



# **Knowledge Transfer Annual Report 2011/12**

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## Executive Summary

Knowledge Transfer (KT) in the past triennium at HKUST was challenging but fruitful. With the KT funding from UGC, we have laid down a foundation for establishing a strong KT culture at HKUST, we have continued to innovate to meet the needs of industry, government and society, and we have expanded our sphere of innovation beyond Hong Kong.

To achieve all this, we have first and foremost invested in various efforts to nurture an environment in which faculty, students and external partners can work together cohesively. One of these efforts, the **Special Research Funding Initiative (SFRI)**, entered its second year of operation with some promising results. The initiative gave fresh impetus to multi-disciplinary collaborative research within the University. The **HKUST Research Forum Series** was initiated as the breeding ground for bright ideas through cross fertilization. The **HKUST Science & Technology (S&T) Forum** engaged economic and societal leaders and policy-makers in discussions concerning our knowledge-based economy. **GrantWise**, a brand new e-newsletter, was rolled out to alert the research community at HKUST to the latest funding opportunities around the world.

Second, we have developed IT systems to make information transparent which facilitates and streamlines the KT process. The **Publication Analysis System (PAS)** maintains author profiles detailing each faculty member's publication track record, allowing areas of excellence in research within the University to be identified with ease. The **Knowledge Transfer Management System (KTMS)** is an in-house system that manages and automates the workflow and business processes involved throughout the lifecycle of university-owned IPs. The **Open Research, Innovation and Collaboration Network (ORION)** enables HKUST to conduct open innovation in a systemic way. It is a gateway to the University's innovative activities. The development of these essential IT systems to support KT activities was made possible by the KT funding.

Third, we have initiated catalytic support to encourage entrepreneurship and commercialization. HKUST has continued to develop its **Entrepreneurship Center** by focusing on three major areas — entrepreneurship education and training, business outreach, and start-up incubation. The “Be Your Own Boss” (BYOB) series has proved to be extremely popular, and the HKUST 2012 Entrepreneurship Competition was also a huge success this year. During this triennium, the **Proof-of-Concept Fund (PCF)** has funded 18 projects with technologies emerging from the University's research for pre-commercialization development.

We see partnerships with industry as conducive to achieving the goal of strengthening our research, educational, and entrepreneurship base. We have set up a new joint research laboratory with Xilinx, in addition to the existing two with GlaxoSmithKline and Huawei respectively. In these joint laboratories, our students get to work on the most sought after research and contribute to the society by utilizing their knowledge and technology knowhow. Our Entrepreneurship Center and the Proof-of-Concept Fund (PCF) have enhanced the chances of our innovations being adopted and commercialized. The spin-off company, iFlight Model Limited, which was founded by one of our postgraduate students, is a case in point. On the other hand, KT at HKUST is also achieved through community engagement such as having our faculty members deliver public lectures and take up advisory roles in government committees.

HKUST aims to bring the benefits of innovation to society not only in Hong Kong, but in Mainland China and beyond. In China, we have built bases in Shenzhen, Guangzhou, Foshan and Hangzhou, and have been engaged in many national and provincial research programs. Internationally, we have begun collaborative projects with a Korea-based household electronics company, as well as UC RUSAL, the world's largest aluminum producer. We have also established research collaborations

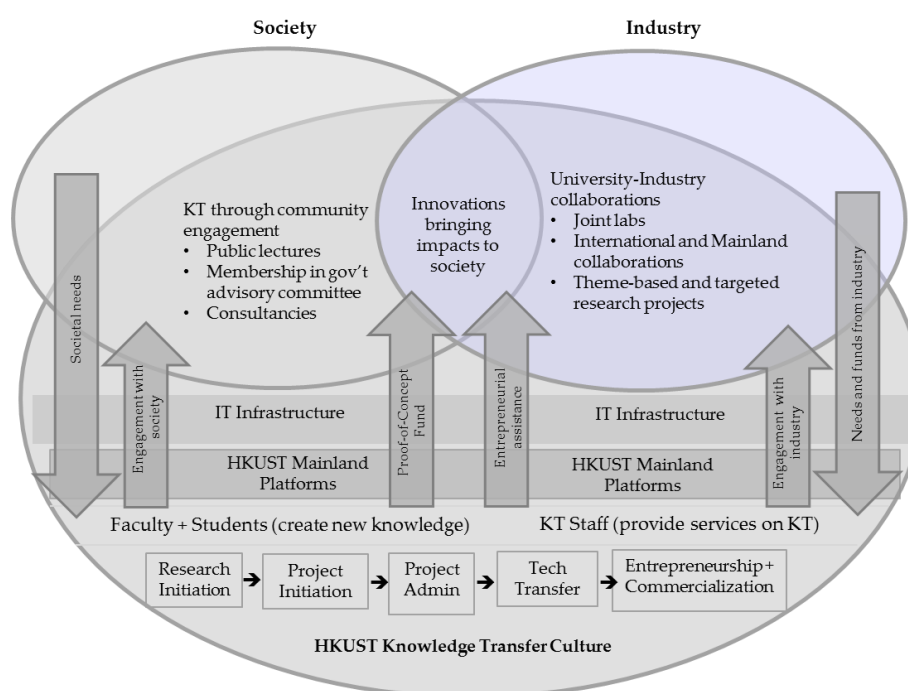
with King Abdullah University of Science and Technology (KAUST), and Massachusetts Institute of Technology (MIT) to make our KT footprint in the world arena.

## 1. Introduction

The old Chinese saying “give a man a fish and you feed him for a day; teach a man to fish and you feed him for a lifetime” exemplifies the difference between knowledge transfer and traditional unidirectional teaching or knowledge dissemination. Knowledge transfer is considered as the creation, application and sharing of technological innovation for the benefit of society. With this in mind, in this reporting year, we have made every effort to pass on the results of our innovation capabilities to society. In general, we have undertaken to:

- Building a campus culture that is conducive to innovation on an efficient and strong knowledge transfer platform.
- Coupling our innovations to society’s needs
- Expanding our sphere of innovations beyond Hong Kong

The following figure represents the KT platform for achieving these goals.



## 2. Developing HKUST Knowledge Transfer Culture

We see the HKUST as a magnet for innovative talents who come to our campus where an embedded culture that encourages, nurtures and enables innovation through collaboration is prevailing. To enhance the KT culture as a part of our DNA, we have 1) invested in efforts to get faculty, students and external partners with different specialties to work together; 2) improved effectiveness of KT process by investing in IT systems which form the backbone of our KT; and 3) provided catalytic support to encourage commercialization and entrepreneurship.

### 2.1 Planting the Seeds of Innovation

Knowledge transfer starts with using existing and creating new research that can have the maximum impacts to enhance human, social and environmental well-being. To achieve this goal, we have

invested in efforts to bring faculty members, students and external partners with different specialties together. Some of our initiatives are highlighted below.

### **2.1.1 Special Research Funding Initiative**

Knowledge transfer requires research capabilities extending beyond traditional academic domains to cross-disciplinary and mission-oriented research clusters. The Special Research Fund Initiative (SRFI) launched in November 2010 is in its second year of operation with total 30 funded projects so far. It has witnessed increased activities in strategic research fields that require multiple strengths from within the University. In particular, group research projects falling into the following clusters have shown promising results: Energy, Life & Health Sciences, and Sustainable Development for Hong Kong.

### **2.1.2 HKUST Research Forum Series**

While new research funding initiatives such as SRFI ignite and fuel the research momentum at HKUST, the HKUST Research Forum Series provides a breeding ground for fresh ideas through cross-fertilization. Two Research Forums respectively on Energy and Climate Change Adaptions were organized in 2012. The Forum Series have been able to bring synergy among faculty members and students within and across disciplines and nurture a collaborative research atmosphere as part of our culture.

### **2.1.3 HKUST Science & Technology Forum**

The Science & Technology Forum held on 1-2 December 2011 was aimed at formulating a future strategy for Hong Kong in terms of how it should go about its scientific and technological developments. The Forum was organized by HKUST together with the Hong Kong Academy of Engineering Sciences and the Hong Kong Institution of Science. It was well attended by leading academics, members of industry and government officials. Experts from various sectors came to exchange their experiences and thoughts on the development of innovation, science and technology policies, and to explore ways to further the cooperation between Hong Kong and the Pearl River Delta region. The forum was an excellent example of HKUST influencing S&T policy and extending its sphere of innovation beyond Hong Kong.

### **2.1.4 Promoting Midstream/Downstream Research and Funding Opportunities**

To facilitate the dissemination of funding opportunities, especially those for midstream and downstream research to the research community at HKUST in a more orderly manner, a new e-newsletter called GrantWise was introduced in January 2012. This e-newsletter has replaced the previous individual calls for proposals and deadline reminders sent out on an irregular basis. Moreover it has provided special news pertaining to research and knowledge transfer to help researchers to monitor large-scale and high-impact projects and trends. A new, criteria-based search function has been added to the website of the Office of Contract and Grant Administration (OCGA), which enables user to identify suitable grant opportunities much more quickly. Appendix A shows snapshots of GrantWise and the new search function at OCGA's website.

### **2.1.5 Collaborative Research Funding**

HKUST researchers have been actively securing research funding to bring their innovative ideas to life. In the past reporting year, proposals were submitted to the Research Grants Council for funding support under the Areas of Excellence Scheme, the Collaborative Research Fund (CRF) and the Theme-based Research Scheme (TBRS); to the Hong Kong Jockey Club for the establishment of an R&D laboratory for Chinese medicine; to the Innovation and Technology Commission (ITC) for the establishment of partner State Key Laboratories; and to many other funding agencies.

Our efforts were mostly rewarded. Last year, we won funding from the RGC for two TBRS projects worth a total of HK\$91.4M and another two CRF projects worth a combined HK\$12.61M. HK\$10M was received from the ITC for the establishment of the Hong Kong State Key Laboratory in Molecular Neuroscience and another HK\$49.62M for a total of 16 Innovation and Technology Fund (ITF) projects.

HKUST submitted a record number of proposals to funding agencies in China in the past year. The result is, not surprisingly, a record number of proposals funded by Chinese agencies such as Ministry of Science and Technology, National Natural Science Foundation of China, Guangdong Provincial Department of Science and Technology, Guangzhou Science and Technology Bureau, Nansha Science & Technology Bureau, Shenzhen Science, Industry, Trade and Information Technology Commission, and China Ocean Mineral Resources R&D Association. The amount of funding received from them reached an all-time high. These results are a testament to our desire to engage in collaborative research relevant to the region and to sow the seeds of knowledge.

## **2.2 Strengthening Infrastructural Support to Facilitate Knowledge Transfer**

### **2.2.1 Publication Analysis System (PAS)**

PAS has been jointly developed by our KT Office and the University Library to identify areas of excellence in research within HKUST. It allows both university staff and the general public to access research publications easily. Currently, over 47,000 publications produced by our faculty members are indexed in the database, with links to the full text articles and bibliometric information. In addition, PAS maintains profiles of our faculty members and a record of their publications. This feature enables senior management of the University to pro-actively identify emerging star faculty members and leading experts to engage them in KT activities. It also increases the visibility of the research work of our faculty members, and enhances the opportunities for collaborative research projects within the University. PAS can be accessed via <http://spfind.ust.hk>. The system will play an important role in facilitating the review and submission of research outputs of HKUST in the forthcoming UGC's Research Assessment Exercise in 2014.

### **2.2.2 Knowledge Transfer Management System (KTMS)**

With the KT funding from UGC, HKUST's Technology Transfer Center was able to develop the Knowledge Transfer Management System (KTMS), which is a comprehensive in-house knowledge transfer activity management system. The system is designed to manage and automate the full range of major workflow and business processes involved throughout the entire life cycles of all university-owned intellectual properties (IPs). It captures research elements such as inventions and research project deliverables at one end of the spectrum and allows for the online listings, data sharing and data analysis of intellectual properties and technologies available for commercialization at the other end of the spectrum. In this manner, innovative ideas are systematically captured and converted into institutional knowledge that can be easily managed and effectively utilized to achieve impactful KT. The key modules and features of the KTMS have already finished user acceptance testing. The successful launch of the KTMS system will provide an efficient and transparent operation management system for KT activities at HKUST.

### **2.2.3 Open Research, Innovation and Collaboration Network (ORION)**

Open innovation is about encouraging research-committed organizations, including corporations and universities, to exchange insight, expertise and resources, in order to achieve collaborations and synergies. HKUST's Open Innovation program embraces the open innovation concept to support innovation and creativity at HKUST and to distribute knowledge across the ecosystem in three major directions: platform development, corporate engagement and open innovation cultivation.

On the platform development aspect, the Open Research, Innovation and Collaboration Network (ORION) (formerly known as Open Innovation Collaboration Platform, OICP) has been built and made accessible to the public at <http://orion.ttc.ust.hk>. ORION is a centralized technology, expertise and IP marketing platform created to encourage interaction between HKUST and the industry, and to sustain HKUST's continuous KT efforts. It aims to be the online gathering place for local researchers, as well as an explorative test bed of best practices in open innovation for regional organizations. The platform also serves as a repository of HKUST's valuable research assets, including inventions, patents, expertise, designs, hardware, software, specialty chemicals, and R&D facilities.

On the corporate engagement aspect, HKUST has been demonstrating its capabilities to both local and multi-national corporations via ORION. By linking to the Trade Development Council's IP Portal, the Hong Kong Science and Technology Park (HKSTP)'s IP Marketplace and the IP Intermediary of Singapore, ORION provides a showcase for the IP and research outputs generated in Hong Kong. The platform has garnered the interest of many multi-national corporations and some have even committed to sponsoring Hong Kong researchers' initiatives and activities. Linkages with other international IP hubs are in the works.

On the open innovation cultivation aspect, the KT team has been collecting information on the University's research assets and encouraging researchers to disclose their latest outputs under a clear and supportive policy framework. In addition, the team has conducted open innovation workshops, visits and exchanges for corporations to encourage the open-minded exploration of research collaboration, commercialization and talent co-development. For more information about ORION, please see Appendix B.

## **2.3 Fostering Entrepreneurship and Commercialization**

### **2.3.1 Entrepreneurship Education and Training**

HKUST's Entrepreneurship Center (EC) has continued to develop by focusing on three major areas: entrepreneurship education and training, business outreach and start-up incubation. The education and training events organized by EC in the past have attracted an average of 85 participants including students, alumni and staff from the four schools at HKUST. In particular, "Be Your Own Boss"—one of EC's flagship seminar series—has been very well attended by the University community and incorporated into an IT entrepreneurship course.

The HKUST One Million Dollar Entrepreneurship Competition 2012 received a total of 89 applications. The judging panel selected 12 finalists after many rounds of rigorous competitions. Eventually, the first prize went to Neoid Limited, a company that develops high performance RFID tagging solutions. As one of the winning teams in the 2011 competition, iFlight Model Limited achieved so much business success that they became an event sponsor this year.

Business outreach and start-up incubation activities have also been actively pursued. EC has been communicating regularly with the HKUST Entrepreneurship Network and the Hong Kong Business Angel Network, and the HKUST Entrepreneurship Program currently has ten companies in the previous reporting year.

### **2.3.2 Proof-of-Concept Fund (PCF)**

The Proof-of-Concept Fund (PCF) was first implemented at HKUST in 2009/2010, with the support of the KT funding. The fund aims to provide gap funding to enable pre-commercialization development of promising, cutting-edge technologies emerging from the University's research. The number of PCF applications has been increasing every year. Out of the total of 29 applications received so far, 18



have been funded. Being the first funding program of such nature at HKUST, PCF has been recognized by faculty members as an excellent means to turn their research outputs into something that would truly benefit the local economy and beyond, thereby enhancing the KT culture among faculty members.

The research outcomes of the PCF projects are more readily to be transferred. Depending on the nature of a project, the route for technology transfer could be direct licensing to the industries, further development with partners, or transferring to start-up companies. The KT team is in continuous discussion with companies interested in adopting the results of completed or in some cases on-going PCF projects. Information on all PCF projects can be accessed via ORION under the category of Featured Technologies.

### **3. Coupling our Innovations to Society's Needs**

Knowledge transfer is the process of coupling innovations with industry and government's needs in a timely manner. We have bolstered our KT infrastructure and built a KT culture on the campus, and have been engaging with industry to stimulate the innovation outcomes. When it comes to harvesting time, we strive to foster commercialization and entrepreneurship to bring the positive effects of our innovations to society.

#### **3.1 Engaging the Industry**

HKUST has been aggressively establishing collaborative partnerships with the industry. These relationships benefit both the University and industry and are at the core of our innovations.

##### **3.1.1 University-Industry Collaborations**

HKUST has been in active collaboration with industry since its founding. Over the past triennium, HKUST has achieved considerable success in experimenting with various ways of transferring knowledge to a diverse range of local and international industries. The KT vehicles employed by HKUST range from collaborative research, education/training, patent licensing and professional services for immediate needs, to sophisticated joint laboratories for longer-term collaboration, as well as germinating Entrepreneurship to industry with home-grown technologies. Some examples are:

- The Xilinx-HKUST Joint Lab was established in June 2012 by HKUST and Xilinx Inc., the very company that invented field-programmable gate arrays (FPGA). The joint lab facilitates the adoption of the latest FPGA technologies in cross-platform and cross-disciplinary IC research and education among researchers and students.
- The GlaxoSmithKline R&D China - HKUST Neuroscience Lab endeavors to elucidate the molecular mechanisms underlying the pathologies of neurodegenerative diseases, as well as to develop drug candidates for their treatment. Facilitated by the sophisticated research tools at the global pharmaceutical company and the innovative academic research at HKUST, this partnership is expected to boost drug development in Hong Kong.
- The HKUST-Huawei Joint Innovation Lab focuses on R&D in information and communications technology. In the past triennium, over 25 collaborative research programs involving researchers from academic and industry have been initiated. The joint lab enables multi-dimensional collaboration among world-class researchers and engineers in Hong Kong.
- The IAS HKUST-Scripps R&D Laboratory was initiated by Prof. Paul Schimmel from Scripps and Prof. Mingjie Zhang from the Division of Life Science at HKUST and builds upon the partnership between aTyr Pharma/Pangu BioPharma (of which Prof. Paul Schimmel is a founder) and HKUST. The partnership has become a model government (ITC), university (HKUST) and industry



(aTyr/Pangu) collaboration, and the lab will translate basic biotechnology research into thriving clinical therapies.

- HKUST collaborated with a local design and manufacturing company to create a household air purifier unit using 3D simulation techniques. The air purifier has subsequently been commercialized and is considered to have the best overall performance in its class.
- HKUST is collaborating with a local healthcare start-up company to develop a state-of-the-art wireless optical device to serve globally unmet medical needs in ophthalmology.

The Technology Transfer Center has been liaising intensively with industry and other universities to facilitate many other collaboration endeavors.

### 3.1.2 Student Engagement

**Participation in Competitions**—students from the School of Engineering have good track records in robotics-related competitions. The latest achievement is a record-breaking result in the Robotcon 2012 Hong Kong Contest in which the two teams that entered the contest have taken home four out of the six awards, including the Champion and 1<sup>st</sup> runner-up.

**Community Service Projects**—HKUST students have collectively received more than 15 awards for community service projects in local and international competitions in the past two years. Completed projects include a Braille embosser for the visually challenged, a cognitive therapy embedded in a digital photo frame for the elderly, and an Android application for Medecins Sans Frontieres, a humanitarian-aid organization.

### 3.1.3 Effective Knowledge Transfer for Social Impact

The following are projects or start-ups that have benefited from the Proof-of-Concept Fund (PCF) or the assistance of the Entrepreneurship Center.

#### ***A novel wireless mesh network technology***

LAViNet, a multi-hop wireless mesh networking technology, was developed through the funding support of ITC and Boeing. With the additional PCF gap funding, the technology was further refined and has been licensed as a platform technology to local industrial users and infrastructure operators. In 2012, the LAViNet Team has won the bronze award in the category of the Best Innovation & Research Award (College & Undergraduates) in the Hong Kong ICT Awards. The project, titled "A Lean Wireless Infrastructure Network for Aviation and other Industries," has been successfully transferred to local industries for commercial use. This is an excellent example of the University, the government, and the industry working together to commercialize research outputs.

#### ***A novel efficient hair-based drug testing technology***

The project team that came up with a hair-based drug testing technology has formed a start-up company under the Entrepreneurship Program of HKUST's Entrepreneurship Center to offer the service to the community.

#### ***Unmanned helicopters***

iFlight Model Limited, a company specializing in unmanned aerial vehicles (UAVs) and ground control systems, graduated from the HKUST Entrepreneurship Program this year. This spin-out company develops and manufactures UAVs for both professional and entertainment uses. The company has created a number of full-time jobs in Hong Kong and the Mainland.

#### ***A novel low-sludge-production sewage treatment technology***

HKUST has developed a revolutionary wastewater treatment technology platform that can significantly reduce sludge formation. With support from PCF, the project team was able to perform

pilot testing of the novel treatment process. HKUST is now collaborating with governmental departments in HK with the goal of applying the technology in Hong Kong. The University is also in discussion with select Chinese municipalities and private wastewater treatment companies to commercialize/apply the technology on a worldwide basis.

#### ***Smart contact lenses for glaucoma diagnosis***

HKUST has developed a wireless and battery-less smart contact lens sensor for glaucoma patients. The sensor measures the corneal curvature of the eye *in vivo* all by itself so patients can avoid trips to the hospital. PCF funding is supporting trials to demonstrate the clinical and commercial value of the new device.

### **3.2 Engaging the Community**

HKUST is committed to extending its impacts on the local economic development and building up innovation culture. HKUST has frequently organized public exhibitions and lectures, and faculty members have taken on advisory roles in various governmental and non-governmental committees. We believe through closer relationships within the community, opportunities will arise to work in partnership for effective knowledge transfer.

#### **3.2.1 Exhibition at the Science Museum**

The School of Engineering hosted the "Bring Technology to Community" exhibition at the Hong Kong Science Museum as a demonstration of HKUST's commitment to contribute to society through technology development. The exhibition aimed to raise the public's awareness of the close connection between innovations and our daily lives, and how technology makes life easier. Exhibits included the world's largest digital photograph, the award-winning robotic machines designed by the HKUST Robotics Team, and the digital ink art made by the proprietary software Moxi that combines modern technology and Chinese art.

#### **3.2.2 Science-for-Lunch Talks**

Talks have been conducted by HKUST faculty members to introduce the public, investors, faculty members and students to some of the exciting research taking place at the University. Topics included voice and language cloud service for consumer products, a "smart" anti-microbial coating for preventing the spread of infectious diseases, new nano-materials for industry applications, innovative green wastewater treatment technology, intelligent lighting systems using LED-on-silicon technology and cancer cells.

#### **3.2.3 Membership on Governmental Advisory Committees**

The University seeks actively and consciously to build strong relationships with the key stakeholders in its communities. HKUST faculty members are increasingly being invited to advise the government on the challenges and issues it faces. Selected memberships can be found in Appendix C.

## **4. Taking Our Innovations to the World Stage**

While we are fully committed to the development of the local knowledge-based economy, as a highly internationalized institution in Asia we aspire to establish global networks to take our knowledge transfer footprint beyond Hong Kong.

### **4.1 Mainland Platforms**

China's rapid development, urbanization and industrialization over the past several decades have created a huge demand for technologies. China's 12<sup>th</sup> 5-Year (12-5) Plan has called for a number of

initiatives to strengthen the economy through innovation. Over the past decade, HKUST has established its presence at numerous locations within China, including Shenzhen, Nansha, Foshan and Zhejiang. These platforms are enhancing HKUST's role in the 12-5 Plan.

#### **4.1.1 HKUST Shenzhen Industry, Education and Research Building**

HKUST has been collaborating with Shenzhen in research, technology incubation and training for over a decade. In 2011, the completion of the HKUST Shenzhen Industry, Education and Research (IER) Building marked another milestone in the University's development in Shenzhen. The 15,000 m<sup>2</sup> facility provides ample space and equipment for scientific research, technology transfer and executive training, creating a platform to facilitate the University's activities and development on the Mainland. Occupants of the Building include incubating companies set up by faculty, students and alumni. The State Key Laboratory of Molecular Neuroscience approved by the Ministry of Science and Technology of China is also located at this facility.

#### **4.1.2 HKUST Fok Ying Tung Graduate School (FYTGS)**

HKUST FYTGS, located in Nansha, Guangzhou, is an important platform on the Mainland. FYTGS seeks to assist the University in fulfilling its mission in technology innovation and advancement in the region, by carrying out research, providing postgraduate education, and fostering knowledge transfer and commercialization. The School enables HKUST faculty and students to participate in Mainland research schemes, including the prestigious 973, 863 and National Science Foundation of China programs, as well as State Key Laboratory and National Key Projects, giving faculty and students the opportunity to collaborate with their Mainland counterparts and industry. To this end, the School has secured 52 projects during 2011-2012. FYTGS' active research and collaboration with industry provides an enviable backdrop for its MPhil students who not only have access to HKUST's academic excellence but through the FYTGS platform have a significant opportunity to work directly on research projects with industry.

#### **4.1.3 HKUST LED-FPD Technology R&D Center at Foshan**

Light-emitting diode (LED) and flat-panel display (FPD) are two of the main trend technologies in the 21st century. HKUST has developed a certain strength in these two areas over the past few years, and in recognition of that, a joint R&D Center has been established at Foshan in which HKUST provides technology and management resources, and the Nanhai Government provides start-up funding of RMB 25 million and 1,800 m<sup>2</sup> of space in Nanhai. The Center comes complete with infrastructure and laboratory equipment.

The Center will foster the transfer of HKUST-developed LED packaging and manufacturing technologies to optical and electrical industries in Nanhai and neighboring areas for subsequent development and commercialization. The Center will also provide technical training, organize seminars, and apply for research funding from provincial government and relevant ministries for major R&D projects. Consultancy services will also be provided to local enterprises in the areas of design, simulation, product analysis, material development and characterization, reliability testing and failure analysis, reverse engineering, product qualification and standardization.

#### **4.1.4 Zhejiang Advanced Manufacturing Institute (ZAMI) of HKUST**

ZAMI was co-established by HKUST, Zhejiang Department of Science & Technology, and Yuhang District People's Government of Hangzhou City. ZAMI is a vehicle for HKUST to have direct engagement in an integrated product development and the supply chain for manufacturing enterprise. It enables HKUST to leverage on the rise of the Yangtze River basin, thereby allowing HKUST to make a national impact of its innovations. ZAMI will also provide R&D and co-op opportunities for students.

## 4.2 Towards the World: Open Innovation as Drivers

HKUST has successfully established numerous relationships with international companies and universities in the past triennium to facilitate KT. The following are cases in point:

### ***Korea-based household electronics company***

This household electronics company is a market leader in water filtration devices and air purifiers in Korea. HKUST hosted an Open Innovation Workshop for the company back in 2010. Subsequent discussions between the company and HKUST led to a collaborative development project for improvements to its air filtration appliances. More collaborative programs in different areas are also being discussed. In addition, the company has signed an agreement with the School of Engineering to support its employees to enroll in graduate programs at the School.

### ***UC RUSAL***

HKUST and UC RUSAL, the world's largest aluminum producer, have launched a five-year joint project aimed at strengthening scientific and educational ties between Russia and Hong Kong. The project aims at fostering joint scientific research, addressing pressing environmental issues and promoting cooperation among young scientists from the two regions. A three-tier program was established which features the UC RUSAL President's Forum, faculty and student exchange programs, and a three-year research project to develop a large-scale fiber-reinforced aluminum envelope and roof system that is environmentally friendly. The project has clear practical value with potential applications to the local, mainland and global building industry.

### ***KAUST***

HKUST has been collaborating with King Abdullah University of Science and Technology (KAUST), a reputable graduate-level research institution in Saudi Arabia, in research since 2008. The collaboration has opened new frontiers in marine genomic research and nanotechnology, two areas in which HKUST has achieved international acclaim (<http://nanofluidics.ust.hk/>). The KAUST/HKUST collaboration has helped establish state-of-the-art micro/nanofluidics laboratories at both HKUST and KAUST campuses, and provides a scientific and technological platform for academic exchange.

### ***MIT***

The Massachusetts Institute of Technology (MIT) and HKUST are creating a new collaborative research and development center to be anchored to a consortium of multi-national corporations interested in the research and development of intelligent living technology. The goal of the consortium/center is to develop pre-competitive technologies and conduct demonstrations so that the companies can obtain thorough understanding of advanced technology through project participation, thus gaining an edge in developing follow-on technologies. The research topics can be divided into four clusters—Smart Green Buildings, Internet Infrastructure, Cloud Computing, and Biomedical Systems—representative of some of the strengths of HKUST and MIT.

With the support from UGC's KT fund, effective and fruitful KT activities are continuing to take place at HKUST. The University seeks to develop and maintain a favorable ground on which innovation, research, talents and new possibilities could blossom.

## 5. KPIs for 2011/12

During the reporting year, our performance as measured by numerous KPIs has either matched or exceeded most of our targets. HKUST has received a total of HK\$68M worth of funding from 70 active collaborative research projects; HK\$48.3M from 117 active contract research projects; and HK\$23.2M from 87 active consultancy projects. As many as 78 new invention disclosures have been received and 52 new patents granted. The set of KPIs is presented in Appendix D.

## Appendix A – Snapshots of GrantWise and New Search Feature at OCGA's Website

The Hong Kong University of Science & Technology

Office of Contract & Grant Administration



### GrantWise

Issue 11, 16 May 2012

#### New Funding Opportunities

**Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies (LSCM)**  
Innovation and Technology Support Programme (ITSP) –  
[Platform Research Programme](#) or [Collaborative Research Programme](#)

LSCM is now soliciting proposals in four technology focus areas: (a) RFID Hardware and Systems; (b) Networking and Infrastructure Technologies; (c) Industrial Segment-Specific Proposal; and (d) Internet-of-Things (IoT) Technologies and Applications. Platform Research project requires cash and/or in-kind contribution from at least two industry partners for at least 10% of the total project cost. While Collaborative Research project requires at least 30% cash and/or in-kind contribution from the collaborating company. There is no formal upper limit on the amount of funding to be requested. Project duration can be 6 to 24 months. All faculty members are eligible to apply.

Deadlines: 25 Jun 2012 (Platform Research Programme)  
Accepted at any time (Collaborative Research Programme)

**The Institute for New Economic Thinking (INET) and The Centre for International Governance Innovation (CIGI)**  
[2012 Research Grant](#)

INET and CIGI of Canada are accepting research proposals for their joint 2012 Grant Program. The four key areas of research are (a) Financial instability and macroeconomic management; (b) Political economy of income and wealth distribution and inequality dynamics; (c) Governance of the international monetary and financial systems; and (d) Innovation. Grants will be awarded primarily to individuals or teams affiliated with academic institutions, think tanks, and other centers of vital research worldwide. Funding will be awarded in the range of US\$25,000–US\$250,000 (including a 10% overhead). Only a 6-page proposal is required at this stage. Successful applicants will be invited to submit full proposals by early September 2012.

Deadline: 11 Jun 2012

#### Forthcoming Proposal Deadlines

**LOCAL**

1. Research Grants Council  
[Direct Allocation Grant \(DAG\) 2011/12](#)  
Deadline: 31 May 2012
2. Nano and Advanced materials Institute Limited  
[Platform Research Programme](#)  
[Collaborative Research Programme \(Full Proposal\)](#)  
Deadline: 31 May 2012
3. University Grants Committee  
[Research Travel Grant \(RTG\)](#)  
Deadline: 1 Jun 2012
4. Research Grants Council  
[Germany/Hong Kong Joint Research Scheme](#)  
Deadline: 4 Jun 2012

**MAINLAND \***

1. Ministry of Industry & Information Technology (MIIT)  
中华人民共和国工业和信息化部  
[“高档数控机床与基础制造装备”科技重大专项 2013 年课题](#)  
Deadline: 17 May 2012
2. Ministry of Science & Technology (MOST)  
中华人民共和国科学技术部  
[国家科技计划（863 计划、支撑计划）2013 年备选项目征集](#)  
Deadline: 18 May 2012

A snapshot of GrantWise



### Upcoming Call for Proposals

#### SkTech International Research Centers

The Skolkovo Institute of Science and Technology (SkTech) is a new private graduate university located just outside of Moscow, Russia. It was established in 2011 in collaboration with the Massachusetts Institute of Technology (MIT). SkTech is announcing an exceptional new funding opportunity to support collaborative, inter-disciplinary, international research teams using innovative approaches to create transformational new science and technology with high potential impact. Particular emphasis will be placed in the fields of Biomedical Science and Technology, Energy Science and Technology, Information Science and Technology, Nuclear Science and Technology, and Space Science and Technology. Up to 15 research centers will be formed, each with funding up to approximately 12M USD per year in steady state. Each virtual research center will be a three-way joint collaboration between SkTech, one or more international universities, and one or more Russian universities or institutes. An open, international call for proposals will soon be issued. Stay tuned!

### *Issue 1 – 6 January 2012*

#### Making the Most Out of Existing Funding Opportunities

HKUST has recently been awarded a grant of HK\$2.8 million by the HKSAR Government under the General Support Programme (GSP) of the Innovation and Technology Fund to promote Hong Kong's R&D capability to top-notch universities and multinational companies overseas and to entice them to establish R&D facilities in HK and the PRD. The project team, led by Professor Mitchell Tseng and in collaboration with MIT, promises to form a university-industry consortium with as many as 10 participating overseas companies by the end of the 18-month project. The project was successfully kicked off earlier this year with a two-day workshop in HK and Shenzhen attended by MIT and local academics, senior HK and PRD government officials, and executives of multinational companies such as Apple, Emerson and Samsung. The project has also received support from the Hong Kong Science & Technology Parks, InvestHK, TE Connectivity and the Chevalier Group. Did you ever think that the Innovation Technology Commission would fund more than workshops and conferences under its GSP?

### *Issue 5 – 5 March 2012*

#### Making the Most Out of Existing Funding Opportunities

##### Crème de la Crème Labs

The second round of the [Partner State Key Laboratories \(PSKL\)](#) is now open for application until **16 April 2012**. Successful labs will be conferred the status of Partner SKLs and will receive up to HK\$2 million each year for five years. There are currently 12 Partner SKLs in Hong Kong and the Partner State Key Laboratory of Molecular Neuroscience, headed by Professor Nancy Ip, is the only one established at the Hong Kong University of Science and Technology. We therefore encourage other mature labs at HKUST to apply. Interested labs must first pair up with SKLs in Mainland. (For example, Prof. Ip's Partner SKL has paired up with the Institute of Neuroscience, Shanghai Institutes for Biological Science, Chinese Academy of Sciences – SKL of Neuroscience.) Labs will mainly be assessed on their research achievements and research capabilities. To secure internal support, interested parties may also apply for up to HK\$200,000 under the [HKUST Development Grant \(DG\)](#) for proposal development. So if you believe your lab is the crème de la crème of labs in Hong Kong, why not grab another HK\$2 million a year to fund it?

### *Issue 8 – 12 April 2012*

#### Making the Most Out of Existing Funding Opportunities

##### 200-Million-Dollar Cake

The Theme-based Research Scheme (TRS) is the latest addition to the Research Grants Council (RGC)'s modest range of funding programs and is designed to "focus academic research efforts of the UGC-funded institutions on themes of strategic importance to the long-term development of Hong Kong". The Scheme is into its second year of operation and full proposals for the latest round have been submitted in March this year. Application is a lengthy process but well worth the effort as Professor Chung-Yee Lee can attest. Professor Lee's proposal "Transforming Hong Kong's Ocean Container Transport Logistics Network" was awarded over HK\$13 million in the inaugural round of the Scheme. His project, which started in November last year, promises to deliver not only the usual research publications, conference presentations and proceedings, but also the incubation of new business ventures, recommendations to policy makers, and tailor-built IT systems for logistic firms in Hong Kong and the greater China region, among other things. He has managed to invite senior executives of major industry players such as OOCL, HIT, Li & Fung and the Hong Kong Shippers' Council to serve on the project's Industrial Advisory Board. The project brings together a team of 13 experts from HKUST, HKU, and CUHK (collaboration is strongly encouraged) and is one of the more compact teams in that round. Colleagues interested in seizing a slice of the 200-Million-Dollar Cake should get into discussions now as the next call is expected to be made in July/August.

### *Issue 10 – 2 May 2012*

## Appendix B – Open Research, Innovation and Collaboration Network

With the support from UGC's KT fund, as well as local and multi-national industries, HKUST has studied and adopted various practices to better serve social and industrial needs. This includes the pilot exploration and development of open innovation to cultivate inventions, talents and collaborations with research institutions and industries.

Open innovation facilitates HKUST's accomplishment of the following missions:

1. Collaborate with other leading universities and research institutions
2. Cultivate insight, ideas and subsequent in-depth research with leading research partners and industries
3. Consider industrial needs at an early stage
4. Form domain expert groups
5. Establish proper channels for effective knowledge/technology creation, harvesting and transfer


The team at HKUST's Technology Transfer Center (TTC) spent the past triennium designing, developing and deploying a sustainable technology marketing platform as a springboard for launching the University's Open Innovation Initiative. The platform is called the **Open Research, Innovation and Collaboration Network (ORION)**, formerly known as the Open Innovation Collaboration Platform (OICP). The platform houses the leading research assets and technologies developed at HKUST, and is also linkable and adaptable to similar platforms at other research institutions and corporations for mutual collaboration. HKUST is keen to share its open innovation knowledge, practices and experience with other sister institutions in the region.

The first phase of ORION is now complete and linkages to sustainable sources of knowledge have been established for future years. The platform is currently home to 345 active patents, 27 featured technologies, 54 pieces of active university software (with source code), 136 specialty compounds, 30 international open innovation resources, 64 research facilities, news and events as well as links to the University's publications. Expert groups and their research profiles have also been identified.

ORION commenced service in May 2012 and is publicly accessible via <http://orion.ttc.ust.hk>. The following screenshot shows the main page of ORION.



ORION's main page provides an overview of the University's research capabilities and assets.



香港科技大學  
THE HONG KONG UNIVERSITY OF  
SCIENCE AND TECHNOLOGY

TECHNOLOGY TRANSFER CENTER  
香港科技大學技術轉移中心

## OPEN RESEARCH, INNOVATION and COLLABORATION NETWORK (ORION)

ORION is an exchange network for research and innovation to capture the best product and values.

Marketing Technologies

Link with Social Network

Home Technology Research Facility Open Resources Research News

Google Custom Search

Featured Technologies

- Invention
- Software
- Specialty Compounds

Site Searching Powered by Google

Featured Technologies

Portable Local Exhaust Ventilation Systems for the Capture, Containment and Removal of Bioaerosols Released from Individuals Suffering from Respiratory Infections

The existing infection control practice for managing patients with highly infectious respiratory ailments involves housing them in isolation wards and requiring health care workers to don various personal protective equipments while working in the unit. Contaminated articles in the ward can subsequently serve as vehicles for infection if good personal hygiene

More

Manufacture of Stereoregular Polyacetylenes in Aqueous Media

A new aqueous polymerization system for manufacturing stereoregular polyacetylenes with high yield is developed. Polymerizations of phenylacetylenes containing a variety of functional groups including liquid crystalline mesogens are effected in water by a large number of organorhodium complexes. Where water was found to be a much better

More

Integrated Variable Inductor with Wide Tuning Range

Conventionally, frequency tuning is achieved by changing the capacitance of a tank using varactor. However, it is more power efficient to minimize the capacitance of the tank and adjust the inductance for frequency variation. Therefore, the need for a variable inductor arises.

More

SOFTWARE

Real-Time Painting with an Expressive Virtual Chinese Brush

A 3D virtual brush's bristles bend and spread realistically like a real Eastern paint brush. The tool lets artists create digital brushwork with spontaneity and spirit

More...

Research News

HKUST Reaps Three Awards for Research Excellence in Natural Sciences presented by the Ministry of Education

2012/3/29

[http://www.ust.hk/eng/news/press\\_20120329-949.html](http://www.ust.hk/eng/news/press_20120329-949.html)

Three notable scientific research projects at The Hong Kong University of Science and Technology (HKUST) have won the Awards for Research Excellence in Natural Sciences presented by the Ministry of Education.

Open Innovation Information

Open Innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology. Open Innovation combines internal and external ideas into architectures and systems whose requirements are defined by a business model. Courtesy of "Open Innovation: The New Imperative", 2003

Supporters

- Emerging Integrated Circuit Technologies
- Power-Aware Design

Featured Experts

Open Resources

Texas Instruments

For nearly 30 years, TI's Worldwide University Program has consistently supported member universities with access;

More

Lenovo

Lenovo Innovation Centers. Where the greatest minds in business and technology join forces to solve the toughest challenges;


More

Panasonic

Open Innovation. Global corporate leaders face ongoing challenges to innovate. One way that corporations augment their


More

FEATURED EXPERTS




Prof. Khaled BEN LETAIEF

- Wireless communications including, OFDM, adaptive resource allocation, space-time processing, broadband and



Prof. Mounir HAMD

Architecture, analysis and design of high performance switches and Internet routers, scheduling algorithms, congestion control, routing protocols and network processors; resource



Prof. Ross MURCH

Wireless Communications, Novel Multiple Input Multiple output (MIMO) Wireless Systems, Compact MIMO Antenna design, Cognitive Radio, Cooperative Wireless, wideband

New in Expert

LAU Kin Nang Vincent

Wireless Communication Adaptive channel coding and modulation Digital hardware

Research Facility

State Key Laboratory of Molecular Neuroscience

First laboratory focused on neuroscience research in Hong Kong

Invention

Optically Rewritable Liquid Crystal E-paper

Flexible LCD e-paper: an rewritable and erasable liquid-crystal-based

Software

Electors Voting for Fast Automatic Shape Correspondence

High quality correspondences can be instantaneously

Specialty Compounds

MOBDA MPPDPS

Fluorescent bioprobe for Long-Term Cell Tracking

Project

Scale-up Technologies for Nanomaterials

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## Appendix C – Selected Membership on Governmental Advisory Committees

Name of Faculty Member	Service Unit	Role
<b>Prof Joseph H W LEE</b>	Secretary for Environment, HKSAR Government	Member, Advisory Council on the Environment (ACE)
	Steering Committee for Research Themes under the Research Endowment Fund, Education Bureau	Member
	Land and Development Advisory Committee, Secretary for Development's Office, HKSAR Government	Member
<b>Prof Mitchell M Tseng</b>	Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies Ltd (LSCM)	Board of Directors
<b>Prof Benzhong TANG</b>	Public Affair Forum of the Home Affairs Bureau, HKSAR Government	Member
	Advisory Committee of the 973 National Strategic Research Project on the Basic Research on Key Issues on High-Performance Carbon Fibers (高性能碳纤维相关重大问题的基础研究) administrated by the Ministry of Science and Technology of China	Member
	Advisory Committee of the 973 National Strategic Research Project on the Basic Research on Key Issues on Nanostructured Fibrous Photovoltaic Cells (基于纳米结构的新型柔性纤维基可编织光伏器件重要基础问题研究) administrated by the Ministry of Science and Technology of China	Member
	Advisory Committee of the State Key Lab of Polymer Physics and Chemistry of the Changchun Institute of Applied Chemistry of the Chinese Academy of Sciences	Member
<b>Prof Alexis Kai Hon LAU</b>	Air Pollution Control Appeal Board Panel, Environmental Protection Department, HKSAR Government	Member
	Expert Advisory Panel for the Daya Bay Contingency Plan, Security Bureau, HKSAR Government	Member
	Study on the action plan for the Bay Area of Pearl River Estuary, Planning Department, HKSAR Government	Specialist Advisor
	Hong Kong Observatory, HKSAR Government	Scientific Advisor
<b>Prof Hong Kam LO</b>	Appeal Tribunal Panel (Buildings), HKSAR Government	Member
	Expert Group of System Analysis & Design of Traffic and Incident Management System, Transport System, HKSAR Government	Member
	Railway Objections Hearing Panel, HKSAR Government	Member
	Research Committee of Road Safety Council, HKSAR Government	Member
	Transport Advisory Committee, HKSAR Government	Member
<b>Prof Ming Fai YUEN</b>	Central Policy Unit, HKSAR Government	Advisor
<b>Prof Yan XU</b>	Regulatory Affairs Advisory Committee, Office of the Telecom Authority, HKSAR Government	Advisory Member
<b>Prof Furong GAO</b>	Longgang District, Shenzhen Government	Honorary Advisor
<b>Prof Leonard</b>	Hong Kong Port Development Council, HKSAR	Member

<b>CHENG</b>	Government	
	Statistics Advisory Board, Census and Statistics, HKSAR Government	Member
<b>Prof Chi Hung FUNG</b>	Hong Kong Observatory, HKSAR Government	Scientific Advisor
<b>Prof Francis Ting Ming LUI</b>	RTHK TV Program Advisory Panel	Member
<b>Prof Philip Kwok Tai MOK</b>	Electricity Ordinance (Chapter 406) Disciplinary Tribunal Panel, The Secretary for Economic Development and Labour, HKSAR Government	Member
	Electronics and Telecommunications Training Board, Education Bureau, Government Secretariat, HKSAR Government	Member
<b>Prof Billy Kee Long SO</b>	Antiquities Advisory Board, HKSAR Government	Member
	Leisure and Cultural Services Department, HKSAR Government	Museum Expert Advisor (Chinese History and Culture)
<b>Prof Tik Sang LIU</b>	Leisure and Cultural Services Department, HKSAR Government	Museum Expert Advisor
<b>Prof Kwing Lam CHAN</b>	The Hong Kong Space Museum	Museum Expert Advisor
	Hong Kong Observatory, HKSAR Government	Scientific Advisor
<b>Prof Karl Wah Keung TSIM</b>	HKCMMS Scientific Committee, Department of Health, HKSAR Government	Member
	Hong Kong TCM Expert Committee, Department of Health, HKSAR Government	Member
<b>Prof Mingjie ZHANG</b>	Academic Advisory Committee, National Laboratory of High Magnetic Field, Wuhan, China	Member
<b>Prof Tianshou ZHAO</b>	Appeal Board Panel, Energy Efficiency Ordinance, HKSAR Government	Member
<b>Prof Lionel NI</b>	Shenzhen Intelligent Transportation System, Shenzhen Government	Member of Expert Panel
<b>Prof Shing Chi CHEUNG</b>	Hong Kong R&D Research Center for Logistics and Supply Chain Management Enabling Technologies	Member of Expert Panel
<b>Prof Christopher CHAO</b>	Energy Efficiency (Labeling of Products), HKSAR Government	Member of the Appeal Board Panel
<b>Prof Wenxiong WANG</b>	Environmental Protection Department, HKSAR Government	Member of the Expert Panel
<b>Prof Chun Man CHAN</b>	Buildings Department, HKSAR Government	Member of Technical Committee on the Code of Practice for the Structural Use of Steel Buildings
<b>Prof Zongjin LI</b>	Buildings Appeal Tribunal Panel, HKSAR Government	Specialist

## Appendix D – KPIs at a Glance

Performance Indicators for Present Activities and Triennium Projects (extracted from Table 9.1 of KT Initial Statement)

Performance Indicator	2009/10 (Achieved)	2010/11 (Projection)	2010/11 (Achieved)	2011/12 (Projection)	2011/12 (Achieved)
Number of patents filed in the year	148 (171) <sup>Note 1</sup>	132	140 <sup>Note 2</sup>	130	136 <sup>Note 6</sup>
Number of patents granted in the year	33 (30) <sup>Note 3</sup>	38	50 (51) <sup>Note 4</sup>	40	52 <sup>Note 7</sup>
Expenditure involved in generating intellectual property rights <sup>Note 5</sup>	\$3.7m	\$3.5m	\$4.1m	\$3.5m	\$4.2m
Number of licenses granted	34	35	34	40	28
1.Exclusive license	23	15	24	25	19
2.Non-exclusive license	10	13	7	10	8
3.Option	1	7	3	5	1
Income (on cash basis) generated from intellectual property rights	\$9.6m	\$5.5m	\$2.4m	\$5.5m	\$4.0m

<sup>Note 1</sup> CDCF Table 65: The number of patents filed is 148 and the number of inventions involved is 80 in the 2009/10 period. The former had been revised to 171 and the latter to 82 after the KT report for the previous year was submitted.

<sup>Note 2</sup> CDCF Table 65: The number of patents filed is 140 and the number of inventions involved is 99 in the 2010/11 period. The first number is different from the “Number of new patent applications filed by application type” (HKUST-proposed performance indicator under Item 3.2 on Page 9 of the Annual Report 2010/11) of 150 which is counted based on the actual number of patents filed according to the official filing date of the application with the respective patent office.

<sup>Note 3</sup> CDCF Table 66: The number of patents granted is 33 and the number of inventions involved is 26 in the 2009/10 period. The former had been revised to 30 and the latter to 23 after the KT Report for the previous year was submitted.

<sup>Note 4</sup> CDCF Table 66: The number of patents granted is 50 and the number of inventions involved is 31 in the 2010/11 period (The former had been revised to 51 and the latter to 32 after the KT report for the previous year was submitted). The first number is different from the “Number of new patent granted” (HKUST-proposed performance indicator under Item 3.2 on Page 9 of the Annual Report 2010-11) of 46 which is counted based on the actual number of patents granted according to the official issue date of the patent with the respective patent office.

<sup>Note 5</sup> The expenditure involved was used to support new patent applications in the reporting year and the expenses for all cumulative active patent applications and patents. The actual budget allocated for 2009/10 by the University is \$3m. The shortfall of \$0.7m in 2009/10 was offset by revenue generated through commercialization of IPs in the previous years. The actual budget allocated for 2010/11 and 2011/12 by the University is \$3.5m. The shortfall of 0.6m in 2010/11 was offset by revenue generated through commercialization of IPs in the previous years. The actual budget allocated for 2011/12 by the University is \$3.5m. The shortfall of \$0.7m in 2011/12 was offset by University funding.

<sup>Note 6</sup> CDCF Table 65: The number of patents filed is 136 and the number of inventions involved is 94 in the 2011/12 period.

<sup>Note 7</sup> CDCF Table 66: The number of patents granted is 52 and the number of inventions involved is 27 in the 2011/12 period.

Performance Indicator		2009/10 (Achieved)		2010/11 (Projection)		2010/11 (Achieved)		2011/12 (Projection)		2011/12 (Achieved)	
Number of collaborative researches, and income thereby generated		50	\$94.3m	40	\$72m	57	\$92.8m	42	\$74m	70	\$68m
Note 8	Local (Hong Kong)	33	\$62.5m			34	\$56.1m			44	\$37m
	China	16	\$40.0m			23	\$61.8m			22	\$21.4m
	International (excluding China)	20	\$36.3m			27	\$25.0m			30	\$22.6m
Number of contract researches (other than those included in “collaborative researches” above), and income thereby generated		172	\$60.5m	170	\$50m	125	\$47.8m	130	\$50m	117	\$48.3m
	Local (Hong Kong)	116	\$22.6m			69	\$15.6m			67	\$17.4m
	China	28	\$18.0m			34	\$16.3m			35	\$10.9m
	International (excluding China)	28	\$19.9m			22	\$15.9m			15	\$20.0m
Number of consultancies, and income thereby generated		62	\$12.5m	45	\$9.5m	70	\$20.1m	55	\$11m	87	\$23.2m
Number of equipment and facilities service agreements, and income thereby generated		377	\$5.8m	360	\$5.4m	387	\$5.6m	370	\$5.6m	451	\$4.8m
Number of student contact hours in short courses or e-learning program specially tailored to meet business or CPD needs		68,440 hrs		71,800 hrs		58,204 hrs		62,000 hrs		46,214 hrs <sup>Note 9</sup>	
Customized courses		64,168				51,130				39,045	
Open courses		4,272				7,074				7,169	

Note 8 This KPI is further broken down into three sub-categories, namely, local, China and international. These figures do not add up as some projects may involve a combination of local, Mainland, and/or overseas CIs.

Note 9 In the reporting year of 2011/12, EC also organized 7 BYOB events; 3 workshops; 6 seminars; 2 conferences for education and training purposes each of which an average of 85 participants allowing us to reach over 1500 entrepreneurs.

Performance Indicator	2009/10 (Achieved)	2010/11 (Projection)	2010/11 (Achieved)	2011/12 (Projection)	2011/12 (Achieved)
Number of economically active spin-off or startup companies	28	No projections in Initial Statement	31	No project in Initial Statement	34
Companies with institutional ownership and using IP from HKUST	7		8		8
Companies with institutional ownership but not using IP from HKUST	21		23		26