global Food Safety and Technology Forum (GFSTF) promulgating the adoption of science as the foundation for enhancing food safety management and the use of scientific risk-based approach to enhance technical competency. As the first-of-its-kind forum in the region to foster engagement and collaboration among food safety stakeholders across different professions, GFSTF was attended by close to 300 participants, with Dr Keiji Fukuda, Specialist for Antimicrobial Resistance and Assistant Director-General of the World Health Organization (WHO) delivering the keynote plenary speech on “Food Safety: Current and Future Challenges & Ways Forward”. Prominent representatives from The United Nations, China National Centre for Food Safety Risk Assessment, The Federal Institute for Risk Assessment (BfR), The Government of the Hong Kong Special Administrative Region as well as other associations, universities, research institutions and corporations contributed to GFSTF by participating as speakers and panelists along the 2-day interactive exchanges. The participation by leading stakeholders from around the globe recognized PolyU’s determined efforts and expertise in propelling technology in food safety.



FSC is also dedicated to promoting PolyU’s collaboration with other universities such as Lund University, National Food Institute of Technical University of Denmark and University of Copenhagen. A letter of intent was signed with Lund University on the establishment of a joint centre of excellence to facilitate global collaborative efforts on advancing food safety. The conclusion of the collaboration with these overseas institutions renowned in food safety research and studies elevated PolyU’s position in the international arena, augmenting the impact of the fruits of research borne by PolyU.

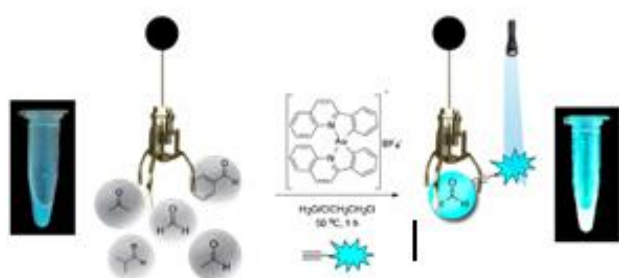
### **Translating technologies into food safety applications**

With the efforts from FSTRC and FSC, PolyU has inscribed successful cases in propelling food safety technology to real-life application. Dr Zhong-ping Yao, Associate Professor of the Department of Applied Biology and Chemical Technology (ABCT), successfully applied the matrix-assisted laser desorption / ionisation mass spectrometry (MALDI-MS) technology, enabling the differentiation of safe edible and toxic gutter oils to be completed within minutes. This new method generates high quality and highly reproducible spectra results through simple processes, including direct sample induction, automatic data acquisition and data processing. A preliminary spectral database of common labelled edible oils has also been established, with the MALDI-MS spectral patterns of 32 types of oils (including peanut, olive, canola and corn oils). Utilizing the database, edible oil samples can be authenticated within five minutes

by analyzing their unique spectral fingerprints via arithmetic calculations and spectrum comparisons, thus rapidly screening out gutter oils. Future development and evaluation are underway with the support from Innovation and Technology Commission (ITC) and Corporate members of FSC.



Another prominent research expert of ABCT, Dr Man-kin Wong, Associate Professor, led his research team in developing the hand-held fast detection kit for formaldehyde detection with high sensitivity and specificity in food by using their well-established fluorescence resonance energy transfer (FRET) technology. It could be further developed into simple and inexpensive rapid detection kits, enabling both the food trade and related government agencies to implement high-throughput front-line quality control as well as on-site food safety inspections. This project has been collaborating with Guangdong Entry-exit Inspection and Quarantine Bureau (GDCIQ) with the support from ITC.



Visual fluorescent detection of formaldehyde by a highly selective gold(III) complex-mediated three component coupling reaction

### Looking forward

PolyU has engaged active and fruitful discussions nurturing new research projects on the pipeline. In collaboration with various local and international partners, innovative projects relating to Food Fraud, Food Supply Intelligence and Innovative Technology Development for Supply Chain Management are underway. Technologies addressing imminent food safety needs such as Norovirus and Hepatitis A virus testing in raw or undercooked shellfish, new markers and reference materials for genetically engineered food products, next generation sequencing for food testing application, on-site rapid detection technologies, novel biological, chemical and physical testing technologies and just some of the expected developments in the near future.



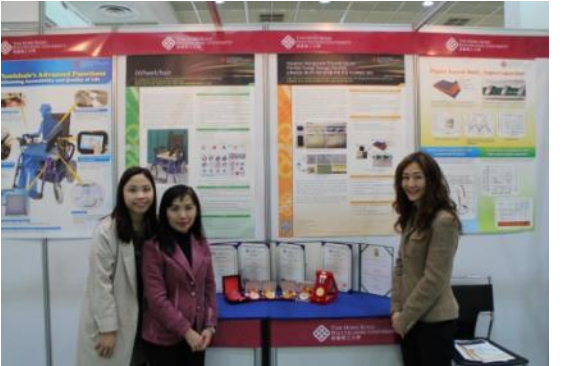
PolyU is bringing ripple effect to the globe, beyond national and international boundaries, with the establishment of the model leveraging a consortium as a pivoting platform engaging the academia, industry, government and other stakeholders, translating novel technology for need-addressing utilization by the society.

## References

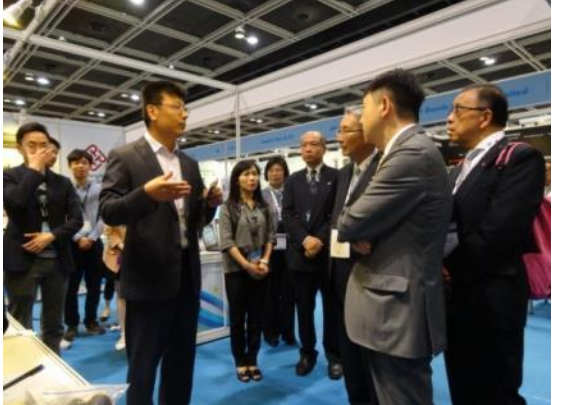


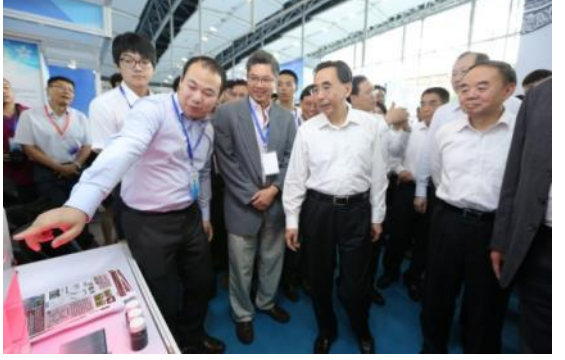
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[http://hk.on.cc/hk/bkn/cnt/news/20150629/bkn-20150629130922411-0629\\_00822\\_001.html](http://hk.on.cc/hk/bkn/cnt/news/20150629/bkn-20150629130922411-0629_00822_001.html)
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<http://paper.wenweipo.com/2015/06/30/YO1506300014.htm>
- 理大食安聯盟冀研發快速檢測 2015 年 12 月 07 日, 星島日報,  
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[http://www.hkcd.com.hk/content/2016-02/02/content\\_3530617.htm](http://www.hkcd.com.hk/content/2016-02/02/content_3530617.htm)
- Event report of Empowering Global Food Safety Seminar and Work Shop (15 Jan 2015)  
[https://www.polyu.edu.hk/itdo/cntfiles/upload/docs/Empowering%20Global%20Food%20Safety%20-%20Event%20Report\\_ver1\\_3.pdf](https://www.polyu.edu.hk/itdo/cntfiles/upload/docs/Empowering%20Global%20Food%20Safety%20-%20Event%20Report_ver1_3.pdf)
- Event report of the Global Food Safety and Technology Forum (GFSTF) (4-5 Feb 2016)  
[http://www.gfstforum.com/docs/GFSTF\\_2016\\_Event\\_Report.pdf](http://www.gfstforum.com/docs/GFSTF_2016_Event_Report.pdf)

## Appendix 2: Technology Marketing and Networking Activities

### (a) Highlights of Special Events

Date	Event	Photo
Nov 2015	<p><b>InnoCarnival 2015</b> In this week-long event in Science Park, the PolyU pavilion showcased the University's endeavours and contributions in building an eco-city and shaping a green future, which included various green innovations and the "Green Deck" initiative, rendering it "My Favourite Booth" in the eyes of the visitors.</p>	
Nov 2015	<p><b>China Hi-Tech Fair 2015</b> PolyU's environmental innovations and technologies, the "Green Deck" initiative, as well as the services offered by PolyU Shenzhen Base were featured in this exhibition in Shenzhen, capturing keen attention from the media and visitors alike.</p>	
Nov 2015	<p><b>Seoul International Invention Fair 2015</b> PolyU inventions from the areas of energy storage, healthcare and smart living have won prestigious awards at this international event, gaining acclaim and recognition from the emergent global hub of technology in East Asia.</p>	

<p>Jan 2016</p>	<p><b>Poly-preneurs™ Carnival</b> Aligning startups, established enterprises, CEO Club members, Poly-preneurs™ and social enterprises, the unique on-campus carnival demonstrated how the PolyU entrepreneurial spirit was upheld across all walks of life to more than 5,000 visitors.</p>	
<p>Mar 2016</p>	<p><b>iWheelchair Launch Event and Press Conference</b> The award-winning smart wheelchair system integrating a series of PolyU technologies was launched in this occasion, generating substantial response from 20 industry guests and wide press coverage of some 120 news reports across the print, electronic and online media.</p>	
<p>Apr 2016</p>	<p><b>The 44th International Exhibition of Inventions of Geneva</b> PolyU was honoured with 14 prizes awarded to its 9 inventions at this annual international event. Our award-winning research experts were received by the Consul-General of Switzerland, the Chief Executive and the Secretary for Innovation and Technology at a related celebration event for the entire Hong Kong delegation to Geneva.</p>	

<p>May 2016</p>	<p><b>Hong Kong International Medical Devices and Supplies Fair 2016</b> A collection of PolyU's outstanding healthcare, therapeutic and rehabilitation innovations and technologies were presented in this fair, enticing the VIPs, the media and visitors from industry at the same time.</p>	
<p>May 2016</p>	<p><b>Star Tech Salon 2015-16</b> PolyU staged a networking event connecting PolyU researchers with industry members, where 13 internationally acclaimed award-winning innovations were showcased. It was well received by industry with over 40 guests attended, including chairpersons from 19 industry associations and CEO Club members.</p>	 
<p>May 2016</p>	<p><b>2nd China Innovation and Technology Fair (2016 中國創新創業成果交流會)</b> Following its success last year, PolyU participated in the second edition of the event, impressing Chinese state officials and prominent guests with its novel technologies and multidisciplinary applied research breakthroughs.</p>	

(b) Major Exhibitions and Tradeshows Participated

Exhibitions / Tradeshows Participated	Location	Disciplines / Items promoted
1. Food Expo 2015	Hong Kong, PRC	Food safety technologies, food grade capsule, food testing, agriculture, etc.
2. International Conference & Exhibition of the Modernization of Chinese Medicine & Health Products (ICMCM) 2015	Hong Kong, PRC	Modern Traditional Chinese Medicine developments
3. Electronics Fair 2015 (Autumn Edition)	Hong Kong, PRC	3D imaging technology, IoT systems, etc.
4. Eco Expo Asia 2015	Hong Kong, PRC	Green projects and sustainability
5. InnoCarnival 2015	Hong Kong, PRC	Green energy, EV technologies, Green Deck, bicycle generator, etc.
6. China Hi-Tech Fair 2015	Shenzhen, PRC	Green energy, EV technologies, Green Deck, bicycle generator, services of PolyU Shenzhen Base, etc.
7. Citi Mobile Challenge	Hong Kong, PRC	IoT systems
8. Seoul International Invention Fair 2015	Seoul, Korea	Energy storage technologies, healthcare garments, smart living technology, etc.
9. 44th International Exhibition of Inventions of Geneva	Geneva, Switzerland	Anti-heat stress uniform, 3D imaging system, self-cleaning nanocomposite, precise mapping model, multisensor apparatus, functional textiles and garments, etc.
10. ICT Expo 2016	Hong Kong, PRC	High Dynamic Range Imaging, Mobile App acceleration services, identification technology, multi-robot system, etc.
11. Hong Kong International Medical Devices and Supplies Fair	Hong Kong, PRC	Functional garments, rehabilitation training devices, occupational therapy system, IoT system for hospital, biosensor, etc.
12. Entrepreneur Day 2016	Hong Kong, PRC	Entrepreneurship development of PolyU, projects of funding awardees, Polypreneurs™, etc.
13. 2nd China Innovation and Technology Fair (2016 中國創新創業成果交流會)	Guangzhou, PRC	Multi-sensor apparatus, green biodiesel catalyst, heat-insulating paint, biosensor, intelligent transportation system, etc.



### Appendix 3: Highlighted Cases of Funded Entrepreneurial Ventures

#### Promoting Green Life and Sustainability

<p><b>WoodLab</b></p> <p><u>Background:</u> WoodLab aims to create upcycling products with waste materials. Their first product “O2 Cat Litter” is made of upcycle soya pulp, a residue collected from tofu production plants. O2 Cat Litter offers excellent liquid and ammonia absorption capacity for cat excrement. Since all the ingredients are natural and there is no airborne dust, the product is safer for cats compared to traditional cat litter pellets.</p> <p><u>Current Stage:</u> The project is also supported by UnLtd Hong Kong's "Try it Do It Incubation Program". Their sales channels include Ztore (an online supermarket) and several pet shops.</p>	
<p><b>Work,Sheet.</b></p> <p><u>Background:</u> Founded by 2 young designers graduated from School of Design, Work,Sheet. is a design studio producing green, original and personalized designer products using 100% biodegradable ingredients and eco-friendly procedures. They also provide designer services to corporate clients.</p> <p><u>Current Stage:</u> Located at the St. James Settlement (SJS) Upcycling Centre, Work,Sheet. is collaborating with SJS and their sheltered workshops to produce waterproof and printable fiber materials for their green products.</p> <p><u>Award:</u> Champion of the 2015 Hong Kong Social Enterprise Challenges</p>	

## Creative ICT/Product Design

### Pokeguide

#### Background:

Founded in 2014, Pokeguide is a mobile application aiming for metro / subway users to locate their correct exit / destination quicker and easier by informing the users the best car compartment to board the train. By collaborating with merchants nearby subway stations, the mobile app adds value to both the users and the merchants by offering shopping information and user data respectively.

#### Current Stage:

The project is currently supported by HKSTP IncuApp Programme, HKFYG Start-up Empowerment Programme, Facebook FbStart Programme and Microsoft BizSpark Programme.

#### Awards:

- HKICT Awards 2016, Best Smart Hong Kong (Public Sector Information Application) Award – Gold Award
- Grantee of Good Seed 2016



### Takon

#### Background:

Founded by 2 PolyU graduates from Department of Mechanical Engineering, Takon is a design studio producing high quality gift and premium products with paper craft. Its signature product line, PosTalk, promotes the originality of Hong Kong design and local and overseas cultural heritages by combining traditional Chinese paper craftsmanship with advance laser cutting technology. As part of its social mission to help the underprivileged, Takon also employs disabled workers from sheltered workshops for their product manufacturing.

#### Current Stage:

Takon completed the Design Incubation Programme of the Hong Kong Design Centre, building up a client portfolio of over 40 large corporates and organizations.

#### Awards:

- Silver Award of HSBC Youth Business Award 2015
- Gold Award from Hong Kong Smart Gift Award 2014



## Promoting Social Inclusion

### CHEARS

#### Background:

Founded by 2 young graduates from Faculty of Engineering in 2015, CHEARS aims to offer economical solution to help the hearing impaired communicate more effectively through a mobile application that turns smartphones into a hearing device.

#### Current Stage:

Their app has been launched on both iOS and Android platforms. The venture is currently supported by the HKSTP IncuApp Programme.

#### Awards:

- Grantee of Good Seed 2016
- Top 10 Finalist of DBS Social Innovator 2016
- Top 15 Finalist of Google EYE Programme 2016



### The Second Box

#### Background:

The Second Box is a social enterprise founded by 4 young PolyU graduates in 2015. Through recycling and reselling carton boxes collected from elderly scavengers to merchants and individual users, the team offers higher collection price to the scavengers for the carton boxes collected, thereby enhancing their quality of life.

#### Current Stage:

The project is supported by UnLtd Hong Kong's "Try it Do It Incubation Program". The team is collaborating with designers to develop more upcycling products and conduct more upcycling workshops with carton boxes.

#### Awards:

- Champion of the 2015 Hong Kong Social Enterprise Challenges
- Grantee of Good Seed 2015



#### Appendix 4: List of Patents Granted in FY2015-16

Patent Title	Country
1. (-)-Epigallocatechin Gallate Derivatives for Inhibiting Proteasome	United States of America
2. An Item of Clothing for Daily Pharmacological Treatment of a Fungal Infection	United States of America
3. Apparatus and Method for Non-invasive Diabetic Retinopathy Detection and Monitoring (Provisional)	United States of America
4. Biomaterial Scaffolds with Keratin for Tissue Engineering	United States of America
5. Composite Tip Array for Polymer Pen Lithography	United States of America
6. Fiber-based Organic Electrochemical Transistor	United States of America
7. Fiber Bragg Grating in Micro/Nanofiber and Method of Producing the Same	United States of America
8. Formulation Coated Self-cleaning Wool	United States of America
9. Items of Clothing Having Shape Memory	United States of America
10. Method of Making and Administering Quinoline Derivatives as Anti-Cancer Agents	United States of America
11. Method for Precipitating a Solute from a Solution	United States of America
12. Multilayer Nanofiber Filter	United States of America
13. Pleurotus Tuber-regium Polysaccharide Functionalized Nano-selenium Hydrosol with Anti-tumor Activity and Preparation Method Thereof	United States of America
14. Rapid Fabrication of Porous Metal-based Biomaterial by Microwave Sintering	United States of America
15. Signal Transmission Method, Signal Receiving Method, Passive Optical Network PON Device, and PON System (Co-owned with Huawei)	United States of America
16. System for Storage Shelving and Methods of Use Thereof	United States of America
17. Three-coil Topology for Wireless Power Transfer	United States of America
18. 一種三維負泊松比織物的織造設備及方法	China
19. 一種可頭部安裝並具有腦電圖用電極的裝置	China
20. 一種可調換的單杯橋接系統	China
21. 一種負泊松比紗線結構及其製造方法	China
22. 一種混凝土磚及其製備方法	China
23. 一種兼容多類型光盤的透鏡	China
24. 一種胸部測量裝置	China
25. 一種輻射屏蔽非織布及其製備方法	China

<b>Patent Title</b>	<b>Country</b>
26. 一種輻射屏蔽纖維及其製備方法	China
27. 一種磷灰石/角蛋白復合支架及其製備方法	China
28. 多肽與化學纖維復合纖維及其製備方法	China
29. 色散估計的方法、裝置和系統	China
30. 拋光磨頭	China
31. 使用兩親核-殼型納米吸附劑對內毒素的去除	China
32. 用於治療過敏性皮炎的丹皮微膠囊及其製備方法和應用	China
33. 用以減緩近視發展的方法與系統	China
34. 用於機載激光掃描系統的數據處理方法及裝置	China
35. 超聲波成像系統及成像方法	China
36. 基於三維虛擬圖像的超聲圖像自動標注方法及系統	China
37. 激光點焊監測方法及監測裝置	China
38. 優化射頻識別部署的方法和射頻識別部署優化器	China
39. 被動隔振平臺/ Passive Vibration Isolation Platform	Hong Kong
40. 基於零剛度隔振結構的絕對位移測量裝置/ A Sensor for Measurement of 3D Absolute Vibration Displacements Based on Quasi-zero-stiffness	Hong Kong
41. Preparation Method of Concrete Surface Layers	Hong Kong
42. A Vertical Micro-injection Machine	Germany
43. Method for Optimizing RFID Deployment and RFID Deployment Optimizer of Use Thereof	Japan
44. The Use of Engineered Arginine-catabolizing Enzymes as Anti-Cancer and Anti-Viral Agents	Canada
45. Site-directed Pegylation of Arginases and the Use of Thereof as Anti-Cancer and Anti-Viral Agents	European Procedure (Patents)
	Germany
	United Kingdom
	France
	Italy
	Netherlands
46. A Three-dimensional (3D) Ultrasound Imaging System for Assessing Scoliosis	Japan
	Australia
47. 基於准零剛度理論的新型振動測量平臺及測試裝置	China
	Hong Kong

## Appendix 5: Additional Key Performance Indicators

Performance Indicators	2014-15 Actual	2015-16 Actual	2016-17 Target
<b>Marketing &amp; Outreaching</b>			
Outreach to industry -			
• No. of Exhibitions / Conference and Forum attended	40	40	40
• No. of people <sup>Note 1</sup> reached ('000)	1,014	1,055	1,100
No. of innovations / technologies being promoted / marketed <sup>Note 2</sup>	189	149	150
<b>Innovation and Entrepreneurial Activities Enabling KT</b>			
Accumulative no. of startup ventures supported / created by students, graduates or staff <sup>Note 3</sup>	116	171	221
Accumulative no. of PolyU innovations / technologies / knowledge transferred through startups by students / alumni / staff <sup>Note 4</sup>	23	26	36
• No. of Micro Fund applications	164	144	160
• No. of students & alumni involved	392	301	400
• No. of Micro Fund entrepreneurial projects supported	17	19	20

### Note:

1. Includes both people from industry and the general public.
2. The target reflects only major public exhibitions, symposia, and competitions in both Hong Kong, mainland and overseas, excluding seminars, workshops and featured media reporting for specific technologies, commercialization and start-ups endeavours.
3. The figures include both awardees under the Micro Fund, China Entrepreneurship Fund (CEF) Schemes, TIF, TLF and Good Seed schemes.
4. There were 7 new KT cases through startups by students / alumni / staff in FY2015-16. The figure is slightly less than expected as (1) some startups switched their product / business directions from exploiting the University's IP; and (2) the CEF scheme in FY2015-16 has been delayed leading to fewer KT cases through startups under CEF.