香港浸會大學
HONG KONG BAPTIST UNIVERSITY

Broadening Knowledge Transfer at HKBU

Knowledge Transfer Office Annual Report

2014-15

知識轉移處
KNOWLEDGE TRANSFER OFFICE

Contents

Mission

The Knowledge Transfer Office (KTO) is committed to match the needs of the community at large with the strengths of Hong Kong Baptist University (HKBU), to work in partnership with members of HKBU to proactively contribute to the community, and to enable knowledge transfer as the third pillar of HKBU.

Vision

KTO aspires to become an enabling catalyst and a supportive bridge between the broader community and HKBU, to enrich research and inform teaching, and to become a driving force in realising HKBU's vision of being the best regional provider of whole person education.

Value

At KTO, we shall always do our best in "providing professional customer-oriented Knowledge Transfer services" to all whom we serve.

Membership and Composition of Knowledge Transfer Committee - Academic Year 2014-15

Chair
Prof Frank FU,
Associate Vice-President

Executive Secretary & Ex-Officio Member
Ir Dr Alfred TAN,
Head of Knowledge Transfer Office

Ex-Officio Members
Prof Rick WONG,
Vice-President (Research & Development)

Prof Albert LEE,
Director of Student Affairs (until 31 August 2015)

Senior Academic Members

Faculty of Arts	Prof Hans LADEGAARD, *Professor of English Language and Literature (until 31 August 2015)*
Faculty of Science	Prof LIU Jiming, *Associate Dean of Science*
Faculty of Social Sciences	Prof MA Hing Keung, *Professor of Education Studies*
School of Business	Mr Simon SO, *Associate Programme Director of Bachelor of Business Administration (Hons)*
School of Chinese Medicine	Prof BIAN Zhaoxiang, *Associate Vice-President, Director of Clinical Division*
School of Communication	Prof Kara CHAN, *Professor of Communication Studies*
Academy of Visual Arts	Dr Patricia FLANAGAN, *Assistant Professor of Visual Arts*

Broadening Knowledge Transfer at HKBU

Executive Summary

The reporting year of 2014-15 has been a fruitful year for Knowledge Transfer Office (KTO) in broadening its support and services at Hong Kong Baptist University (HKBU).

In the current reporting year, two HKBU KT Awards, namely the HKBU Knowledge Transfer Award 2015 and the HKBU Innovationem Award 2015, were presented to two exemplar knowledge transfer and innovation projects. They are:

- "Building Learning Community through a Transdisciplinary Multi-layered Approach" - a multi awards winning knowledge transfer project where transdisciplinary multi-layered approach to cross generations education spearheaded by the Faculty of Social Sciences (The winner of the HKBU Knowledge Transfer Award 2015); and
- "Ultra-hard, Anti-scratch Thin Film" - a project developed by a bright hot technology start-up spun off from the University wherein their technology is seeking to protect all glass covers with scratch proof armour-like shields (The winner of the HKBU Innovationem Award 2015).

More details on these exciting and exemplar winners can be found in the relevant sections of this report.

In the area of Knowledge Transfer Partnership (KTP), HKBU has successfully engaged in a number of exciting KTP projects that produced significant and positive impacts on the communities. The diversity of KTP projects at HKBU further exemplifies the broadening of the uptake of knowledge transfer as a mean of community engagement at the University. For more information, please refer to KTP section.

Technology Transfer (TT) at HKBU has also expanded its support and services across a much broader spectrum in the academic year of 2014-15. Five HKBU technology start-ups were set up with the funding support from the Technology Start-up Support Scheme for Universities (TSSSU) by the Innovation and Technology Commission (ITC), the Government of the Hong Kong Special Administrative Region (HKSAR). Besides, six new exciting technological projects, ranging from Chinese Medicines to detection of LED flickers, received funding from the HKBU Matching Proof-of-Concept Fund (MPCF) for prototype development of possible commercialisation. Moreover, a brand new technology commercialisation company - the HKBU R&D Licensing Limited - has successfully licensed technology projects from the University. Last but not least, the numbers of patent filings and patents issued this year have reached a new record high. The first patent titled "Assembly for Ball and Socket Joints" from a non-science academic unit, the Academy of Visual Arts, has been filed in the USA. For details, please refer to TT section.

In the entrepreneurship aspect, HKBU continued its support to Business Entrepreneurship Support and Training (BEST) Programme three years in a row. The number of participants served by this HKBU BEST Programme is now over a thousand. At least four student's start-ups were established with the support of this programme at the University. It is expected to have more entrepreneurship competitions, support services and start-up opportunities provided for students and staff by the University. The five TSSSU start-ups also benefitted from the support and services of the BEST Programme at HKBU. For further information about entrepreneurship activities, please refer to Entrepreneurship section.

To sum up, 2014-15 has been an encouraging and exciting year for knowledge transfer at HKBU. Innovative ideas and creative inventions bring up more knowledge transfer opportunities at the University which may cause deeper and broader impacts on the society and the economy as a whole.

Ir Dr Alfred TAN
Head of Knowledge Transfer Office
July, 2015

Knowledge Transfer Partnership (KTP)

The transfer of knowledge from HKBU to the community

Knowledge Transfer Partnership (KTP) is one of the engagement strategies for academics to engage in signature partnerships with the wider community. It is a model that involves collaboration between Hong Kong Baptist University (HKBU) (the Academic Partner) and an external organisation (the External Partner), with the assistance of a Knowledge Transfer (KT) Associate, to serve the community. The collaboration projects enable the transfer of knowledge from HKBU to the community, empowering not only the external organisation, but also individual participants of the projects.

In the academic year of 2014-15, four knowledge transfer impact cases were highlighted as they were either the winner or finalists of the HKBU Knowledge Transfer Award 2015 as well as KTP projects with significant contributions to the society. The impacts are also diverse in terms of social and health from establishing a platform for different generations and community sectors for KT, promoting micro-urban farming, promoting health communication campaigns via narrative animation, to transforming knowledge of narrative concepts with the use of acupuncture and traditional Chinese medicine in outreach services to help adolescent drug users.

This year, a total of nine KTP projects have been granted. Please refer to P.31 for details. Successful projects from this batch will be included in the KT Annual Report for the academic year of 2015-16. We have planned to showcase the impact cases to the community and faculties to motivate staff to undertake more KT activities, especially interdisciplinary and collaborative research in the near future.

Ir Dr Alfred TAN
Head of Knowledge Transfer Office
July, 2015

KT Awards 2015

The HKBU Knowledge Transfer Award

The HKBU Knowledge Transfer Award was established in 2014. It is sponsored by the University Grants Committee (UGC) Knowledge Transfer (KT) funding and administered by the Knowledge Transfer Committee (KTC) via the Knowledge Transfer Office (KTO). This Exemplar Knowledge Transfer Project of the Year Award is awarded to a KT project led by a HKBU colleague/team which is judged to have utmost value for community engagement through its knowledge transfer along the criteria of:

- Providing leadership contributions via intellectual-based knowledge transfer in serving the community needs;
- Providing significant, sustainable positive impact and/or fundamental change for long term betterment of the community;
- Providing exemplar contributions towards building the research and teaching strengths at HKBU; and
- Possessing the greatest potential to further raise HKBU's good reputation globally.

Winner of the Exemplar Knowledge Transfer Project of the Year Award

Building Learning Community through a Transdisciplinary Multi-layered Approach

Principal Investigator: Prof Atara SIVAN,
Department of Education Studies

Project Team: Prof Vicky TAM Chiu-wan[1], Mr Eugene TAM[1], Mr Michael HO[1], Prof Petrus NG Yat-nam[2], Dr Esther CHO Yin-nei[2], Mr John NG Siu-hung[2], Dr KWAN Yee-wan[2], Dr Odalia WONG Ming-hung[3], Dr Louie LOBO Hung-tak[4]

1 Department of Education Studies
2 Department of Social Work
3 Department of Sociology
4 Department of Physical Education

External Partners: Hong Kong Sheung Kung Hui Welfare Council Limited, Kowloon City Baptist Church Neighbourhood Elderly Centre and Lee Kau Yan Memorial School

Community Served: Youth and elderly in Hong Kong

Summary

This is a social impact case. Through extensive community engagement and research on transdisciplinary multi-layered approach over the years, Prof Sivan from the Department of Education Studies has successfully established a platform for knowledge transfer within different generations and community sectors, whole person development, engagement in civic/community service as well as expansion of transdisciplinary collaboration and mutual understanding and learning from one another.

The project aimed at establishing a Community of Practice (CoP) consisting of academics and professionals, students from the Faculty of Social Sciences, elderly community members and secondary school students. Using a transdisciplinary three-layered approach, participants at each layer were empowered to engage problems and issues, and work collaboratively to bring about changes and improvement to the community. One emphasis was put on the social aspects of community development and team work. The learning community infused academic and professional knowledge while integrating with practices and connecting with the society. These elements brought together created the synergy to provide the best opportunities for successful contribution to the society. In the project, elderly sector was the main focus.

Underpinning Research

The project was underpinned by researches, scholarly works and community outreach activities undertaken by Prof Sivan in the areas of leisure education, teaching and learning approaches and methods, action learning in education, and populations with special needs. Some highlights of Prof Sivan's scholarly activities which informed this project were shown:

- Large-scale research studies on leisure education highlighted the importance of experiential, lifelong learning and optimal use of leisure for personal growth and well-being.
- Territory-wide studies on leisure participation and perception in Hong Kong indicated the need for involvement in active forms of leisure and the need for outside classroom experiences for life-wide learning.
- Researches on "teaching and learning" approaches and methods lent support to the contribution of student-teacher interaction to students' cognitive, affective and moral learning.
- Projects utilising action learning indicated the significance of reflection on action for bringing about changes and improvements to current practices.
- Active involvement in community work of several non-profit associations (e.g. TREATS and Community Drug Advisory Council (CDAC)) which catered for populations with special needs highlighted the potential contribution of community learning through service to the development of servant leadership.

This project integrated the contributions made by the above studies, scholarly works and community outreach activities by enhancing intergenerational, active, experiential and action learning through community engagement. Building a CoP, university's students together with academic staff, secondary school students and the elderly were involved in cycles of planning, action, observation and reflection, which led to multi-layered engagement and knowledge transfer.

Prof Sivan has published extensively on these areas, authoring and editing six books and compendiums, over 65 academic papers, book chapters and 20 reports. These scholarly outputs resulted from over 40 competitive grants obtained from large-scale universities, governments, strategy development and consultancy competitive funds. Prof Sivan has also been invited as the keynote speaker for more than 20 international conferences and was recognised for her scholarly contribution by being a recipient of several international prestigious awards including the Hillel Ruskin Memorial Scholar Lecture Award and the George Torkildsen Literary Award. Besides, Prof Sivan was awarded the HKBU Knowledge Transfer Award in 2015.

References to the Research

Key Peer-reviewed Publications:

1. **Sivan A.** & Chan D. W. K. (2014). Enhancing teachers' understanding of their interpersonal behaviour in the classroom: An action learning project. *Journal of the International Society for Teacher Education,* 18(1), 7-15.

2. **Sivan A.** (2014). Leisure education and the role of schools: Planning and implementation in times of change. *African journal for physical, health education, recreation and dance,* 20 (4:2), 1524-1536.

3. **Sivan A.**, Chan D. W. K. & Kwan Y. W. (2014). Psychometric evaluation of the Chinese version of the questionnaire on teacher interaction (C-QTI) in Hong Kong. *Psychological Reports: Measures & Statistics.*

4. **Sivan A.** & Stebbins R. (Eds.) (2014). *Leisure Education: A Cross-National View,* Abingdon, Oxfordshire, UK: Routledge.

5. **Sivan A**., Chan D.W. K. & Wong E. Y. W. (2014). *Studies on Teaching and Learning (Vol.3),* Hong Kong: Pearson Education Asia Limited.

6. **Sivan A**. & Chan W. K. D. (2013). Learning values and attitudes among Hong Kong students. *Educational Practice & Theory,* 35(1), 27-40.

7. **Sivan A**. & Chan W. K. D. (2013). Teacher-student Relationships and Students' Learning Outcomes. In S. Phillipson, K. Ku & S. Phillipson (Eds.). *Constructing Educational Achievement: A sociocultural perspective* (pp.136-147). London: Routledge.

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9. **Sivan A**. & Chan W. K. D. (2012). Leisure education in schools from students' perspectives: the case of Hong Kong. *World Leisure Journal,* 54(1), 26-37.

10. **Sivan A.** & Stebbins R. (2011). Leisure education: definitions, aims, advocacy, and practices – are we talking about the same thing(s)? *World Leisure Journal,* 53(1), 27-41.

11. **Sivan A.** (2010). Is leisure studies "ethnocentric"? Integrating leisure studies worldwide: A view from Hong Kong. *World Leisure Journal,* 52(3), 177-180.

12. **Sivan A**. & Lam S. Y. (2009). Enhancing student-teachers' learning and teaching through guided reflection. In **Sivan A**. (Ed.), *Studies on Teaching and Learning* (pp. 17-28). Hong Kong: Hong Kong Baptist University, Quality Assurance Committee.

13. **Sivan A**. & Chan W. K. D. (2008). Values education in Hong Kong classrooms. *Learning and Teaching,* 1(2), 75-85.

14. **Sivan A**. (2008). Leisure education in educational settings: From instruction to inspiration. *Society and Leisure,* 31(1), 49-68.

15. **Sivan A**. (2003). Has leisure got anything to do with learning? An exploratory study of the lifestyles of young people in Hong Kong universities. *Journal of Leisure Studies,* 22(2), 129-146.

16. **Sivan A**. (2002). Leisure Participation of Hong Kong Elderly: Policy and Practice. *World Leisure,* 44(1), 11-18.

17. **Sivan A**. (2000). Global influence and local uniqueness: the case of adolescent leisure in Hong Kong. *World Leisure,* 42(4), 24-32.

18. **Sivan A.** & Ruskin H. (Eds.) (2000). *Leisure Education, Community Development and Populations with Special Needs.* Oxford & New York: CABI Publishing.

Selected External Grant

Funding Scheme	University Strategic Development Fund (SDF)
Principal Investigator	Prof Atara SIVAN, Department of Education Studies
Period	3 years
Amount Awarded	HK$989,200

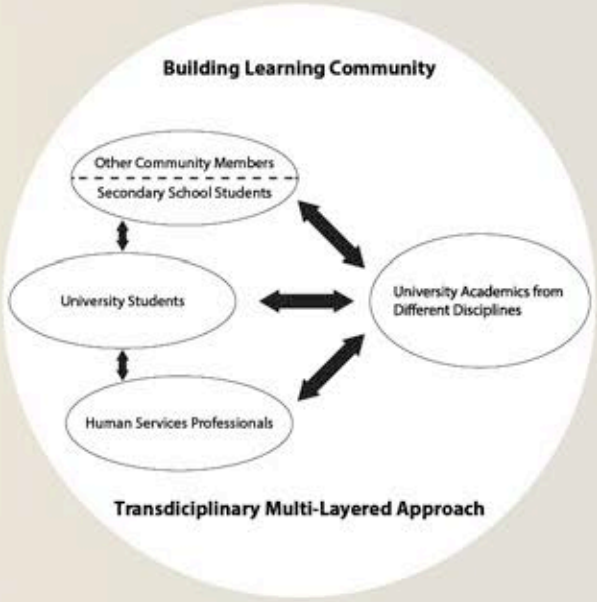
Details of Impact or Benefit

Social Impact

The project successfully established a platform for knowledge transfer within different generations and community sectors, whole person development, engagement in civic/community service, expansion of transdisciplinary collaboration and mutual understanding as well as learning from one another. In specific:

- Providing a platform for academics and professionals to engage in and transfer their knowledge to the community;
- Providing whole person education for nurturing young generations, including citizenship, knowledge, learning, skills, creativity, communication and teamwork;
- Providing a channel for young generations and the elderly for their better understanding and communication with each other to narrow the generation gap;
- Providing a platform for young generations for their first trial in community service especially in elderly service, to further improve their community engagement and community care; and
- Arranging series of practices and activities to the elderly to motivate their learning as well as to improve their life quality and health condition.

In general, the project served the youth and the elderly community in Hong Kong. Declining birth rate and increasing longevity were a new challenge to Hong Kong and many other cities. Elderly community service for long-term development had a growing demand. On the other hand, most learning was still examination-driven and scant attention was paid to "learning to learn". Students in Hong Kong were locked into an academic programme. Transdisciplinary three-layered approach (refer to Picture 1) was applied among university students, staff, professionals, secondary school students and the elderly in the community through three phases. Tremendous growth of participants demonstrated a healthy development of the learning community and the commitment of its members. It improved the elderly's learning attitude, living quality and health condition in a small local community. Moreover, it provided opportunities for whole person education to youth generations from external partners in order to narrow the generation gap between the youth and the elderly due to misunderstanding and missing communication channels. Some of them had intrinsic perception of each other and find it hard to get along with.



Picture 1

Building on the achievements of the project, extensive awards and media coverage from 2013 to 2015 were granted and received respectively. Prof Sivan was invited to give a paper presentation about the project in Lily International Spring Conference in 2015. Another achievement was being given the right to use the Caring Organisation Logo from 1 March 2015 to 29 February 2016 under the programme called "Caring Company Scheme 2014-15", by the Hong Kong Council of Social Service to HKBU. This was to recognise their commitment in caring for the community, the employees and the environment over the past years. It standed as a testimony to the success and community contribution of this CoP project.

Apart from the Caring Organisation Logo, the project was given support letters from the Dean of Social Sciences, Acting President and Vice-Chancellor for 2015 MacJannet Award, which was established by the Talloires Network and the MacJannet Foundation. It was established to recognise exceptional student community engagement initiatives at 344 Tallories Network member universities in 75 countries around the world and contributed financially to their on-going public service efforts. It recommended steps to elevate the civic engagement of universities around the world. Out of 61 original nominations of MacJannet Award, only 12 were selected to advance to the next round as finalists while Prof Sivan's project was one of them. The profiles of 2015 Prize Recipients and Finalists were updated on the official website. *(http://talloiresnetwork.tufts.edu/about-the-macjannet-prize/)*

References to the Corroboration of Impact or Benefit

1. Statements of support from the following organisations are available for corroboration purpose:
   - Kowloon City Baptist Church Neighbourhood Elderly Centre (Lok Fu)
   - Hong Kong Sheng Kung Hui Welfare Council Limited
   - Lee Kau Yan Memorial School
2. Following materials are available:
   - Photos of the activities
   - Evaluation report
   - A website *(http://learningcommunity.hkbu.edu.hk/)*

Finalist of the Exemplar Knowledge Transfer Project of the Year Award

Greener Living - Micro Urban Farming and Turning Waste into Resource

Principal Investigator: Dr Daisy TAM Dic-sze,
Department of Humanities and Creative Writing

External Partners: Time to Grow Company Limited and Feeding Hong Kong

Community Served: Micro-urban farming community in Hong Kong

Summary

This is a social impact case. Led by Dr Tam, the "Micro-urban farming community in Hong Kong" project aimed at promoting micro-urban farming as a holistic way of addressing issues of food security and eating. It instigated and demonstrated how to achieve greener, healthier, more conscious and sustainable ways of life. By adapting waste materials to set up micro-urban farms in unused or underutilised spaces, the project served as a "facilitating initiative" showing that farming in city is possible and accessible to all.

The engagement process included the development of a sustainable vertical planting system by making use of underutilised space and waste materials. An eight-session workshop, co-organised with collaborating partners, relating to the practical skills of micro-urban farming was held. A compact booklet with an overview of issues like food security and farming know-how, a planter kit including seeds and soil, and a start-up manual were distributed to the participants. By such, the project achieved remarkably positive impacts and penetrations with proven qualities and recognitions, as evidenced by the support of HKBU Faculty Research Grant Category I and General Research Grant, in transferring the research-based skills of micro-urban farming to the local community.

Underpinning Research

Dr Tam has a proven track record in high quality engagement and research in contemporary ethical food movements. Her specialised engagements over the years included a five-year ethnographic field work at an apple farm in Kent, London; growth of the Forest Farm Peace Garden in Hainault, London; and a community vegetable garden at Goldsmiths, the University of London. These empirical involvements in her research had deepened her understanding of ethical food practices and provided her with practical experiences of organic farming as well as the organisation of communal gardening.

One of the important findings from Dr Tam's research was the disjointed approaches or initiatives that tackle only certain aspects of the food system. According to Hong Kong Exporter Guide 2014, Hong Kong used less than 3 percent of its land for agriculture and imported over 95 percent of the food. Hong Kong's dependence upon other countries to supply her everyday' s needs makes her become vulnerable and places her at the mercy of economic, political and climatic changes as well as practices. In order to initiate changes, it is necessary to fundamentally transform our understanding and relationship to food. Through the use of a holistic approach from understanding the limitations of the current food model, it can improve our food production, distribution and consumption.

The project took into account of the specific limitations of the Hong Kong environment and offered solutions to the urbanity of the city. Micro-scale farming utilises the unused spaces of our homes and offices for the growing of vegetables – from walls, window ledges to full-scale rooftop gardens. The

materials used would be adapted from waste resources, which are accessible and affordable. Micro-urban farming would not fully solve the problem of the current food system, but it would undoubtedly address some issues by offering a viable and practical solution that is accessible to all. Above all, the project has successfully demonstrated the possibility to farm in Hong Kong and the contribution to a greener environment.

References to the Research

Key Peer-reviewed Publications

1. **Tam D. S.** (2011). Inextricable Aesthetics: packaging ethics in markets and supermarkets in Menrath S. & Schwinghammer A. (eds). *That's What a Chameleon Looks Like.* Contesting Immersive Culture Cologne, Germany: Herbert von Halem Verlag, 198-222.
2. **Tam D. S.** (2014). The Return of Home Cooking – question of nostalgia, foreigners and nationalism in Evers C. (ed). *Altitude.* An e-journal of emerging Humanities work.
3. **Tam D. S.** (2009). 家常便飯 Home Cooking: On Collective Memory and Identity in *Journal of Local Discourse.* 本土論述 台北市：漫遊者文化事業股份有限公司, 231-244.
4. **Tam D. S.** (2008). Slow Journeys in **Tam D. S.** & Frost N. (eds). *Food, Culture and Society Berg,* 11(2), 207-218.
5. **Tam D. S.** (2008). Food Journeys – Culinary Travels in Time and Space: Introduction to Slow Journeys. *Food Culture and Society Berg,* 11(2), 127-132.

Selected External Grants

Project Title	Transforming the Parasite – Ethical Waste in Food Practices
Funding Scheme	Faculty Research Grant Catagory I, Research Committee, Graduate School, HKBU
Period	October 2013 - September 2014
Amount Awarded	HK$50,000

Project Title	The Capacity for Ethics – Food Practices in Hong Kong
Funding Scheme	General Research Grant, University Grants Committee, the Govenment of the HKSAR
Period	January 2014 - December 2015
Amount Awarded	HK$275,000

Details of Impact or Benefit

Impact to the Academics

The project offered new insights into Hong Kong's food security problem and addressed the issues on urban space and living. The manual and start-up kit were successfully incorporated into the academic curriculum. The empirical materials generated were developed into case studies, and consequent theoretical research was disseminated in conferences and academic publications. The showcase study contributed to greening the campus and promoting low carbon living. Through the eight-session workshop (open to the public) and the collaboration with external partners, the exposure of the academic departments, for example, Department of Biology, and the sustainability initiatives of HKBU had been increased.

Current urban farming initiatives focus mainly on rooftops. The project offered creative and alternative models for micro farming, such as converting vertical spaces into usable farming area. The project offered the team and related parties an opportunity to explore and gain experience in setting up the first vertical vegetable garden in Hong Kong. This study had been incorporated into a course taught by Dr Tam called "Food and Humanities GDAR 1026" in which students had an opportunity to critically engage in the topic of food. It also offered a cultural analysis of contemporary food movements and examined practices in food production, distribution, consumption and waste. The course was attended by 100 students and was offered by the Humanities Programme at HKBU.

Impact to the Non-academic Partners

The project served as a platform to gather experts from different partners in order to create a more holistic approach in their respective works by complementary of individual's initiatives. In doing so, a teaching kit was used in the workshops and continued to be made available for the partners to incorporate into their respective educational programmes and activities.

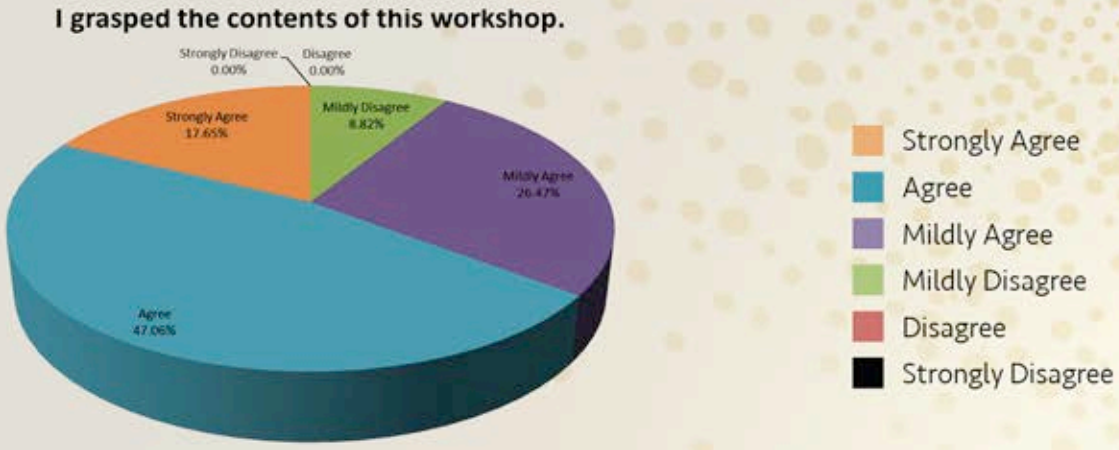
The expertise and networks of all parties were fully utilised to work on this, and thus enriching their knowledge and skills in setting up farming projects in different environments. The project enabled them to share experiences and give insights into how to create green, edible, educational and creative spaces. As a result, the project raised the awareness of the partners' work to promote urban farming and combat food insecurity in Hong Kong.

Impact to the General Public

The project introduced the possibilities of micro-urban farming to the local community by distributing start-up kits to workshop participants. Through the workshops, the participants learnt how to care their produce and as well, had increased their awareness and understanding of food security, food systems and seasonality in micro-urban farming.

Impact Assessment on the Participants of the "Food Jamming" Workshop

An activity assessment survey was conducted at the end of the workshop. More than 60 percent of 34 respondents agreed that they grasped the contents presented in the activity (Figure 1). Nearly 80 percent of the respondents agreed that they had learnt new concepts / knowledge about local ingredients during the activity (Figure 2). It was encouraging to find out nearly 80 percent of the respondents agreed that the activity had increased their interests in the related knowledge (Figure 3).



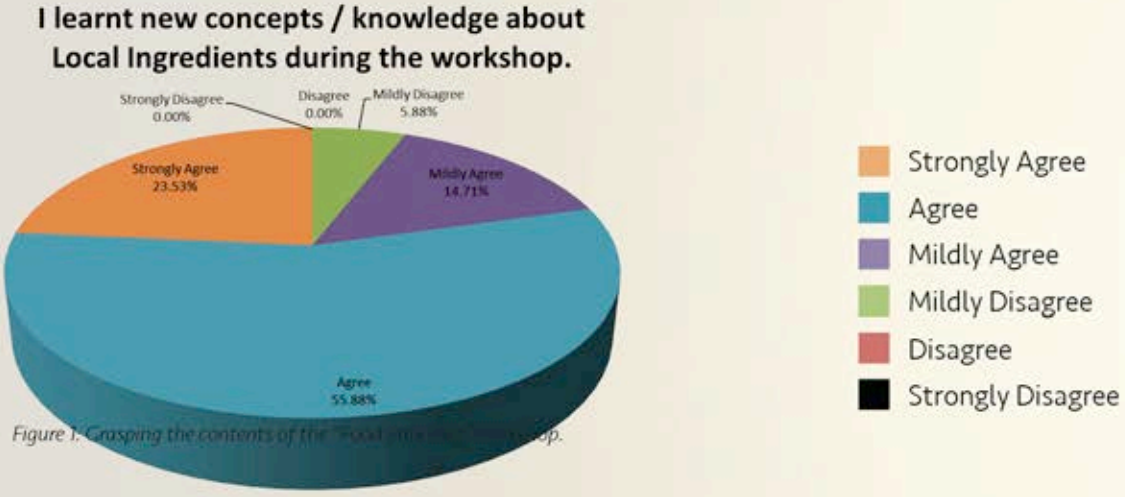


Figure 1: Grasping the contents of the "Food [illegible] op.

Figure 2: Learning new concepts / knowledge about local ingredients in the "Food Jamming" workshop.

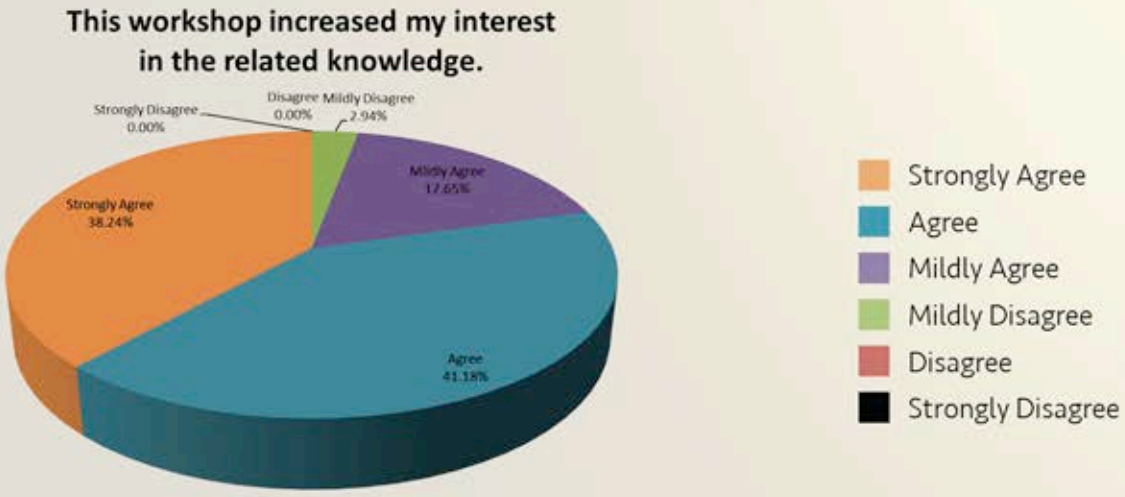


Figure 3: Increasing the participants' interests in the related knowledge in the "Food Jamming" Workshop.

A booklet with an overview of food security, urban farming, farming know-how, recipes and related content of healthy living was published and distributed during the project period. It served as a step-by-step guide to help readers to start and maintain their own edible balcony, windowsill or rooftop. The start-up planter kits, including a home ready vegetable box with seedlings, were given to the workshop participants for free. As a whole, the project has successfully increased public awareness of the micro-urban farming movement.

References to the Corroboration of Impact or Benefit

1. The co-founder of Time to Grow had made the following comments to Dr Tam's project:

   "This has been a wonderful collaboration: the workshops not only promoted urban farming and taught participants the practicalities of growing and planting, but also introduced them to the issues of food security and the importance of sustainable living. The workshops were diverse and catered to different audiences but delivered a very focus message on our food system."

2. Media Coverage (Original Titles in Chinese)
   - Sing Tao Daily (星島日報) (20 February 2014), F03, 「浸大巧用廚餘 蛋穀種蔬菜」.
   - Wen Wei Po (文匯報) (19 February 2014), A25, 「浸大都市種植有機菜收成」.
   - HKBU e-News (21 February 2014), "Green Project Launched to promote micro-urban farming".
   - HKBU On Campus (Issue 81, March 2014), "Greens in a bottle".
   - Eyes on HKBU (2014), "Reflections on food issues through micro-urban farming (藉都市微種植啟發對食物系統的反思)".

3. Support from Social Media

   A Facebook group called "生活書院 (School of Everyday Life)" *(https://www.facebook.com/schoolofeverydaylife)* was established for sharing information. It serves as a platform for peer learning and a repository for ideas about a greener, healthier, more conscious and sustainable way of life. Knowledge or updates of information, such as upcoming activities, would be made freely available online through the existing platforms (e.g. partner's websites, social media including the Facebook page). Participants can share their outcomes, tips, recipes and ideas through these channels.

Finalist of the Exemplar Knowledge Transfer Project of the Year Award

Effective Health Communication Using Narrative Animation

Principal Investigator: Dr Kelvin LEE Kai-wah, Academy of Film

Co-investigator: Dr Timothy FUNG Kai-fung, Department of Communication Studies

External Partner: Renal Companion Association

Community Served: Patients with renal disease and their families

Summary

This is a social and public health impact case. Engaging with Dr KAM Man-fa, a specialist in nephrology, and Dr Fung from the Department of Communication Studies, Dr Lee developed a nine-minute animation illustrating the basic knowledge that can lower the risk of life-threatening infection for the patients with end-stage renal failure during the peritoneal dialysis (PD) exchange. This pioneer project between health communication and media production aimed at promoting the effective health communications for patients with renal disease.

In general, this project generated huge implications for health communication campaigns since the narrative animation have been used for diversified health issues, from encouraging people to seek early diagnosis to addressing sensitive issues to survivorship. The narrative animation is now available *(https://www.youtube.com/watch?v=DiRQ6L6KINk)* as a reference for patients, their families and caretakers. Furthermore, this animation has been shown to the patients through the channel of seven renal patient supporting groups.

Underpinning research

Dr Lee has sound theoretical knowledge and strong industrial experiences in computer animation. He has been teaching at HKBU for 13 years with primarily interests and specialisation in computer animation, digital storytelling and interactive media. Before joining HKBU, he was the founder of a digital animation studio, which was acquired by a renowned digital post-production studio called Centro Digital Pictures Ltd. He has a PhD degree in computer science (major in computer graphics). Dr Lee received Staff Development Grants for his outstanding performances in the online Professional Animation Studies at *AnimationMentor.com* and "Gesture Drawing" courses by *Schoolism.com* in 2010 and 2013 respectively. Through these two professional development courses, Dr Lee acquired knowledge and skills in the production of narrative animation, and thus enabling him to become an expert in the field.

Dr Lee has supervised nearly 200 student animation works with the focus of utilising animation for entertainment and transmission of meaningful message in effective ways. Most of the works have been applied with narrative animation technique. Their efforts were recognised by numerous awards. For example, the animation titled "Defending Our Homeland with Integrity" won three awards from the competition organised by Hong Kong Independent Commission Against Corruption (HKICAC) in 2012.

Dr Lee participated in a lot of local and international exhibitions and competitions. He received significant recognitions from "Autodesk 3D Studio Image & Animation Contest 1996" and "The 18th IFVA Competition". Furthermore, Dr Lee collaborated with HKBU library and received a grant to build a platform to demonstrate students' animation works in 2011.

In 2014, Dr Lee and Dr Fung received another funding from the HKBU Faculty Research Grant II and started their research and studies in applying the narrative animation knowledge and skills in public health sector to promote effective health communication to end-stage renal disease patients under dialysis treatment at the renal centre of Queen Marry Hospital. The project team interviewed 28 patients and discovered many of the infection cases were due to incorrect use of medical products in daily care, for instance, patients reused the medical products as they believed the products were clean and free of germs, and they wanted to save money. Through sharing with patients, the project team decided to initiate this project.

The project team decided to use narrative animation instead of traditional forms of information dissemination employed by medical professional to communicate with the patients. In fact, visual representation of health information can bridge challenges posed by traditional health literacy.

To develop a storyboard for the narrative animation, the team chose the setting, characters and a sequence of events based on their findings from the focus groups and communication theory. A survey was conducted with patients under dialysis treatment to identify the communication problems in getting the health-related messages. The survey results were analysed by theoretical frameworks drawn from health belief models and narrative persuasion in order to define the specifications of character, story structure and animation style.

References to the Research

Key Peer-reviewed Publications

1. **Lee K. K. W.** & Yuen P. C. (2013). An Interdisciplinary GE course from preparation to execution to formative assessment. The Conference Proceeding of the General Education and University Curriculum Reform: An International Conference in Hong Kong.

2. Lai R. Y. Q., Yuen P. C. & **Lee K. K. W.** (2011). On Exploiting Low-Rank Structure of Human Motion for Computer Animation. The 32nd International Conference of the European Association for Computer Graphics.

3. **Lee K. K. W.** & Wang W. P. (2005). Feature-preserving Mesh Denoising via Bilateral Normal Filtering. The 9th International Conference on Computer Graphics and Computer-Aided Design (CAD).

4. **Lee K. K. W.** (2003). The past and future of Animation in Hong Kong, Media Digest RTHK.

Selected Creative Work Showcases

1. March 2014: Dr Lee's creative work "Differential Reality" was invited to exhibit "Slow and Fast Animamix Biennale 2013-14" from 14 March - 12 April, 2014 at the City University of Hong Kong. The event was sponsored by the Leisure and Cultural Services Department, the Government of the HKSAR. Dr Lee's work was exhibited alongside with renowned artists such as Jeffrey Shaw (Dean of School of Creative Media), Thomas Laurenzo (Professor, School of Creative Media), Stanley Wong and Henry Chu (founder of *pillandpillow.com*).

2. May 2013: "Differential Reality" was invited to exhibit at the Art East Island Exhibition, sponsored by the Pure Art Foundation.

3. May 2013: "Differential Reality" was invited to exhibit at the event "Living in the Post-Digital Age", organised by the BATES CHI Hong Kong.

Awards and Honours

1. March 2013: Jury Special Mention Award (Interactive category), The 18th IFVA Competition, the Hong Kong Arts Centre.
2. 2011: UGC Teaching Award 2011, School of Communication, HKBU.
3. 2009: Best Teaching Award, School of Communication, HKBU.
4. 1996: Gold Award, Autodesk 3D Studio Image & Animation Contest.

Selected External Grants

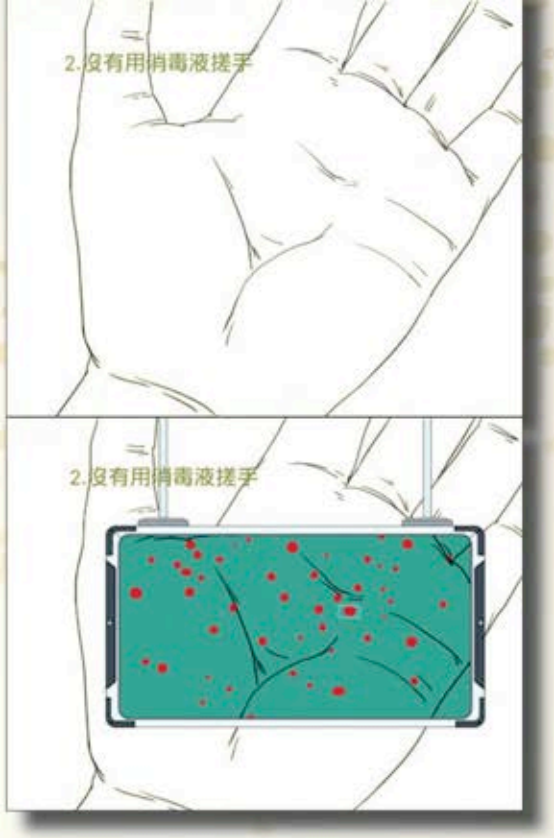
Project Title	Interdisciplinary Repository of Student Multimedia Productions to Enhance Student's Learning Outcomes and Learning Motivation
Funding Scheme	HKBU Interdisciplinary Teaching Development Grant
Project Team	Ms Rebecca WONG, Dr Kelvin LEE
Year of Award	2011
Amount Awarded	HK$196,080

Project Title	An Examination of Factors Influencing the Compliance with the Peritonitis Preventive Regiments among Patients under Continuous Ambulatory Peritoneal Dialysis
Funding Scheme	HKBU Faculty Research Grant II
Project Team	Dr Timothy FUNG, Dr Kelvin LEE
Period	February 2014 to February 2015
Amount Awarded	HK$90,000

Details of Impact or Benefit

According to the data from the Hospital Authority, over 90 percent of more than 7,000 patients with end-stage renal failure are undergoing Continuous Ambulatory Peritoneal Dialysis (CAPD) at home in Hong Kong *(http://www21.ha.org.hk/smartpatient/en/chronicdiseases_zone/details.html?id=120)*. The CAPD process uses the patient's peritoneum in the abdomen as a membrane through which the wastes in blood are diffused into dialysate fluid. A permanent tube is inserted into the abdomen through surgery so that the dialysate fluid can be drained in and out of the abdomen. The dialysate fluid is left in the abdomen cavity for five to six hours before it drained out through the tube and discarded. Each time the dialysate filling and emptying from the abdomen is called one exchange. This exchange cycle will repeat normally from four to five times during the day.

CAPD is an optimal treatment under the consideration of balancing patient's health and governmental health financial policy. The PD exchange offers patients the flexibility to perform the treatment at



home so that patients could possibly resume back to their normal life whereas the operational pressure on the hospital side could be substantially relieved because patients only have to attend regular follow-up instead of demanding attentive cares during hospitalisation.

However, patients under the dialysis treatment are at high risk if the treatment procedures are not strictly followed. For example, the permanent tube could expose to the threat of bacterial infection resulted in peritonitis that might lead to fatal consequence. Patients could suffer from complications, and thus relying on other expensive medical treatments such as haemodialysis to sustain their lives. This is undesirable for both the patients and the government because of the additional sufferings and resources consumption.

Surveys discovered that many of infection cases were mainly due to the patient's negligence during the exchange procedures. The project team disseminated the health information about CAPD treatment by using the narrative animation to increase patient's awareness and retention in order to improve their self-management skills and health literacy.

The characters in the narrative animation connected patients through a story context to make them easier to identify the similarities with their own situations so as to develop stronger cognitive and affective responses. Patients' engagement with stories can reduce their resistance to the information and increase their acceptance and motivation for staying healthy.

The project team invited 138 patients from the Renal Companion Association of Queen Mary Hospital, and seven patient supporting groups for post-project evaluation. Many patients found that the animation echoed their own experience and would respond positively towards the intended message. The narrative approach to convey health communication was proved to be effective and able to encourage patients with positive attitudinal due to their behavioural changes and awareness of personal hygiene.

Impact assessments were conducted immediately after showing the nine-minute animation to the patients. A total of 138 patients from the following renal patient supporting groups were screened:

1. The Kidney Patients' Association (Tuen Mum Hospital)
2. Hong Ling Renal Club (United Hospital)
3. QEH renal support group (Queen Elizabeth Hospital)
4. Renal mutual help association (Princess Margaret Hospital)
5. Mutual Support Society for Tung Wah Patients (Tung Wah Hospital)
6. Renal Companion Association (Queen Mary Hospital)
7. Eastern Renal Support Association (Pamela Youde Nethersole Eastern Hospital)

The narrative approach of communication to present health-related information had been successfully demonstrated and the details of this project was presented in a seminar to a group of graduate students from the Master of Arts (MA) in Communication on 4 February 2015 at HKBU. The graduate students found the seminar inspiring and also gained knowledge through the experience sharing with the project team in using narrative animation for health communication from the theoretical framework to practical application. The findings of this project were also presented in a conference held in May 2015 in Puerto Rico.

Besides, narrative form of communication received positive feedback from doctors and non-governmental organisations (NGOs). Recently, the Hong Kong Society of Transplantation has approached Dr Lee's team to apply this narrative animation technique to disseminate transplantation information to the community.

References to the Corroboration of Impact or Benefit

1. A survey report with 138 participants
2. One accepted conference paper

   An Exploration of Socio-psychological Factors Associated With Suboptimal Adherence to Therapeutic Regimens Among Patients on Continuous Ambulatory Peritoneal Dialysis. Health Communication Division of Annual Conference of International Communication Association, San Juan, Puerto Rico, 21-25 May 2015.
3. Media coverage (original titles in Chinese):
   - HKBU Horizons, 2014-15 Issue 2.
   - Oriental Daily News (東方日報) (4 June 2015), 「浸大動畫教洗腎護理」.
   - Wen Wei Po (文匯報) (4 June 2015), 「浸大跨科製動畫 病人睇片識洗腎 提升衛生意識防併發症 下一套擬推廣器官移植」.
   - Sing Tao Daily (星島日報) (4 June 2015), 「浸大講師製動畫破洗肚誤解」.
   - The Sun (太陽報) (4 June 2015), 「醫知健：動畫教洗腎長者易入耳」.
4. The nine-minute animation is available on Youtube:

   https://www.youtube.com/watch?v=DiRQ6L6KINk

Finalist of the Exemplar Knowledge Transfer Project of the Year Award

Narrative Journey with Young Persons Who Are Taking Drugs

Principal Investigator: Dr Angela TSUN On-kee, Department of Social Work

Co-investigator: Dr Sharon LEUNG Shui-king, Department of Social Work

External Partner: Sham Shui Po District Youth Outreaching Social Work Team of the Boys' and Girls' Clubs Association of Hong Kong (BGCA)

Community Served: Social workers and young drug users in Hong Kong

Summary

This is a social impact case. Through extensive community engagement and multidisciplinary research, Dr Tsun cooperated with the youth outreaching social work team of the BGCA and targeted its services at adolescent drug users in Hong Kong by adopting narrative therapy. The project also addressed some common issues about relapsing into drug use after treatment.

A team of 12 social workers from the BGCA was trained with transforming knowledge of narrative concepts. Treatments of acupuncture and traditional Chinese medicine were also applied to young drug users in the project. Their narrative journeys were published in a book and a 30-minute video was produced for training purpose. This project was considered highly beneficial to the community. Over 25 percent of the young participants decided to quit drug use after the therapy sessions. Based on the successful outcome of this seed project, the narrative therapy model has been further adopted in another large-scale theme based project titled "Career and Life Adventure Planning Programme for Youth". It is expected to induce more positive impacts to the community.

Underpinning Research

This project was designed based on narrative therapy approach - a treatment model focusing on "making process of a person's life stories" to realise a person's values, beliefs and hopes. Dr Tsun used narrative ideas and skills to a group of young people with behavioural, emotional and drug use problems. The project successfully helped the participants to reclaim their self value and identity after the narrative intervention. They regained a sense of agency and responsibility to move on to their life goals.

References to the Research

Research Projects

1. 2014: Narrative co-research with people who perpetrate sexually abusive behaviours (co-researcher: Caritas-Hong Kong)
2. 2009: "Life Bank" Drugs Prevention Project (co-researcher: The Salvation Army)

Key Peer-reviewed Publications

1. **Tsun O. K.** (2012). *Stories of people who have perpetrated sexually violent behaviours – problem, resistance and hopes.* Centre for Youth Research and Practice, and Caritas-Hong Kong. (Published in Chinese)

2. **Tsun O. K.** (2012). Externalizing Conversation. In **Tsun O. K.** & Hung S. L. (Eds.), *Young people: New thoughts for social work* (pp. 236-259). Hong Kong: Red Corporation Limited. (Published in Chinese)

3. **Tsun O. K.** (2012). Scaffolding Conversation. In **Tsun O. K.** & Hung S. L. (Eds.), *Young people: New thoughts for social work* (pp.260-281). Hong Kong: Red Corporation Limited. (Published in Chinese)

4. **Tsun O. K.** (2011). Overeating as a Serious Problem and Foods as Real Good Friends: Revising the Relationship with Food and Self in Narrative Conversations. *International Journal of Narrative Therapy & Community Work*, 2, 2011: 3-15.

5. **秦安琪**（2009）。*《我們的抗藥旅程：「生命智庫計畫」敘事理念與實踐》*，研究報告，84頁。香港，香港浸會大學青年研究實踐中心。

6. **Tsun O. K.** (2007). Extending our vision: Responding to violence in Hong Kong families. In Yuen A. & White C. (eds.), *Conversations about gender, culture, violence & narrative practice* (pp.51-55). Adelaide, South Australia: Dulwich Centre Publications.

7. **秦安琪**（2005）。〈敘事治療 — 與你伙伴共行的旅程〉，尤卓慧、岑秀成、夏民光、**秦安琪**、葉劍青及黎玉蓮主編，*《探索敘事治療實踐》*。台北：心理出版社，頁165-194。

Details of Impact or Benefit

In Hong Kong, a recent rise in the number of adolescent drug users is a considerable public concern. According to the Hong Kong Narcotics Report in 2011, the number of first time drug users among adolescents aged 16 or below had increased in both genders. For males, the percentage had increased from 54.4 percent in 2008 to 60.7 percent in 2010, and for females, from 70.8 percent in 2008 to 74.7 percent in 2010. The Government of the HKSAR and related professional organisations have made efforts to combat adolescent drug use by providing compulsory placement schemes, voluntary out-patient methadone treatment programmes, voluntary residential drug treatment and rehabilitation programmes, counselling centres for psychotropic substance users. Counselling, recreation and employment services for drug users are also available in some substance abuse clinics.

To address concerns about relapsing into drug use after treatment, the BGCA Youth Outreaching Social Work Team and Dr Tsun have been working closely since 2012. The project focused on training 12 social workers by applying the knowledge of narrative therapy on their works and at the same time providing traditional Chinese medicine to the young drug users as part of their outreach services.

The project is a good example of knowledge transfer to the community by building a practical training model for social workers. It is anticipated to help social service organisations, such as the BGCA in their future planning of new sites as well as to facilitate the counselling services to young people. In summary, the project is highly beneficial to the community in the following aspects:

Impacts to the Served Community:

- **Transferring the knowledge of narrative therapy to social workers so as to enhance the effectiveness of counselling services**

  A new counselling technique, the concepts and skills of narrative therapy, was taught to the participated social workers through a six-session training workshop. It broadened their horizon and counselling skill set. As reflected from the social workers' feedback on the training course, 67 percent of respondents had gained basic understanding of narrative ideas (e.g. externalising, remembering, de-centred position). Under the supervision of narrative practitioner, the trained social workers could apply what they had learnt to conduct therapy sessions for young drug users.

- **Benefits to the young drug users who participated in the narrative therapy**

  After the narrative dialogues, young drug users grasped their unnoticed skills and knowledge and started to realise their dreams for life. They regained a sense of agency in life to actualise those dreams. The dialogues resulted in very positive outcome as the participants found their alternative stories positively that could be full of potential and capacity. Successfully, some of them decided to quit drug use or even serve voluntarily in drug rehabilitation centres. This helped the young people to tackle drug use and regain their preferred identities and life directions. Moreover, their relationships with families were much improved.

Impacts to the Broader Community

- **Enhancing social service's effectiveness by a better therapeutic outcome through an encouragement of caseworkers to attempt narrative therapy**

  Upon the completion of the training in this project, the trained social workers are able to adopt the theory and practice of narrative therapy at work. Apart from handling young drug users' problems, they reported to use narrative therapy skills in other situations, such as family relations problems, inter-personal problems and vocational problems. The outcomes are very satisfactory.

- **Arousing stakeholders' awareness of the needs and the real life situation of youths-at-risk**

  The young people's narrative journeys were published in a Chinese book titled《走出毒品陰霾的敘事》and their life stories and incidents of the characters were documented in a 30-minute video. These materials become an effective tool and medium for future trainings. The books were printed and distributed at social service organisations, district councils and schools in order to address the concerns of the general public towards adolescent drug use. It may tackle the bias and prejudices towards these young people as well.

- **Providing a reference model and sustainable encouragement, attempts of applying narrative therapy in other social service fields**

  The narrative therapy can also be applied to other social service areas. The Guangzhou Growth Dynamics Social Work Professional Development & Resource Centre of BGCA had adopted the same narrative model in their pioneered programme for dispersed orphans. The results were satisfactory and rewarding, according to the comments from the responsible organisation.

In a five-year pilot programme named "Career and Life Adventure Planning Programme for Youth", which was funded by a HK$500 million donation from the Hong Kong Jockey Club Charities Trust, social workers of the BGCA have used the project as a reference and adopted the narrative therapy as one of the work approaches in carrying out career and life planning for young participants who are non-engaged, at-risk and early drop-outs from school. The project is one of five successful applications and will be implemented in one of five districts in Hong Kong in the near future.

References to the Corroboration of Impact or Benefit

1. The Department of Social Work/Centre for Youth Research and Practice of the Hong Kong Baptist University received invitations from different organisations, including the Social Welfare Department, the Hong Kong Federation of Youth Groups, the Spastics Association of Hong Kong, and the Yang Youth Division of Memorial Methodist Social Service, to provide narrative therapy training and consultancy services.
2. A Chinese book titled《走出毒品陰霾的敘事》 *(A narrative journey with young people who are using drugs)* was published.
3. A 30-minute video clip documented how the narrative therapy session presents alternative views toward drug use was made for corroboration purpose.
4. Statements of support from the following parties were given for corroboration purpose:
    - Ms Lilian LAW Suk-kwan, JP, Executive Director of the Boy's and Girl's Clubs Association of Hong Kong
    - Ms Cecily MA Yeuk-nung, Supervisor (Sham Shui Po) of the Boys' and Girls' Clubs Association of Hong Kong
    - MA C. Y. , Service user
5. An open seminar, co-organised with the BGCA was held in March 2014. A sharing session organised by the social workers and the publication of the Chinese book were reported by local newspapers and online media.

KTP Project Title: Building Learning Community through a Transdisciplinary Multi-layered Approach

Principal Investigator: Prof Atara SIVAN,
Department of Education Studies

Project Team: Prof Vicky TAM Chiu-wan[1], Mr Eugene TAM[1], Mr Michael HO[1], Prof Petrus NG Yat-nam[2], Dr Esther CHO Yin-nei[2], Mr John NG Siu-hung[2], Dr KWAN Yee-wan[2], Dr Odalia WONG Ming-hung[3], Dr Louie LOBO Hung-tak[4]

1 Department of Education Studies
2 Department of Social Work
3 Department of Sociology
4 Department of Physical Education

External Partners: Hong Kong Sheng Kung Hui Welfare Council Limited, Kowloon City Baptist Church Neighbourhood Elderly Centre and Lee Kau Yan Memorial School

Summary

This is a social impact case. Through extensive community engagement and research on transdisciplinary multi-layered approach over the years, Prof Sivan of the Department of Education Studies has successfully established a platform for knowledge transfer of different generations and community sectors, whole person development, engagement in civic/community service as well as expansion of transdisciplinary collaboration and mutual understanding and learning from one another.

The project aimed at establishing a Community of Practice (CoP) consisting of academics and professionals, Social Sciences students, elderly community members and secondary school students. Using a transdisciplinary three-layered approach, participants at each layer were empowered to engage problems and issues, and work collaboratively to bring about changes and improvement to the community. One emphasis was put on social aspects of community development and team work. The learning community infused academic and professional knowledge while integrating it with practices and connecting with the society. These elements brought together created the synergy to provide the best opportunities for successful contribution to the society. In the project, elderly sector was chosen to be the pilot project. Prof Sivan was also invited as the keynote speaker for more than 20 international conferences and was recognised for her scholarly contribution by being a recipient of several international prestigious awards including the Hillel Ruskin Memorial Scholar Lecture Award and the George Torkildsen Literary Award. Besides, Prof Sivan was awarded the HKBU Knowledge Transfer Award 2015.

Underpinning Research
(please refer to P.8 for details)

Details of Impact or Benefit
(please refer to P.11 for details)

References to the Research
(please refer to P.9 for details)

References to the Corroboration of Impact or Benefit
(please refer to P.12 for details)

KTP Project Title: Greener Living - Micro Urban Farming and Turning Waste into Resource

Principal Investigator: Dr Daisy TAM Dic-sze, Department of Humanities and Creative Writing

External Partners: Time to Grow Company Limited and Feeding Hong Kong

Summary

This is a social impact case. Led by Dr Tam, the "Micro-urban farming community in Hong Kong" project aimed at promoting micro-urban farming as a holistic way of addressing issues of food security and eating. It instigated and demonstrated how to achieve greener, healthier, more conscious and sustainable ways of life. By adapting waste materials to set up micro-urban farms in unused or underutilised spaces, the project served as a "facilitating initiative" showing that farming in city is possible and accessible to all.

The engagement process included the development of a sustainable vertical planting system by making use of underutilised space and waste materials. An eight-session workshop, co-organised with collaborating partners, relating to the practical skills of micro-urban farming was held. A compact booklet with an overview of issues like food security and farming know-how, a planter kit including seeds andsoil, and a start-up manual were distributed to the participants. By such, the project achieved remarkably positive impacts and penetrations with proven qualities and recognitions, as evidenced by the support of HKBU Faculty Research Grant Category I and General Research Grant, in transferring the research-based skills of micro-urban farming to the local community.

Underpinning Research

(please refer to P.13 for details)

References to the Research

(please refer to P.14 for details)

Details of Impact or Benefit

(please refer to P.15 for details)

References to the Corroboration of Impact or Benefit

(please refer to P.17 for details)

KTP Project Title: Effective Health Communication Using Narrative Animation

Principal Investigator: Dr Kelvin LEE Kai-wah, Academy of Film

Co-investigator: Dr Timothy FUNG Kai-fung, Department of Communication Studies

External Partner: Renal Companion Association

Summary

This is a social and public health impact case. Engaging with Dr KAM Man-fa, a specialist in nephrology, and Dr Fung from the Department of Communication Studies, Dr Lee developed a nine-minute animation illustrating the basic knowledge that can lower the risk of life-threatening infection for the patients with end-stage renal failure during the peritoneal dialysis (PD) exchange. This pioneer project between health communication and media production aimed at promoting the effective health communications for patients with renal disease.

In general, this project generated huge implications for health communication campaigns since the narrative animation produced have been used for diversified health issues, from encouraging people to seek early diagnosis to addressing sensitive issues to survivorship. The narrative animation is now available *(https://www.youtube.com/watch?v=DiRQ6L6KINk)* as a reference for patients, their families and caretakers. Furthermore, the animation has been shown to the patients through the channel of seven renal patient supporting groups.

Underpinning Research

(please refer to P.18 for details)

References to the Research

(please refer to P.19 for details)

Details of Impact or Benefit

(please refer to P.20 for details)

References to the Corroboration of Impact or Benefit

(please refer to P.22 for details)

Project Title:	Narrative Journey with Young Persons Who Are Taking Drugs
Principal Investigator:	Dr Angela TSUN On-kee, Department of Social Work
Co-investigator:	Dr Sharon LEUNG Shui-king, Department of Social Work
External Partner:	Sham Shui Po District Youth Outreaching Social Work Team of the Boys' and Girls' Clubs Association of Hong Kong (BGCA)

Summary

This is a social impact case. Through extensive community engagement and multidisciplinary research, Dr Tsun cooperated with the youth outreaching social work team of the BGCA and targeted its services at the adolescent drug users aged 16 and under in Hong Kong by adopting narrative therapy. The project also addressed common issue about relapsing into drug use after treatment.

A team of 12 social workers from the BGCA was trained with transforming knowledge of narrative concepts. Treatments of acupuncture and traditional Chinese medicine were also applied to young drug users in the project. Their narrative journeys were published in a book and a 30-minute video was produced for training purpose. This project was considered highly beneficial to the community. Over 25 percent of the young participants decided to quit drug use after the therapy sessions. Based on the successful outcome of this seed project, the narrative therapy model has been further elaborated in another large-scale theme based project titled "Career and Life Adventure Planning Programme for Youth". It is expected to induce more impacts to the community.

Underpinning Research

(please refer to P.23 for details)

Details of Impact or Benefit

(please refer to P.24 for details)

References to the Research

(please refer to P.23 for details)

References to the Corroboration of Impact or Benefit

(please refer to P.26 for details)

List of Projects Winning KTP Grants in 2014-15

Project Title:	Easy992 – Emergency Call Mobile Application for Hearing-impaired Persons
Principal Investigator:	Dr LAM Ka-man, Department of Computer Science
External Partner:	Chinese YMCA of Hong Kong - Y's Men's Centre for the Deaf
Community Served:	Hearing-impaired persons in Hong Kong
Approved KTP Fund (in HK$):	100,000

Project Title:	A Model of Supportive Group: Promoting its Application to the Chinese Social Work
Principal Investigator:	Dr Shirley HUNG Suet-lin, Department of Social Work
External Partner:	The Boys' and Girls' Clubs Association of Hong Kong (BGCA)
Community Served:	Disadvantaged individuals/families
Approved KTP Fund (in HK$):	100,000

Project Title:	An Accessible Tibet: Through Pema Tseden's Films, Fiction and Translation
Principal Investigator:	Dr Jessica YEUNG Wai-yee, Department of English Language and Literature
Co-investigators:	Prof LO Kwai-cheung, Department of Humanities and Creative Writing; Dr LO Wai-luk, Academy of Film
External Partner:	Cinezen
Community Served:	Chinese minorities in society
Approved KTP Fund (in HK$):	100,000

Project Title:	A Narrative Journey with Parents Whose Children Have Special Educational Needs
Principal Investigator:	Dr Sharon LEUNG Shui-king, Department of Social Work
Co-investigator:	Dr Angela TSUN On-kee, Department of Social Work
External Partner:	The Boys' and Girls' Clubs Association of Hong Kong (BGCA)
Community Served:	Parents whose children have special educational needs
Approved KTP Fund (in HK$):	100,000

Project Title:	Transfer and Apply TCM Knowledge by Establishing Herbal Gardens in Schools
Principal Investigator:	Prof ZHANG Hong-qi, School of Chinese Medicine
Co-investigators:	Dr CHEN Hu-biao[1], Dr Kevin YUE Kin-man[1], Miss Edna CHAN Yi-yi[1], Mr CHEUNG Chun-hoi[1], Mr WEN Fang-cai[1], Dr Daisy TAM Dic-sze[2], Dr CHONG King[3] 1 School of Chinese Medicine 2 Department of Humanities and Creative Writing 3 Centre for Holistic Teaching and Learning
External Partner:	Hong Kong Baptist University Affiliated Wong Kam Fai Secondary and Primary School
Community Served:	HKBU School of Chinese Medicine students
Approved KTP Fund (in HK$):	100,000

Project Title:	Project for Supporting "Independent Enquiry Study" among Secondary School Students
Principal Investigator:	Prof Kara CHAN Ka-wah, Department of Communication Studies
External Partner:	Hong Kong Baptist University Affiliated School Wong Kam Fai Secondary and Primary School
Community Served:	Senior secondary students in Hong Kong
Approved KTP Fund (in HK$):	100,000

Project Title:	Application of Cognitive Behavioral Therapy for People with Mental Health Problem
Principal Investigator:	Dr Daniel YOUNG Kim-wan, Department of Social Work
External Partner:	The Bonfire World Charitable Fund (BWCF) Limited
Community Served:	People with mental health problems in Hong Kong
Approved KTP Fund (in HK$):	100,000

Project Title:	Chinese Medicine and Nephropathy Care
Principal Investigator:	Dr XU Min, School of Chinese Medicine
External Partners:	Hong Kong Association of Traditional Chinese Medicine, Hong Kong Registered Chinese Medicine Practitioners Association and Alliance for Renal Patients Mutual Help Association
Community Served:	Chinese medicine practitioners in Hong Kong
Approved KTP Fund (in HK$):	100,000

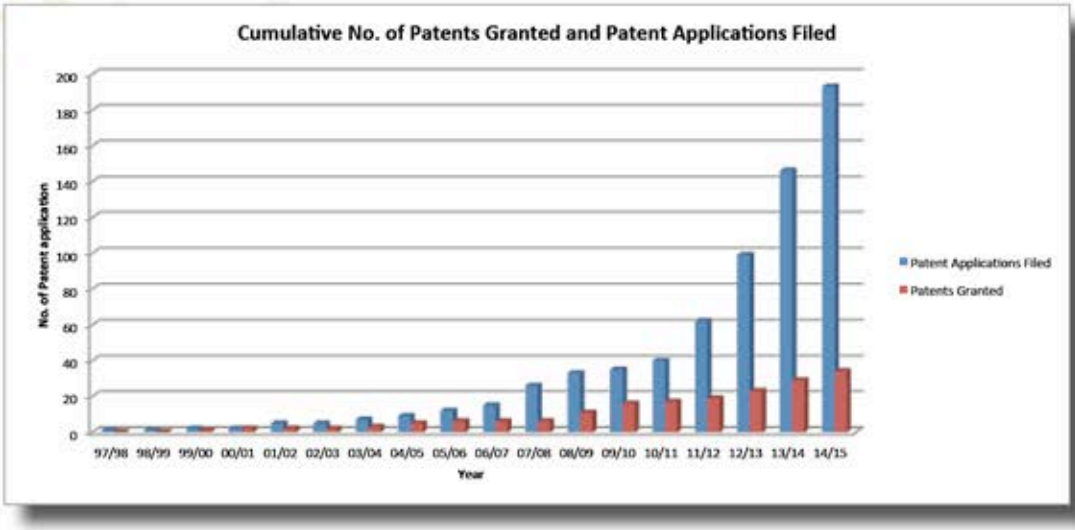
Project Title:	Promotion of Lifestyle Medicine in Hong Kong
Principal Investigator:	Prof ZHANG Hong-qi, School of Chinese Medicine
Co-investigator:	Dr DANG Yi, School of Chinese Medicine
External Partner:	Jockey Club CADENZA Hub
Community Served:	People with lifestyle-related health problems
Approved KTP Fund (in HK$):	100,000

Technology Transfer (TT)

In the academic year of 2014-15, Knowledge Transfer Office (KTO) has continued its efforts in TT by strengthening the partnerships with stakeholder groups of their disciplines, such as professionals, non-governmental organisations, and industries. Five Technology Start-up Support Scheme for Universities (TSSSU) and six Matching Proof-of-Concept Fund (MPCF) impact cases, showcasing high quality researches, have made significant contributions to different aspects of the society from economic, environment, social to public health. The TT projects covered diversified topics which included scaling up the fabrication process of ultra-high, anti-scratch film for portable devices, large OLED signage application by blade coating, new technologies for artwork and herb authentication, neurodegenerative diseases treatment by nano-based individualised neural stem cell replacements, personalised medicine and by Chinese medicine, identifying the pollutant by flow imaging technique and checking LED flicker that might seriously affect human's health.

HKBU R&D Licensing Limited, a subsidiary company responsible for commercialising the University's technologies, has become a subset of knowledge transfer as an integral part of the University's mission. In this reporting year, 13 patents have been licensed to five technology start-ups and among those, a five-month old company has won an investment funding from a venture capital company, which valued the company at about HK$50 million.

With the concerted efforts, the numbers of patent applications filed and granted at HKBU have been increasing since the academic year of 2010-11. The following chart presented the cumulative number of patent applications filed and grants at HKBU from 1997-98 to 2014-15.



Financial support from the University Grants Committee to knowledge transfer since 2009-10 and the Innovation and Technology Commission to TT and promotion of technologies start-ups since 2013-14 and 2014-15, respectively have definitely played an important role for this successful outcome.

In addition to HKBU newsletters and KTO website, video broadcast is also an effective medium to disseminate the University's knowledge to society. The videos available on the website of KTO *(http://kto.hkbu.edu.hk/eng/channel.php?channel=video)* and the HKBUtube *(http://hkbutube.lib.hkbu.edu.hk/hkbutube/index.php)* provide a channel to share the knowledge with the general public. A recent media coverage in an international publication, *QS News2WOWU (May 2015 issue)*, has given recognition to the biotechnological advancement at HKBU.

Looking ahead, the University will further develop its impact agenda and continue to encourage partnerships between Faculties and professionals, non-governmental organisations and industries. In addition, the University will enhance its support to students and faculty members in entrepreneurship.

Ir Dr Alfred TAN
Head of Knowledge Transfer Office
July, 2015

KT Awards 2015

The HKBU Innovationem Award

The HKBU Innovationem Award was established in 2014. It is sponsored by the University Grants Committee (UGC) Knowledge Transfer (KT) funding and the Innovation and Technology Fund by the Innovation and Technology Commission (ITC), and administered by the Knowledge Transfer Committee (KTC) via the Knowledge Transfer Office (KTO). This Most Promising Innovation of the Year Award is awarded to an innovation resulted from the research outcome of faculty at Hong Kong Baptist University (HKBU) for a given year, wherein said innovation is judged to be possessing the utmost innovative value along the criteria of:

- Providing leadership contributions in key economic, social, well-being or environmental areas in serving the community;
- Providing significant, sustainable, positive impact and/or fundamental change for betterment of the community;
- Providing exemplar contributions towards building the innovative strengths at HKBU; and
- Possessing the greatest potential to further raise HKBU's good reputation globally.

Winner of the Most Promising Innovation of the Year Award

Ultra-hard, Anti-scratch Thin Film

Person-in-charge:	Dr Lee Ka-suen
Project Team:	Prof CHEAH Kok-wai, Dr LI King-fai, Dr TAM Hoi-lam, Mr LAM Wing-yui, Department of Physics
Nominated by:	Prof Michel A. VAN HOVE, Chair Professor and Acting Head of Department of Physics
Name of Start-up:	Cathay Photonics Limited

Summary

This project brings a huge economic impact. Through the extensive industry engagement over the years, Prof Cheah is devoted to solving technical problems that hindered the advancement of technology and economic growth. Recently, he has led his research team to demonstrate how to bring excellent research to the business and industry sectors, as evidenced by the support of a grant from the Innovation and Technology Fund for his start-up and a venture capital investment as well as engagement for prototypes with a few major cover screen manufacturers internationally.

This five-month-old start-up namely "Cathay Photonics Limited" (CPL) has won a venture capital investment from Radiant Venture Capital Ltd., which valued the company at about HK$50 million. The mission of CPL is to deliver low-cost, high-throughput fabrication of ultra-hard sapphire crystal thin-film. The technology would be applied to cover glass of watches and electronic devices such as mobile phones, tablets and smartphones. The tremendous ascent of CPL has both excited and mystified many.

With strong outreach efforts through the media, Prof Cheah has engaged with a few major suppliers of cover screen. In the meantime, Prof Cheah and his team won the 2015 HKBU Innovationem Award on 9 June 2015 in recognition of this outstanding work.

Underpinning Research

In recent news, an Apple sapphire screen supplier filed for Chapter 11 in October 2014 after Apple introduced two new iPhone models, neither of which uses a sapphire screen. Although the CEO of the supplier emphasised that it was an unfounded rumour that these Apple smartphones would carry a sapphire screen, it would be more interesting to look into the background technologies instead of going through the details of the story. Sapphire is the second hardest natural materials known and is difficult to cut and polish. Growing single crystal sapphire is time consuming and technically very challenging for large size substrates (i.e. greater than six inches). So, the production yield of sapphire is fairly low due to two critical criteria in terms of feasibility and repeatability. Obviously, long fabrication time causes high production cost (i.e. higher than US$40 per screen), which is unrealistic and impractical for large commercial scale.

However, CPL has developed a patent pending technology for ultra-hard and anti-scratch sapphire thin-film coating, which is a turnkey solution for such cover screens. Compared to the existing technology, the merits of CPL's are lightweight, high hardness, low cost, high optical transmission and less processing time. Importantly, this technology can be adopted by the industry without further investment of new equipment and facilities. With the TSSSU funding support, CPL employed two full-time and one part-

time staff. Due to their excitement at such patent pending innovations, Radiant Venture Capital Ltd. invested in CPL bringing further business development expertise to the top class technology team at CPL.

References to the Research

Patent:

1. **Cheah K. W.**, Li K. F., Tam H. L., Lam W. Y. & Lee K. S. "Sapphire Thin Film Coated Substrate". US Patent 14/642,742, 9 March 2015.

Grants:

1. Name of TSSSU Technology Start-up: Cathay Photonics Limited (TSSSU/HKBU/14/05/1)

   Funding Scheme: Technology Start-up Support Scheme for Universities (TSSSU) 2014-15

   Source of Funding: Innovation and Technology Fund, Innovation and Technology Commission, the Government of the HKSAR

   Period: 2 December 2014 - 31 March 2015

   Amount Awarded: HK$1,000,000

2. Name of TSSSU Technology Start-up: Cathay Photonics Limited (TSSSU/HKBU/14/05/2)

   Funding Scheme: Technology Start-up Support Scheme for Universities (TSSSU) 2015-16

   Source of Funding: Innovation and Technology Fund, Innovation and Technology Commission, the Government of the HKSAR

   Period: 1 April 2015 - 31 March 2016

   Amount Awarded: HK$1,080,000

Media Coverage:

- On.cc (東網) (27 May 2015), 港澳版, 「浸大『鐵甲玻璃』可保輕觸顯示屏防刮花」.
- Wen Wei Po (文匯報) (28 May 2015), A28, 「『鐵甲玻璃』護手機 浸大料明年中應市 硬度媲美蘋果寶石屏幕 成本減半已申專利」.
- am730 (28 May 2015), A20, 「研創『鐵甲玻璃』浸大：唔怕鎖匙整花」.
- HKET(香港經濟日報) (28 May 2015), A16, 「浸大研發 超硬抗刮屏薄膜」.
- Sky Post (晴報) (28 May 2015), P02, 「浸大研『鐵甲玻璃』 防手機mon刮花」.
- The Sun (太陽報) (28 May 2015), A14, 「浸大研『鐵甲玻璃』薄膜抗刮力強」.
- Metro HK (都市日報) (28 May 2015), P08, 「浸大研發『鐵甲玻璃』媲美蘋果」.
- Sing Tao (星島日報) (28 May 2015), F02, 「浸大研抗刮薄膜 硬度媲美藍寶石玻璃 用於手機屏幕 成本一百以下」.
- Ming Pao (明報) (28 May 2015), A18, 「浸大研發夠硬夠平『鐵甲玻璃』盼進軍手機屏幕」.
- Apple Daily (蘋果日報) (28 May 2015), A15, 「蘋果生活：浸大研發成本平一半鐵甲薄膜硬如Apple藍寶石玻璃」.
- Oriental Daily (東方日報) (28 May 2015), A16, 「浸大『鐵甲玻璃』媲美蘋果屏幕」.
- Ta Kung Pao (大公報) (28 May 2015), A20, 「輕如鴻毛靈敏度高成本減半 浸大研防刮鐵甲觸屏」.

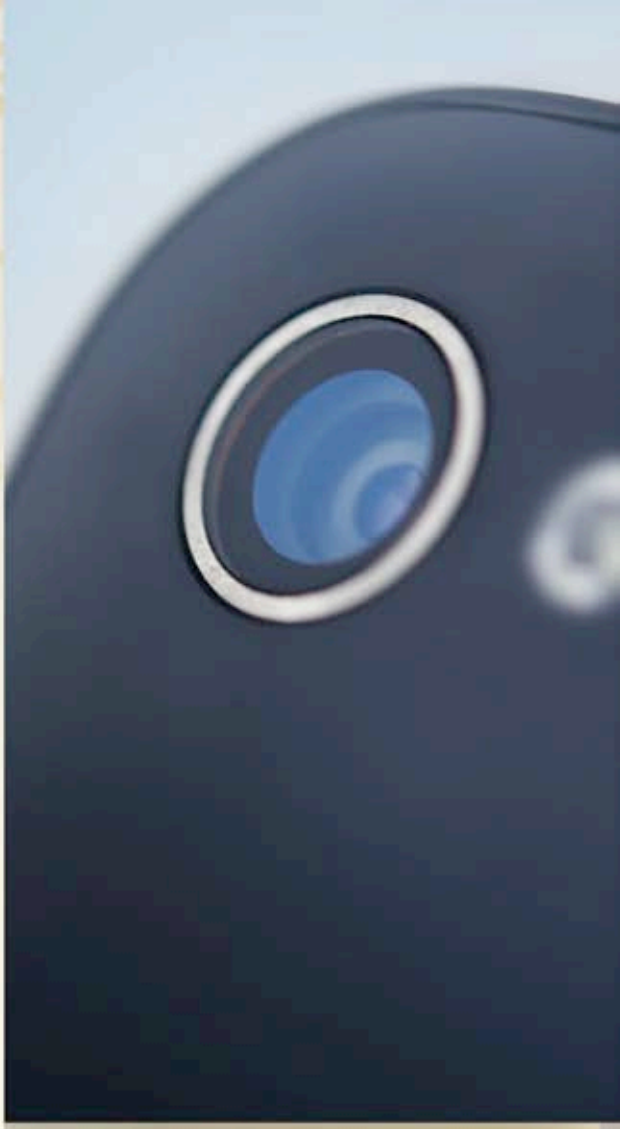
- Hong Kong Daily News (新報) (28 May 2015), A03, 「浸大『鐵甲玻璃』超薄防刮 百元有找 明年推出」.
- Headline (頭條日報) (28 May 2015), P06, 「比藍寶石屏幕平一半 浸大研防刮『鐵甲玻璃』」.
- Hong Kong Daily News (新報) (28 May 2015), M02, 「浸大製成超硬『鐵甲玻璃』」.
- Hong Kong Daily News (新報) (28 May 2015), A03, 「要平多過靚 未必渴求」.
- The Standard (英文虎報) (28 May 2015), P11, "Hard work pays off on scratch-resistant glass".

Details of Impact or Benefit

Currently, sapphire is actively considered as the most suitable natural material for the screen of smartphones and tablets. It is the second hardest material after diamond so using it as screen would mean the smartphone/tablet has a superior scratch and crack resistant screen. Sapphire screen has already been featured on iPhone 5S Touch ID scanner and camera lens on the rear of the phone. Vertu, the luxury smartphone manufacturer, is also developing sapphire screen. However, since sapphire is the second hardest material, it is difficult to be cut and polished. Coupled by the fact that the growth of a large size of single crystal sapphire is time consuming and costly, Apple Inc. limited to use such sapphire screen for Apple Watch only.

Current popular 'tough' screen material used is Gorilla Glass from Corning which is used in over 1.5 billion devices. Sapphire is in fact harder to be scratched than Gorilla Glass and this is verified by several institutes such as Centre for Advanced Ceramic Technology at Alfred University's Kazuo Inamori School of Engineering. On the Mohs scale of hardness, the newest Gorilla Glass only scores 6.5 Mohs which is below the Mohs value of mineral quartz such that Gorilla Glass is still easy to be scratched by sand and metals. Sapphire is the second hardest naturally occurring material on the planet, behind diamond which scores 10 on the Mohs scale of mineral hardness. This test matches one substance's ability to scratch another, so it is a better indicator of scratch resistance than shatter resistance.

Apart from being heavier, sapphire being the second hardest material is also difficult to be cut and polished. Growing single crystal sapphire is time consuming especially when the diameter size is large (> six inches), this is technically very challenging. Therefore the fabrication cost is high and fabrication time is long for sapphire screen. The objective of this technology is to provide fabrication means of sapphire screen materials that is quick to fabricate and low in cost while having the following advantages:



- harder than any hardened glass;
- lower possibility of fragmentation than pure sapphire screen;
- lighter than pure sapphire screen; and
- higher transparency than pure sapphire screen.

CPL recruited three staff including Chief Executive Officer, Technical/ QA Officer and part-time Administrative Officer to do the production trial run. The company is also an exemplar to share with the academic community and the community-at-large for the encouragement of more start-ups in Hong Kong. It is anticipated to create positive impacts to the society when more and more successful cases are built with the support of the local universities and the Government of the HKSAR.

Finalist of the HKBU Innovationem Award

Eight-channel Mechanical Cell Wounder for Cell Wounding Assay

Person-in-charge: Prof Ricky WONG Ngok-shun

Project Team: Dr YUE Ying-kit, Ms LEUNG Pui-ying, Prof MAK Nai-ki, Department of Biology

Name of Start-up: R&P Technology Limited

Summary

This project brings an impact on scientific research and development. In order to perform biological testing in a more efficient, reliable and effective way, Prof Wong and his team have developed a very user-friendly and highly reproducible device, which is currently marketed by the start-up, R&P Technology Limited *(http://www.rptech.com.hk/).*

The key feature of this patented device is its eight-channel mechanical wounder, which resolves various technical problems associated with the cell migration assay. In biological science, this assay is vital and carries a lot of information to the scientists for their understanding of the mechanism of cell's behaviours.

There are several advantages of this new device. Firstly, this wounder can be easily sterilised by autoclaving or with common disinfectants. Secondly, the individual adjustable pins allow even contacts on the surface of the cell culture plate so that sharp and reproducible wounds can be created. Thirdly, the guiding-bar on both sides of the wounder ensures consistent wounding position in each well. Lastly, the use of disposable plastic pipette tips for wounding can better handle the wounding process as well as minimise cross-contamination. In conclusion, this wounder can provide a large extent of flexibility on performing cell migration assay using 96-well culture plate.

Underpinning Research

Cell migration plays a key role in both normal physiological and pathological conditions. Cell wounding assay is commonly used to study cell migration and other biological processes, such as angiogenesis and tumour metastasis. In this assay, cells are grown to form a confluent monolayer and a mechanical injury (mechanical wound) through the scratching of the mechanical device. Then, those cells along the edge of the wound will migrate towards the denuded area. The closure of the denuded area can be observed, measured and quantified over a time course using microscopy or a computer imaging system; thus, the cell motility capability can be determined.

Cell wounding process is conventionally performed by using plastic pipette tip, syringe needle or razor blade. Since some of these devices are made of plastic, they can neither be sterilised by autoclave nor create a smooth and sharp wound edge on the cell monolayer. Besides, no cell wounder is completely compatible with different cell culture plates produced by different suppliers. The non-flexible design of conventional cell wounder cannot ensure a perfect contact with the surface of a multi-well plate, which makes it difficult to create smooth wound edge and even cause damages to the cell monolayer. Such discrepancies may affect the accuracy of image analysis as well as the consistency and repeatability of the experiment. Moreover, repeated use of same device during the experiment may result in cross contamination. Last but not least the current cell wounder can only be used for Petri dish or 384-well plate that causes constraints on real applications.

This newly invented cell wounder has incorporated different designs to resolve the above technical problems. It can be sterilized by autoclave, diluted blench, antiseptic and 70 percent alcohol. The individual adjustable pins allow even contacts with multi-well plate surface in order to produce identical,

smooth and sharp wounds on the cell monolayer. The adjustable guiding-bar ensures consistent wounding position in each well and is fit for various types of 96-well plates. The adjustable guiding bar and pins, together with the plastic pipette tip on each pin helps to protect against serious mechanical damages on the surface of cell culture plate. The disposable plastic pipette tips can further minimize the chance of cross-contamination. In short, this cell wounder can provide a large extent of flexibility on performing cell migration assay using 96-well culture plate.

With the help of this device, the usual cell migration assay can be performed in a high throughput manner in some general or small scale research laboratories. Since cell migration is one of the importance phenomena upon stress induction including drug treatment, the cell mobility will provide the scientists with a lot of information and insight into different fields of study such as neuroscience, pharmacology and oncology. The device is exceptionally useful for small scale operation or general research laboratories where advanced high throughput screening and imaging equipment is unavailable.

This simple mechanical cell wounder can greatly improve the work efficiency in small scale or general research laboratories. More accurate data can be obtained even without expensive or advanced equipment. It is believed that this device will become one of the basic tools for scientific research in future. This cell migration assay device has received 14 citations on Pubmed *(http://www.ncbi.nlm.nih.gov/pubmed/?term =A+Simplified+Method+for+Quantifying+Cell+Migration%2FWound+Healing+in+96-Well+Plates).*

References to the Research

Key Peer-reviewed Publications:

1. Yue P. Y. K., Leung E. P. Y., Mak N. K. & **Wong R. N. S.** (2010). A simplified method for quantifying cell migration/wound. *Journal of Biomolecular Screening*, 15(4), 427-433.

Patents:

1. Yue P. Y. K., Leung E. P. Y., Mak N. K. & **Wong R. N. S.** "Mechanical cell wounder device and related method". US Patent 11/888, 706, 2 August 2007.
2. Yue P. Y. K., Leung E. P. Y., Mak N. K. & **Wong R. N. S.** 「用於對細胞進行損傷處理的機械損傷器」. CN 200710127846.1, 3 July 2007.

Grants:

1. Name of TSSSU Technology Start-up: R&P Technology Limited (TSSSU/HKBU/14/01/1)

   Funding Scheme: Technology Start-up Support Scheme for Universities (TSSSU) 2014-15

   Source of Funding: Innovation and Technology Fund, Innovation and Technology Commission, the Government of the HKSAR

   Period: 2 December 2014 - 31 March 2015

   Amount Awarded: HK$450,000

2. Name of TSSSU Technology Start-up: R&P Technology Limited (TSSSU/HKBU/14/01/2)

   Funding Scheme: Technology Start-up Support Scheme for Universities (TSSSU) 2015-16

   Source of Funding: Innovation and Technology Fund, Innovation and Technology Commission, the Government of the HKSAR

   Period: 1 April 2015 - 31 March 2016

   Amount Awarded: HK$740,000

Details of Impact or Benefit

The vision of this start-up is to provide biomedical/ biotechnological research team with a unique, user-friendly and contamination-free device to perform analysis of cell motility in a simple, reproducible, semi-high throughput and cost-effective manner.

This patented wounder will potentially become a new standard for cell motility related studies. It is expected that the unique features will provide their customers the best end-to-end service with a possible solution for most technical issues relating to cell migration assays. This product is readily available in the market, and the assay is very reliable in view of biological studies. Hence, this would bring an impact on scientific research and development.

Finalist of the HKBU Innovationem Award

Development of Nano-based Individualised Neural Stem Cell Replacements and Personalised Medicine for Patients with Incurable Diseases

Person-in-charge: Dr Cathy LUI Nga-ping

Project Team: Prof Ken YUNG Kin-lam[1], Dr LI Hung-wing[2], Dr YANG Wang-gui[2], Ms WONG Yi[2], Dr Olivia NG[1], Dr Daniel KWONG Wei-jing[2], Prof Ricky WONG Man-shing[2], Dr HO See-lok[2], Dr TSUI Yat-ping[3], Prof CHAN Ying-shing[3], Prof SHUM Kwok-yan[3], Prof Edman TSANG Shik-chi[4]

1 Department of Biology, HKBU
2 Department of Chemistry, HKBU
3 LSK Faculty of Medicine, University of Hong Kong
4 Department of Chemistry, University of Oxford

Name of Start-up: OPER Technology Limited

Summary

This is a social, public health and economic impact case. Researchers from the Departments of Biology and Chemistry have made a major breakthrough in the development of innovative technologies in personalised and nanomaterial-based medicines for the treatment of neurodegenerative diseases.

Traditionally, there is no way to harvest neural stem cells from adult subjects. Researchers usually use embryotic stem cells from embryo. Although there is another technology called Induced Pluripotent Stem Cell technology or IPS technology, this IPS technology usually involves genetic engineering. Skin cells will be taken out from patients/donors and then their genes are modified to turning to be stem cells. One concern about this technology is to make use of "viral" vectors from virus, which is known as "pathogenic". Even though "pathogenic" vectors causing any disease from virus is not adopted, people still worry if the viruses might "immutate".

This is a pioneer group to harvest neural stem cells from the adult animals, manipulate the stem cells and transplant back into the same subject animal. After receiving the said treatment, all animals remain alive and healthy. This technique may cause significant implications in isolating individual patients' own neural stem cells for tailor-made treatments of their specific neurological problems in future stem cells therapy without the consideration of ethical issue. This patented technology in an early stage of development, may give exciting potentials in biological and clinical applications from bench to bed. Another patented technology is about the functional characteristics of carbazole-based fluorophores, which is blood brain barrier permeable, is able in imaging and treating Aβ peptides aggregation-associated diseases and preventing development and progression of said diseases. The use of carbazole-based fluorophores can be very safe due to extreme low toxicity and no radioactivity. Patents for both technologies are granted in the USA and now, the technologies are reached out to commercialisation through the technology start-up, media and website.

Underpinning Research

Loss of memory and cognitive functions are often associated with aging, which is the result of neurodegeneration. The restoration of the degenerating neurons becomes imperative for the treatment of the diseases. The current treatments are mainly for symptoms relief, not profound cure, and life-long process for patients.

Along with the increased awareness of health care in the world, the rapid growth of elderly population may give a great impact on society and the economic development. For example, in 2010, the global medical expense on the treatment of Alzheimer's disease was US$604 billion. The economic burden due to the huge medical costs as well as the indirect costs related to the social and family issues can be foreseen in the near future.

In recent years, several approaches aimed at inhibiting disease progression have advanced to clinical trials. Prof Yung's team used adult neural stem cells to develop and differentiate neurons and avoid ethical and genetic problems. Noteworthily, the present invention has been highlighted in NewScientist. Apart from stem cell therapy, strategies targeting the production and clearance of the Aβ peptide, which is thought to be a critical protein involved in the pathogenesis of the disease, are the most advanced. Currently, there is only one commercial available compound called Pittsburgh Compound-B that can provide imaging brain amyloid in Alzheimer's disease. However, this compound is radioactive.

A joint research team led by Prof Ricky Wong of the Department of Chemistry and Prof Ken Yung of the Department of Biology has been granted a US patent for their carbazole-based fluorophores that effectively locate Aβ peptides. Due to its binding affinity towards Aβ peptides concomitant with strong fluorescent enhancement, a novel functional carbazole-based fluorophores for imaging and inhibiting the aggregation of Aβ peptides is successfully demonstrated. More importantly, their carbazole-based fluorophores are non-radioactive. With this breakthrough, early detection of Alzheimer's disease can be achieved in a scientific way. It is the first step to preventing the progression of the disease, thereby improving the quality of life of patients and their families and preparing them for the future.

Led by Prof Yung, his technology start-up "OPER Technology Limited" (OPER), successively received two-year TSSSU grants supported by Innovation and Technology Fund and subsequently licensed the said technologies from HKBU, was established in November 2014. OPER aims to build up a larger portfolio in order to extend their research to other co-operators and bring them into clinics. OPER is currently run by five staff including CEO, Scientific Officer, Research and Administrative staff and its office is located in the Hong Kong Science Park.

References to the Research

Key Peer-reviewed Publications:

1. Yang W. G., Wong Y., Ng O. T. W., Bai L. P., Kwong D. W. J., Ke Y., Jiang Z. H., Li H. W., **Yung K. K. L.** & **Wong R. M. S.** (2012). Inhibition of beta-amyloid peptide aggregation by multifunctional carbazole-based fluorophores. *Angewandte Chemie International Edition*, 51, 1804 - 1810.
2. Lui C. N. P., Tsui Y. P., Ho A. S. L., Shum D. K. Y., Chan Y. S., Wu C. T., Li H. W., Tsang S. C. E. & **Yung K. K. L.** (2013). Neural stem cells harvested from live brains by antibody-conjugated magnetic nanoparticles. *Angewandte Chemie International Edition*, 52(47), 12298–12302.
3. Lui C. N. P. & **Yung K. K. L.** (2014). Real-time monitoring and harvesting of neural stem cells. *Faraday Discuss*, 2014, DOI: 10.1039/C4FD00132J.

Patents:

1. Yang W. G., Wong Y., Ng O. T. W., Li H. W., **Yung K. K. L.**, Kwong D. W. J. & **Wong R. M. S.** "Imaging Beta-Amyloid Peptides and Inhibition of Beta-Amyloid Peptide Aggregation". US Patent 13/447,127, 13 April 2012.

2. Yang W. G., Wong Y., Ng O. T. W., Li H. W., **Yung K. K. L.**, Kwong D. W. J. & **Wong R. M. S.** 「β 淀粉样肽的成像及 β 淀粉样肽的聚集的抑制」. China Patent 201210119357.2, 20 April 2012.
3. **Yung K. K. L.**, Li H. W., Lui N. P., Ho S. L., Tsui Y. P., Chan Y. S., Shum K. Y. & Tsang E. S. C. "Method of Extracting Neural Stem Cells Using Nanoparticles". US Patent 13/834,750, 15 March 2013.
4. **Yung K. K. L.**, Li H. W., Lui N. P., Ho S. L., Tsui Y. P., Chan. Y. S., Shum K. Y. & Tsang E. S. C. "Method of Extracting Neural Stem Cells Using Nanoparticles". PCT Patent WO 2014/075629 A1, 15 November 2013.
5. Yang W. G., Wong Y., Ng O. T. W., Li H. W., **Yung K. K. L.**, Kwong D. W. J. & **Wong R. M. S.** "Imaging Beta-Amyloid Peptides and Inhibition of Beta-Amyloid Peptide Aggregation". US Patent 14/231,715, 31 March 2014.
6. Yang W. G., Wong Y., Ng O. T. W., Li H. W., **Yung K. K. L.**, Kwong D. W. J. & **Wong R. M. S.** "Imaging Beta-Amyloid Peptides and Inhibition of Beta-Amyloid Peptide Aggregation". US Patent 14/231,724, 31 March 2014.
7. **Yung K. K. L.**, Li H. W., Lui N. P., Ho S. L., Tsui Y. P., Chan. Y. S., Shum K. Y. & Tsang E. S. C. "Method of Extracting Neural Stem Cells Using Nanoparticles". EP Patent 13855417.5, 24 March 2015.

Grants:

1. Project Title: In vivo extraction of neural stem cells in the brain using novel nanomaterials (MPCF-005-13/14)

   Funding Scheme: Matching Proof-of-Concept Fund 2013-14, UGC

   Period: 1 September 2013 - 31 August 2014

   Amount Awarded: HK$150,000
2. Name of TSSSU Technology Start-up: OPER Technology Limited (TSSSU/HKBU/14/03/1)

   Funding Scheme: Technology Start-up Support Scheme for Universities (TSSSU) 2014-15

   Source of Funding: Innovation and Technology Fund, Innovation and Technology Commission, the Government of the HKSAR

   Period: 2 December 2014 - 31 March 2015

   Amount Awarded: HK$1,100,000
3. Name of TSSSU Technology Start-up: OPER Technology Limited (TSSSU/HKBU/14/03/2)

   Funding Scheme: Technology Start-up Support Scheme for Universities (TSSSU) 2015-16

   Source of Funding: Innovation and Technology Fund, Innovation and Technology Commission, the Government of the HKSAR

   Period: 1 April 2015 - 31 March 2016

   Amount Awarded: HK$1,100,000

4. Project Title: Novel beta-amyloid aggregate inhibitors for Alzheimer's disease

   Principal Investigator: Prof Ricky WONG Man-shing

   Funding Scheme: Health and Medical Research Fund

   Period: 1 April 2014 - 31 March 2016

   Amount Awarded: HK$987,600

5. Project Title: A highly sensitive multiplex on-chip detection of peptides in cerebrospinal fluid as biomarkers for early diagnosis of Alzheimer's disease

   Principal Investigator: Dr LI Hung-wing

   Funding Scheme: Innovation and Technology Fund, Innovation and Technology Commission, the Government of the HKSAR

   Period: 1 September 2014 – 28 February 2016

   Amount Awarded: HK$863,052

   Amount Sponsored by Bio-Gene Technology Ltd.: HK$97,520

Name and Year of the Awards:

1. Best Poster Award for the invention "Real-time monitoring and harvesting of neural stem cells" in Faraday Discussion (2014)

   Organisation and location for presenting the award:

   Physical Chemistry of Functionalised Biomedical Nanoparticles, Royal Society of Chemistry, UK

2. International Travel Award for the invention "In situ neural stem cell extraction in the brain using novel nanomaterials" in 2nd Taiwan International Congress of Parkinson's Disease and Movement Disorders

   Organisation and location for presenting the award:

   Taiwan Movement Disorder Society, Taiwan

References to the Corroboration of Impact and Benefit

- To expand the reach of stem cell technology to public, a short video titled "APAC Innovation Summit 2014 – Highlight 4" was arranged to broadcast on Roadshow TV in 1,600 buses in Hong Kong. The video was also uploaded on Youtube *(https://www.youtube.com/watch?v=3e9xjDTGi8M)*. The coverage of the feature project started at 0:31.
- A video introducing the stem cell technology and correlation of neurodegenerative diseases is also available *(http://kto.hkbu.edu.hk/files/file/StemCell.mp4)* at the KTO website.
- The press release "More research needed on HK$5b bid to boost R&D", with the subtitled "Academics tell of the challenges involved in getting breakthrough work to market", was covered by the media.

Details of Impact or Benefit

OPER was set up to develop and improve the use of this innovative technology in nanomaterial-based individualised stem cell therapy - a personalised medical treatment that is effective, inexpensive, precise, with real-time monitoring and globally available. It helps to improve the healthcare and clinical practices for restoring health and extending life of patients with incurable diseases.

This new core technology is a real-time monitored nano-surgery that enables specific cell harvest in complicated systems, cell engineering and specific drug delivery to specific cells in the body. The target recipients of this technology are: patients with neurological diseases, cancer patients undergoing the treatment of nano-surgery, research laboratories and medical research institutes around the world. OPER will continue to commit on medical technology advancement and to inspire counterparts with innovative medical technology solutions.

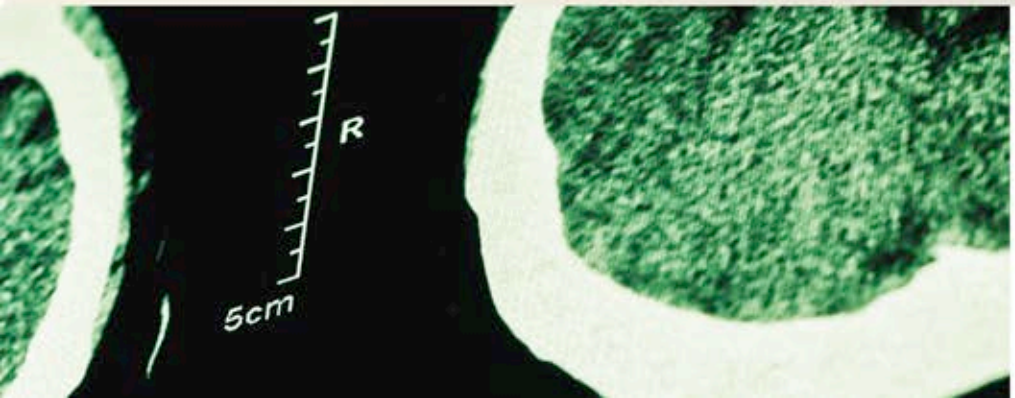
OPER's two core businesses:

1. The first core business is the technology of personalised neural stem cell harvesting. This technology will form a basis for personalised neural stem cell therapy for patients with neurological diseases upon regulatory bodies' approval for clinical applications.

2. The second core business is the development of technology in nanomaterials and small molecules that can be used for a wide range of applications including real-time monitoring, MRI imaging, drug research and cell engineering. These products will be produced under the supervision of the expert team. It is anticipated that many of them will be used in approved clinical applications and in both animal/cell application researches in which regulatory bodies' approvals are unnecessary/minimal compared with clinical applications.

OPER has recruited five staff including CEO, Scientific Officer, Research and Administrative staff since established. In November 2014, the company was approved to join a four-year incubation programme with financial aid offered by Hong Kong Science and Technology Parks Corporation. The technology incubation programme provides a valuable international platform to gain potential investors/entrepreneurs and marketing support.

In the short run, OPER may encourage and support the development of technopreneurship. In the long run, with the support from all promising findings and the feasible clinical applications that to better tackle the problems associated with neurological diseases. It is strongly believed that the technology will have significant impacts to the community.



Please scan the QR Code below to watch our Introductory Video!

Finalist of the HKBU Innovationem Award

Modified Huanglian-Jie-Du Tang for Treating Neurodegenerative Diseases

Project Team: Prof LI Min, Dr DURAIRAJAN Siva-sundara-kumar, Ms CHEN Lei-lei, Mr LIU Liang-feng, Dr SONG Ju-xian, School of Chinese Medicine

Project Awarded Fund: HK$150,000

Technology Area: Biotechnology

Summary

This is a social and public health impact case. Prof Li has rich experience and fruitful results in the study of neurological degenerative brain diseases, including Alzheimer's and Parkinson's diseases. With 30-year of clinical experience, Prof Li's research does not limit to the theories of traditional Chinese medicine (TCM). Apart from studying bioactive compounds in herbs, she conducts in-depth research on conventional formulations by means of recombination and verification. Eventually, a breakthrough has been made.

Prof Li and her team have modified a traditional Chinese medicine formula called Huanglian-Jie-Du Tang (HLJDT or 黃連解毒湯) by removing a particular herb and have successfully demonstrated that it would significantly decrease the generation of β-amyloid (Aβ) and also clear the accumulation of certain proteins, which is the root cause of Alzheimer's disease. A video about this project is available on the KTO website *(http://kto.hkbu.edu.hk/eng/channel.php?channel=video)* to enrich people's understanding of the impact of this research.

In January 2015, a donation of HK$5 million was received to establish a research centre at HKBU to support her research study on potential new TCM. Besides, Prof Li and her team have engaged with a local pharmaceutical company to co-develop herbal supplements aiming at neuron protection from damage caused by aging.

Underpinning Research

TCM has a long and profound history and there has been a board range of combination in its prescription and application. Since ancient times, TCM has been widely used, for example, HLJDT was first mentioned in "Waitai Miyao" in the Tang Dynasty. It consists of Rhizoma Coptidis (黃連), Cortex Phellodendri (黃柏), Radix Scutellariae (黃芩) and Fructus Gardenia (梔子). HLJDT commonly treats excess heat and toxins inside the body. It is also adopted by the medical professionals in Japan. Nowadays, the advancement in technology and equipment allows integration and innovative growth of some well-known Chinese herbs.

In recent years, literature shows that HLJDT has significant effects on anti-inflammation, anti-cerebral ischemia, anti-tumour, reducing blood lipids, mitigating liver damage, etc. Its clinical studies of the last century mainly focused on the field of cerebrovascular disease and mental illness. After entering the 21st century, HLJDT has already been used for the treatment of various diseases.

Prof Li and her research team have transformed and improved the prescription of HLJDT. Her modified formulation has given more significant therapeutic and pharmacological effects on Alzheimer's disease with extremely low side effect while comparing to the conventional formulation. The next goal is to extract several major monomers in the formulation and create a new drug with molecular size for the treatment of Alzheimer's disease through the investigation of molecular interactions.

To recognise her outstanding research work in the treatment of neurodegenerative diseases, Prof Li received HK$5 million donations from Mr and Mrs KO Chi-ming to set up a research centre. It aims to promote Chinese medicine in clinical studies, pharmacology studies and new drug development. In the near future, it is believed that an effective, safe and new Chinese medical formulation would be developed to help the patients and their families.

References to the Research

Key Peer-reviewed Publications:

1. **Durairajan S. S. K.**, Huang Y. Y., Zhang Y., Chen L. L., Liu L. F., Song J. X. & **Li M.** (2014). Differential Effects of Huanglian-Jie-Du-Tang and Its Modified Formula on the Modulation of β-Amyloid Precursor Protein Processing in Alzheimer's Disease Models. *PLoS ONE* - International Alzheimer's Disease Conference, Hong Kong, 6-7 June 2014. (Invited speaker).

2. **Durairajan S. S. K.**, Huang Y. Y., Yuen P. Y., Chen L. L., Kwok K. Y., Liu L. F., Song J. X., Han Q. B., Xue L., Chung S. K., Huang J. D., Baum L., Senapati S. & **Li M.** (2014). Effects of Huanglian-Jie-Du-Tang and its modified formula on the modulation of amyloid-beta precursor protein processing in Alzheimer's disease models. *PLoS ONE*, 3(9), e92954.

3. **Durairajan S. S. K.**, Liu L. F., Lu J. H., Chen L. L., Yuan Q. J., Chung S. K., Huang L., Li X. S., Huang J. D. & **Li M.** (2012). Berberine ameliorates beta-amyloid pathology, gliosis and cognitive impairment in an Alzheimer's disease transgenic mouse model. *Neurobiology Aging*, 33, 2903-2919.

4. Kwok K. Y., Xu J., Ho H. M., Chen H. B., **Li M.**, Lang Y. & Han Q. B. (2013). Quality evaluation of commercial Huang-Lian-Jie-Du-Tang based on simultaneous determination of fourteen major chemical constituents using high performance liquid chromatography. *Journal of Pharmaceutical and Biomedical Analysis*, 85, 239-244.

5. **Duriarajan S. S. K.**, Liu L. F., Lu J. H., Koo I., Chung S. K., Maruyama K., Huang J. D. & **Li M.** (2011). Berberine inhibits abeta production, plaque formation, gliosis and cognitive deterioration in a transgenic mouse model of Alzheimer's disease. *Neurodegenerative Diseases*, 8(1), 1.

6. Lu J. H., Ardah M. T., **Duriarajan S. S. K.**, Liu L. F., Xie L. X., Fong W. F., Hasan M. Y., Huang J. D., El-Agnaf O. M. A. & **Li M.** (2011). Baicalein inhibits formation of alpha-synuclein oligomers within living cells and prevents Aβ peptide fibrillation and oligomerization. *ChemBioChem*, 12, 615-624.

Patents:

1. **Li M.**, **Durairajan S. S. K.**, Chen L. L., Liu L. F. & Song J. X. "Composition comprising Rhizoma Coptidis, Cortex Pellodendri and Fructus Gardeniae and For Treating Neurodegenerative Diseases". US Patent 14/303,622, 13 June 2014.

2. **Li M.**, **Durairajan S. S. K.**, Chen L. L., Liu L. F. & Song J. X. 「包含黃連、黃柏以及梔子並且用於治療神經變性疾病的組合物」. CN Patent 201410265207.1, 13 June 2014.

3. **Li M.**, **Durairajan S. S. K.**, Chen L. L., Liu L. F. & Song J. X. 「包含黃連、黃柏以及梔子並且用於治療神經變性疾病的組合物」. HK Patent 15100686.2, 21 January 2015.

Grant:

1. Project Title: An in vivo investigation of the therapeutic effects of modified Huanglian-Jie-Du Tang and its combination with a western drug memantine

   Funding Scheme: Human Medical Research Fund (HMRF)

   Source of Funding: Research Fund Secretariat, Food and Health Bureau, the Government of the HKSAR

   Period: 5 February 2014 - 4 February 2016

   Amount Awarded: HK$904,000

Donation:

1. Name: Mr & Mrs KO Chi-ming Centre for Parkinson's Disease Research

   Amount Received: HK$5,000,000

Details of Impact or Benefit

Alzheimer's disease is a common neurodegenerative disease, characterised by the appearance of Aβ plaques and abnormal Tau-associated neurofibrillary tangles. Currently, there is no drug that can effectively delay and reverse this neurodegeneration.

Based on significant therapeutic and pharmacological effects of the modified formulation of HLJDT in the treatment of neurodegenerative diseases, the research focused on the optimisation of the modified HLJDT by its combination of Danshen (Radix Salviae Miltiorrhizae) and Yanhusuo (Rhizoma Corydalis) [hereafter termed as NeuroDefend]. Prof Li's research team found that components of NeuroDefend can reduce Aβ and Tau pathology in the mouse model of Alzheimer disease. Since Alzheimer's disease is a multifactorial disease with multiple pathogenetic mechanisms, it is believed that NeuroDefend targeting several sites would be more effective than the modified HLJDT. The success of this project could result in the commercialisation of NeuroDefend and substantiate its clinical study.

Having considered the neuroprotective potential of HLJDT for the treatment of Alzheimer's disease, Prof Li's team received the HMRF grant funded by the Food and Health Bureau of the Government of the HKSAR to support her research on the vivo investigation of NeuroDefend and the therapeutic effects as well as its combination with a western drug memantine. It is expected that the outcome of this research project can be useful for the future drug development and clinical trial on neurodegenerative diseases.

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Finalist of the HKBU Innovationem Award

A Quality Control Marker and its Use in Herbs Authentication

Project Team: Dr HAN Quan-bin, Dr CHEN Hu-biao, Mr XU Jun, School of Chinese Medicine

Project Awarded Fund: HK$150,000

Technology Area: Testing and Certificate

Summary

This project brings impacts on economy and society. Dr Han and his research team have pioneered the use of high performance gel permeation chromatography (HPGPC) for the identification of some specific quality control (QC) markers in the authentication of *Dendrobium officinale* Kimura et Migo, which is well-known as an expensive Chinese medicine under the name of Tiepi Shihu (鐵皮石斛). This technology is novel, inventive and not being adopted by the industries for both qualitative and quantitative authentication of herbal materials. The research team has been granted the patent of this technology and Dr Han is now a consultant for the development of the herbal tea products based on this patented technology.

Underpinning Research

Dendrobium is one of the largest genera in the plant family Orchidaceae. More than 1,100 species of Dendrobium have been identified, with a wide distribution throughout Asia, Europe and Australia. Among them, Dendrobii Officinalis Caulis, called Tiepi Shihu in Chinese, which is derived from dried stems of *Dendrobium officinale* Kimura et Migo, is traditionally recognised as the best Shihu for tonic purpose, such as nourishing stomach, protecting throat and benefiting eyes. The stems of *Dendrobium officinale* are always heated and then twisted to a spiral or spring form followed by drying for sell in herbal markets and commonly known as Tiepi Fengdou. The uncharacteristic appearance and high price of Tiepi Fengdou could lead to the occurrence of the adulterants, confused speciesand counterfeits. Therefore, authentication and quality evaluation of Tiepi Fengdou is crucial for ensuring the safety and efficacy.

Currently, two methodologies are used for this purpose. One is the conventional method severely depends on the experience of botanical experts and subjective judgement while the other is based on DNA bio-coding, which is very expensive and time consuming. As known in the art, the existing methodologies are extremely intricate, difficult and time consuming, and therefore not suitable for routine quality control method development. More importantly, they are not able to indicate whether the active ingredients exist in the samples. Another kind of analytical method including small molecule fingerprint and sugar composition analysis has been tried for quality control of *Dendrobium officinale*. However, it failed to distinguish *Dendrobium officinale* from other Dendrobium species.

During the early work, Dr Han's team identified the uncommonly-seen high content of carbohydrates of *Dendrobium officinale*, together with the lack of technology for the authentication and quality evaluation of Tiepi Fengdou using HPGPC, the research team proceeded to develop a novel and rapid HPGPC-based method for quality control of saccharide-dominant herbal materials by simultaneously qualitative and quantitative characterisation of carbohydrate components.

The key of this technology is to provide low cost, efficient, stable and convenient with reduced uncertainties in the qualitative and quantitative evaluation of *Dendrobium officinale*. With the promising findings, Dr Han's team had a US patent granted and received a MPCF grant in 2014 to further develop QC kit for its

commercialisation, which includes the QC maker, HPGPC column, data analysis tool, user guideline and other accessories.

After successfully evaluating a few samples, Dr Han is being invited to provide consultancy services and help to optimise the growth conditions of *Dendrobium officinale* in order to get the best quality. This successfully demonstrates an impressive technology being adopted by commercial enterprise.

References to the Research

Key Peer-reviewed Publication:

1. Xu J., Li S. L., Yue R. Q., Ko C. H., Hu J. M., Liu J., Ho H. M., Yi T., Zhao Z. Z., Zhou J., Leung P. C., Chen H. B. & **Han Q. B.** (2014). A novel and rapid HPGPC-based strategy for quality control of saccharide-dominant herbal materials: *Dendrobium officinale*, a case study. *Analytical and Bioanalytical Chemistry*, 406, 6409-6417.

Patents:

1. **Han Q. B.**, Chen H. B. & Xu J. "A Quality Control Marker and Its Use in Herbs Authentication". US Patent 13/940,944, 12 July 2013.
2. **Han Q. B.**, Chen H. B. & Xu J. 「質控標誌物及其在中草藥鑒定中的應用」. CN 201410330544.4, 11 July 2014.

Grants:

1. Project Title: A Dendrobium QC marker and its use in quick efficient and low-cost herb authentication (MPCF-01-14/15)

   Funding Scheme: Matching Proof-of-Concept Fund 2014-15, UGC

   Period: 1 June 2014 - 30 November 2015

   Amount Awarded: HK$150,000

2. Project Title: Chemical structure elucidation of a polysaccharide marker of *Dendrobium officinale* (FRG2/14-15/028)

   Funding Scheme: Faculty Research Grant, Research Committee, HKBU

   Period: 1 May 2015 - 30 April 2016

   Amount Awarded: HK$127,500

Income:

Consultancy

1. Name: Lohas Tea House Limited

   Period: 1 March 2015 - 29 February 2016

Details of Impact or Benefit

Authentication of the expensive *Dendrobium officinale* materials remains a challenge without proper QC markers. Conventional methods such as DNA barcoding and microscopic identification involve time-consuming, complicated and high-cost operations, and yet fail to provide quantitative quality evaluation. High performance liquid chromatography (HPLC) fingerprinting is not practicable because *Dendrobium officinale* is rich in saccharides that account for up to 70 percent of the total weight. Besides, sugar composition analysis using enzyme/acid hydrolysis involves complicated sample preparation procedures and even cannot distinguish the authentic species from many other Dendrobium species.

Dr Han's team has successfully developed an innovative method for quality control of *Dendrobium officinale* based on qualitative and quantitative analysis of a unique polysaccharide marker. This new method, using a novel *Dendrobium officinale* polysaccharide marker, can not only differentiate the authentic species from other Dendrobium species, but also provide useful quality analysis of commercial *Dendrobium officinale* samples, in terms of low-cost, easy and high efficiency. This project aims to characterise the chemistry of the QC marker, finalise the user's guideline for this QC kit including the experimental protocol, and test its practicability using more Dendrobium samples. In fact, this technology has been proven to be applicable to the market, and its repeatability and reproducibility are satisfactory.

Matching Proof-of-Concept Fund Projects (MPCF)

At Hong Kong Baptist University (HKBU), a MPCF was set up by Knowledge Transfer Office (KTO) for intellectual property (IP) creators to identify a development path and an intellectual property rights (IPRs) strategy for innovative ideas arising from their research. This funding allows the IPRs created at the University to be brought to a pre-commercialisation stage where potential commercialisation opportunities can be identified. The MPCF operates on a three-dollar-to-one (3:1) cash-matching basis up to the maximum funding cap of HK$200,000 in total per project.

MPCF Project Title:

Modified Huanglian-Jie-Du Tang for Treating Neurodegenerative Diseases

Principal Investigator:	Dr DURAIRAJAN Siva-sundara-kumar, School of Chinese Medicine
Co-investigator:	Prof LI Min, School of Chinese Medicine
Project Awarded Fund:	HK$150,000
Technology Area:	Biotechnology

Summary

This is a social and general public health impact case. Prof Li has rich experience and fruitful results in the study of neurological degenerative brain diseases, including Alzheimer's and Parkinson's diseases. With 30-year of clinical experience, Prof Li's research does not limit to the theories of traditional Chinese medicine (TCM). Apart from studying bioactive compounds in herbs, she conducted in-depth research on conventional formulations by means of recombination and verification. Eventually, a breakthrough has been made.

Prof Li and her team have modified a traditional Chinese medicine formula called Huanglian-Jie-Du Tang (HLJDT or 黃連解毒湯) by removing a particular herb and have successfully demonstrated that it would significantly decrease the generation of Aβ and also clear the accumulation of certain proteins, which is the major root cause of Alzheimer's disease. A video about this project is available on the KTO website *(http://kto.hkbu.edu.hk/eng/channel.php?channel=video)* to enrich people's understanding of the impact of this research.

In January 2015, a donation of HK$5 million was received to establish a research centre at HKBU to further her research study on potential new TCM. Besides, Prof Li and her team have engaged with a local pharmaceutical company to co-develop herbal supplements aiming at neuron protection from damage caused by aging in Hong Kong.

Underpinning Research

(Please refer to P.48 for details)

References to the Research

(Please refer to P.49 for details)

Details of Impact or Benefit

(Please refer to P.50 for details)

MPCF Project Title:

A Quality Control Marker and Its Use in Herbs Authentication

Principal Investigator:	Dr HAN Quan-bin, School of Chinese Medicine
Co-investigator:	Dr CHEN Hu-biao, School of Chinese Medicine
Project Awarded Fund:	HK$150,000
Technology Area:	Biotechnology

Summary

This project brings an impact on economy and society. Dr Han and his research team have pioneered the use of high performance gel permeation chromatography (HPGPC) for the identification of some specific quality control (QC) markers in the authentication of *Dendrobium officinale* Kimura et Migo, which is well-known as an expensive Chinese medicine under the name of Tiepi Shihu (鐵皮石斛). This technology is novel, inventive and not being adopted by the industries for both qualitative and quantitative authentication of herbal materials. The research team has been granted the patent of this technology and Dr Han is now a consultant for the development of the herbal tea products based on this patented technology.

Underpinning Research

(Please refer to P.51 for details)

References to the Research

(Please refer to P.52 for details)

Details of Impact or Benefit

(Please refer to P.53 for details)

MPCF Project Title:

Development of a mTOR-independent Activator of TFEB for the Treatment of Neurodegenerative Diseases

Principal Investigator:	Prof LI Min, School of Chinese Medicine
Project Awarded Fund:	HK$150,000
Technology Area:	Biotechnology

Summary

This project has potential for making health and social impacts. Autophagy is a highly conserved homeostatic pathway by which cells transport damaged proteins and organelles to lysosomes for degradation. Prof Li's team is proactive in the identification and development of novel autophagy regulators derived from Chinese herbs for the prevention and treatment of neurodegenerative diseases, including Parkinson's disease (PD) and Alzheimer's disease (AD).

Prof Li and her research team focus on small molecule activator of transcription factor (TFEB), which is independent of mTOR inhibition. This TFEB is a master regulator of autophagy and lysosome biogenesis that is a very promising drug target for neuroprotection. It is believed that this invention would become a milestone in the history of drug development of the treatment for neurodegenerative diseases.

Prof Li and her research team presented the poster titled "A synthesized curcumin derivative activates TFEB to promote autophagy and lysosome biogenesis and protect neurons independent of mTOR inhibition" and won the Best Poster Award at the 7th International Symposium on Autophagy held on 19 - 23 March 2015 in Huangshan, China. This was one of the best two posters selected from about 100 entries. This award testified their good work at the international advanced level.

Underpinning Research

Dysfunction in the autophagy-lysosome pathway (ALP) is directly linked to neurodegenerative disorders. The TFEB is identified as a master regulator of ALP and TFEB activation promotes the clearance of toxic protein aggregated in neurodegenerative diseases including PD and AD. Drugs directly targeting TFEB hold great promise for the development of efficient neuroprotective therapies.

Prof Li's research team has identified small molecule activator of TFEB from Chinese herbs, which is independent of mTOR inhibition. From the scientific point of view, this finding would step up the development of new drugs for the treatment for neurodegenerative diseases. Recently, Prof Li's team has received the award in recognition of their outstanding research in the field of autophagy, neurodegenerative diseases and drug discovery.

References to the Research

1. Zeng Y., Song J. X., Liu L. F., Chen L. L., Lu J. H., Huang Y. Y., Duriarajan, S. S. K., Zhang H. Q. & **Li M.** (2014). "Synthesized curcumin derivatives induce neuronal autophagy via mTOR/TFEB pathway and promote alpha-synuclein (SNCA) degradation". Poster presentation at Keystone Symposia on Autophagy: Fundamentals to Disease (E2), Hyatt Regency Austin, Austin, Texas, USA, 23-28 May 2014.
2. Song J. X., Zeng Y., Yu X., Liu L. F., Lu J. H., Huang Y. Y., Wang M. Z., Chen L. L., Durairajan S. S. K. & **Li M.** (2015). "A synthesized curcumin derivative activates TFEB to promote autophagy and lysosome biogenesis and protect neurons independent of MTOR inhibition". Poster presentation at the 7th

International Symposium on Autophagy (7th ISA), Huangshan, China, 19-23 March 2015 (The Best Poster Award).

Patents:

1. **Li M.**, Song J. X., Zhen Y. & Liu L. F. "A mTOR-independent activator of TFEB for autophagy enhancement and uses thereof". US Patent 14/609,438, 30 January 2015.
2. **Li M.**, Song J. X., Zhen Y. & Liu L. F. "A mTOR-independent activator of TFEB for autophagy enhancement and uses thereof". PTC Patent PCT/CN2015/073764, 6 March 2015.

Grant:

1. Project Title: Development of a mTOR-independent activator of TFEB for the treatment of neurodegenerative diseases (MPCF-008-14/15)

   Funding Scheme: Matching Proof-of-Concept Fund 2014-15, UGC

   Period: 1 May 2014 - 31 July 2015

   Amount Awarded: HK$150,000

Donation:

1. Name: Mr & Mrs KO Chi-ming Centre for Parkinson's Disease Research
   Amount Received: HK$5,000,000

Award:

1. Title: A synthesized curcumin derivative activates TFEB to promote autophagy and lysosome biogenesis and protect neurons independent of mTOR inhibition (Best Poster Award).

   Organisation and location for presenting the award:

   The 7th International Symposium on Autophagy, Huangshan, China.

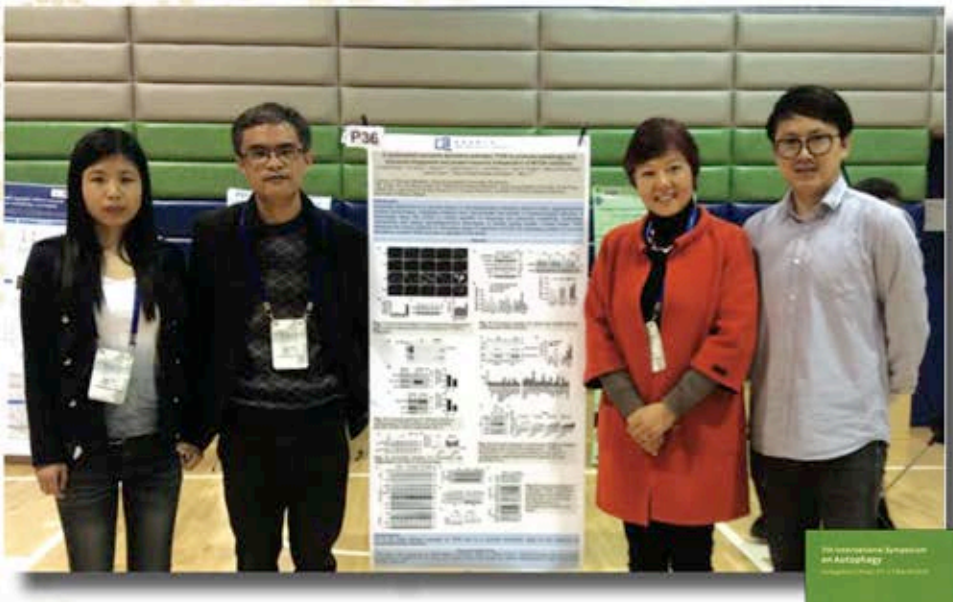


Photo caption: Prof Li Min (second from right) with the three members in her research team, Ms CHEN Lei-lei (left), Dr SONG Ju-xian (second from left) and Mr LIU Liang-feng (right), from SCM of HKBU, received the Best Poster Award at the 7th International Symposium on Autophagy.

Details of Impact or Benefit

Dysfunction in the ALP has been directly linked to neurodegenerative disorders. Recently, the TFEB has been identified as a master regulator of ALP. TFEB transgene to increase TFEB expression, or small molecules aimed to stimulate nuclear translocation of endogenous TFEB promotes the clearance of toxic protein aggregates, thus providing a disease-modifying intervention for neurodegenerative disorders such as PD, AD and Huntington's disease (HD). Current mTOR inhibitors, such as rapamycin and temsirolimus, activate TFEB by promoting TFEB translocation. However, their pharmacokinetic profile and side effects make them less likely to be useful for long-term use in patients with neurodegenerative diseases. Drugs directly targeting TFEB hold great promise for the development of efficient neuroprotective therapies.

The project team has relevant research background and experience in the areas of autophagy and neuroprotection. Previously, they identified several neuronal autophagy enhancers for herbal medicines. Given the essential role of TFEB in autophagy and lysosome biogenesis, they screened a series of synthesized curcumin analogs, hoping to find potent autophagy enhancers which target TFEB and protect neurons.

AD and PD are two of the most prevalent neurodegenerative diseases in the world. The prevalence of AD for those aged over 60 is ranging from five to seven percent worldwide. It was estimated that 35.6 million people lived with dementia worldwide in 2010, with numbers expected to almost double every 20 years, to 65.7 million in 2030. For PD, there are about 10 million patients worldwide, whereas 6 million patients are in China. Current treatments for AD and PD are symptomatic and with serious complications. The ever-growing number of patients afflicted by AD and PD triggers the development of new drugs by many of the big pharmaceutical companies. Once a drug with disease-modifying efficacy is developed, the market would be enormous.

MPCF Project Title:

Blade Coating for Large Area OLED Fabrication for Signage Application

Principal Investigator:	Prof CHEAH Kok-wai, Department of Physics
Co-investigator:	Dr TAM Ho-lam, Department of Physics
Project Awarded Fund:	HK$150,000
Technology Area:	Display and Lighting Technologies

Summary

This project has potential for making economic and environmental impacts. Large area organic light-emitting diode (OLED) is highly desirable for signage, lighting and decoration applications. The large emissive area will negate the necessity of cumbersome and expensive lighting accessories and fixtures such as optical lens. To enable the adoption of OLED in these applications, the fabrication cost has to be reduced and the panel size has to be increased in the meanwhile. To address this issue, solution processing is a feasible approach.

So far, only simple single layer structure has been demonstrated by this process due to the dissolution problem in the multilayer system. Since multilayer OLED has already been proven to have superior device performance, single layer device has placed a severe bottleneck in performance. To encounter this problem, Prof Cheah and his research team have figured out a more economical and scalable process to fabricate large area OLED. Nominated by colleagues and fellows, Prof Cheah was honoured by the conferment of the Fellowship of the Institute of Physics in the UK in 2013 in recognition of his contribution to education and research.

Based on the basic blade coating process being well established by Prof Cheah's team through the support of MPCF, they received an innovation and technology fund (ITF) grant amounting HK$2,719,750, in which 10 percent of sponsorship received from two private companies, in August 2014 for further development of white OLED.

Underpinning Research

OLED technology has been widely used in display applications. From mobile phones to TVs, OLED has demonstrated superior colour saturation and fidelity compared to other conventional display technologies. OLED can also be used in lighting application and the active development for such application has been undertaken. Solution deposition methods generally have much higher material utilisation efficiency compared to vacuum deposition methods such as thermal evaporation, which utilise only about 20 percent of the materials each time. This is especially true for larger panel size as material utilisation efficiency of vacuum deposition methods considerably drops when the size of coating chamber increases. However, solution processed deposition method has a limit to the number of organic layers. Stacking may cause inter-diffusion between the layers due to the solution incompatibility. Moreover, the solubility of many organic materials and their respective wettability on surfaces limit the number of application as they are originally not designed for solution processing. This has placed a stringent design limitation on the choice of materials to build the structure of device. Consequently, the performance of solution processed OLED is adversely affected.

Prof Cheah and his team have developed a more economical and scalable process to fabricate large area OLED to tackle this problem. Four-inch panel for three primary colour OLEDs has been demonstrated by using the solution process. With the success of this project, Prof Cheah received sponsorships from two companies to match with the ITF grant for further development. After the project finished, both companies have shown their interests in forming strategic partners on the system design and artistic aspect of OLED panels. Conclusively, this process will provide Hong Kong with a potential locally derived alternative lighting technology and also enforce the government policy on energy saving. Since it generates the least amount of hazardous waste, requires much less production energy when comparing to production method for other lighting devices, the project goes in line with the government initiatives.

Grants:

1. Project Title: Blade coating for large area OLED fabrication for signage application (MPCF-04-14/15)

   Funding Scheme: Matching Proof-of-Concept Fund 2014-15, UGC

   Period: 1 April 2014 - 31 March 2015

   Amount Awarded: HK$150,000

2. Project Title: Large area OLED for signage and lighting applications by blade coating process (ITS/182/14FP)

   Funding Scheme: Innovation and Technology Fund, Innovation and Technology Commission, the Goverment of the HKSAR

   Period: 15 August 2014 - 14 August 2016

   Amount Awarded: HK$2,719,750

   Amount Sponsored by Max Fast International Limited and Wister Engineering Technology Company Limited: HK$308,000

Corroboration, Impact and Benefit

Solution processed OLED is currently a hot research topic among many top research institutes in the world. This project will provide young researchers invaluable hand-on experience to tackle various realisation issues in an established research institution. From the fundamental understanding of semiconductor physics and solubility theory to the more advanced research topics such as photonic simulation, researchers will require multitude of knowledge to complete the tasks. Prof HSIN Fei-meng from National Chiao Tung University, Taiwan, who has been developing the technology for many years, is willing to provide necessary support for the blade coating fabrication method. Researchers from the two institutions will hold short-term placements to exchange their ideas on the related topic.

Details of Impact or Benefit

Current major lighting system still relies on fluorescent tube or LED as lighting source, but OLED technology has already been utilised in display applications. From mobile phones to TVs, OLED has demonstrated superior colour saturation and fidelity compared to conventional display technologies. OLED can also be used in lighting application and is already under active development for such application. The main constraint in OLED is its inefficient material usage. This project will bring OLED panel closer to commercialisation, which aims to develop a more economical and scalable process to fabricate large area OLED that addresses the problem.

This new deposition technology will lower the production cost of large area OLED, which is currently the greatest barrier for OLED's development as lighting equipment. The direct outcome of this project is a low-cost, large area OLED that has various traditional and new applications. These applications include, but not limited to, ultra-thin lighting panels, semi-transparent lighting panels, panelised signages, self-emissive wallpapers and emissive printed matters. More importantly, this project will also give rise to a new solution-processed coating technology not only for organic semiconductors, but potentially other solution processable conductors and inorganic semiconductors as well. From transparent conductor films to quantum-dot electroluminescence devices, the blade-coating technology is also capable of fabricating these devices with a few adjustments.

This method will resolve the relatively large colour and performance deviation across devices fabricated by vapour deposition method. For solution-processed OLED, the emission spectrum is controlled by the dopant ratio. Such ratio can be set accurately by the weight ratio of the constituent molecules in the coating solution. Moreover, high power efficiency is more easily achieved by blade-coating method when compared to other solution-processes for fabricating OLED. This is due to the difficulty in optimising multilayer device structure by conventional solution deposition methods without material redevelopment.

One of the major cost components in fabricating OLED originates from the organic materials used. Many of these materials are synthesised from precious metals such as gold, platinum or iridium and have to undergo various purification processes before use. As a result, these materials are often very expensive fine chemicals with sampling cost ranging from HK$5,000 to HK$15,000 per gram. For conventional thermal evaporation method, the material yield ranges from only five to twenty percent. Comparatively, the material yield for blade coating method is over 70 percent. Therefore, the cost of production for blade coating is significantly lower than thermal evaporation method. Moreover, organic materials for OLED are usually designed to be thermally evaporated. Another advantage of blade coating method is that it would not require special modifications of the organic materials used for thermal evaporation before use, which is a common requirement in other solution deposition methods. This will reduce the cost of materials as well as the development effort and production cost, thus giving a strong incentive to the lighting equipment industry to develop products with OLED. Further development based on this technology could result in other distinctly innovative lighting devices such as semi-transparent OLED panels and conformal lighting panels. All these technologies will redefine the future lighting system. Furthermore, the adoption of large area OLED will save the installation and fixture costs in construction and building since OLED is a plane emissive device. Therefore, interior design companies will certainly welcome panelised LED with a wide colour selection.

Blade coating or film application technology has already been used by printing or coating industries in Hong Kong for decades. One of the motivations behind the submission of this project is to motivate the printing industries to adopt new technology and produce more value-added products such as OLED. More importantly, OLED panels can be incorporated into many graphics or interior design. Large area OLED with customisable emissive pattern would give creative industries a unique drawing board to unleash their creativity. By the proliferation of this technology, it is hoped that the synergy created between science and design will strengthen the competitiveness of both sectors in Hong Kong.

MPCF Title:

Light Flicker Detection Mobile Application

Principal Investigator:	Dr Carmen LAM Ka-man, Department of Computer Science
Project Awarded Fund:	HK$150,000
Technology Area:	Information and Communication Technologies

Summary

This project has potential for making economic and health impacts. As Light Emitting Diodes (LEDs) are much more energy-effective than incandescent light bulbs and non-toxic as compared with fluorescent lamps (CFLs), it has become the next generation of lighting device around the world. However, LEDs lighting produces flicker, which may be harmful to human health. Researchers have been studying how LED flicker affects health. Yet, general consumers have no idea or method to check whether the lighting device, either already in use or to be purchased, has such a serious flicker problem. This is because the flicker frequency of the lighting device is always unavailable on its package. Besides, measuring the flicker frequency of the lighting device requires professional equipment.

Dr Lam was aware of this issue and thought that general consumers might not need to know the exact value of flicker frequency of the lighting device. In fact, a hand-held device that provided the level of severity, for example ranging from zero to five levels, where zero is excellent and five is the worst, would be enough for customers to differentiate good or bad products. Therefore, she developed a mobile application that enables users or consumers to get an estimation of the flicker level by taking a video or photos of the lighting device with the camera in their mobile devices for the said comparison. Since similar mobile applications and technology were not found, this technology had a patent filed in the USA.

The project would help avoid potential harmful effects on health like epileptic seizures, malaise, headaches and impaired visual performance caused by flicker frequency, and thus benefit the society.

Underpinning Research

To save energy, the global trend of lighting device is in transition from traditional incandescent light bulbs to CFLs and LED lamps. Producing the same amount of light intensity, CFLs and LEDs can save 70 to 90 percent more energy than incandescent light bulbs. This is why governments around the world have passed regulations or measures to ban or stop manufacture, importation or sale of incandescent light bulbs in order to phase out the old generation of lighting device and switch to a more energy-effective generation like CFLs and LEDs. However, most CFLs contain mercury, which is toxic and harmful to health and the environment if they are not disposed properly. On the other hand, LEDs do not contain mercury but raise other health concerns.

According to the paper "LED lighting flicker and potential health concerns: IEEE standard PAR1789 update", LED lighting produces flicker, i.e. a rapid and repeated change over time in the brightness of light. A few seconds' exposure to visible flicker (or low flicker frequency) may trigger epileptic seizures even the person might not have any history or diagnosis of epilepsy. Long-term exposure to invisible flicker (or high flicker frequency) may cause adverse health effects such as malaise, headaches and impaired visual performance. Since different levels of flicker produced by LED lightings may cause harmful effects on individuals, the information of flicker properties of LED lightings as one of the criteria in making purchase

decisions shall be provided to customers.

In the literature, flicker percentage, flicker index and flicker frequency are the metrics used to describe how severe the flicker is. However, such information is often not shown in the light bulb package. To obtain the said values, professional equipment in the laboratory is required. Nevertheless, general consumers actually do not need to know the exact values of the flicker properties. Dr Lam's project aims to create a mobile application that allows consumers to assess flicker information by taking a video or photo of light bulbs with their mobile phones. For instance, consumers would be able to compare light bulbs and identify which product is at the safe, acceptable or severe flicker levels.

On the commercial side, buyers of lighting device may need to ensure that the products from the manufacturers meet their flicker standards, thus an inexpensive, portable and easy-to-use screening equipment is necessary for preliminary quality check.

References to the Research

Patent:

1. **Lam K. M.** "Method for light source flicker analysis and device thereof". US Patent 14/673,881, 31 March 2015.

Grant:

1. Project Title: Light flicker detection mobile application (MPCF-003-14/15)

   Funding Scheme: Matching Proof-of-Concept Fund 2014-15, UGC

   Period: 1 June 2014 - 31 May 2015

   Amount Awarded: HK$150,000

Details of Impact or Benefit

As LEDs are much more energy-effective than incandescent light bulbs and not toxic as CFLs, they have become the next generation of lighting equipment around the world. However, LED lighting produces flicker which may cause harmful effect to our health. Due to the changing trend of lighting equipment, the health concern of flicker problem and the lack of available information of flicker frequencies in product packages, a handy mobile application to check the flicker level of the existing lighting equipment will be useful for both private and commercial sectors. As nowadays people are more health concerned, especially children's health, this handy mobile application for checking flicker level of lighting equipment would have great market opportunity.

MPCF Project Title:

Developing "Residue Iteration Decomposition (RIDE)" Method into a Pipeline for Research on Cognitive Brain Functions and Testing Its Clinical Applicability

Principal Investigator:	Dr ZHOU Chang-song, Department of Physics
Co-investigator:	Dr OUYANG Guang, Department of Physics

Project Awarded Fund:	HK$150,000
Technology Area:	Information Technology (Medical)

Summary

This project has potential for making health and economic impacts. Many studies of cognitive brain functions, especially their impairments, rely on recording event-related potential (ERP), which is obtained by averaging a number of repeated trials of electroencephalographic (EEG) locked to stimulus onsets. The averaging scheme neglects the brain's trial-by-trial response variability and has serious inherent limitations: the neural activities related to cognitive sub-processes are blurred and mixed, and the dynamical information of the timing of cognitive sub-processes is lost.

Recently, Dr Zhou and his team have developed the method of Residue Iteration Decomposition (RIDE) that is able to extract specific components of neural signal associated with different sub-processes and obtain the latency and amplitude of each component. With the purified components, RIDE is able to reconstruct ERP in a greatly unblurred and sharpened form. This property of RIDE is of the highest interest for researchers and neurologists working with cognitive ERP. Moreover, the information of each sub-process extracted by RIDE, such as the waveforms, latencies, amplitudes, and their correlations with the timing of external events (i.e. stimuli and responses), is very valuable to better understanding of the neurocognitive mechanisms, which are underlying individual differences in healthy persons, aging-related cognition issues, brain diseases and mental disorders.

Dr Zhou's team presented their algorithm of RIDE in the World Congress of Psychophysiology (IOP 2014) in Japan and was awarded the Best Young Presentation Award for the outstanding presentation in September 2014. This proved the importance of this project by the international community, which would attract more international collaborations. After the IOP congress, another core team member, Dr Ouyang was invited to McGill University in Canada to present their works and discuss further collaboration.

Underpinning Research

ERP means the signal of electrical potential that is related to the specific events to which the brain responds. The smearing and mixing problem in ERP component hampers ERP researchers in investigating the brain-behaviour relationship. RIDE has been proved to solve the long-standing problem of smearing and mixing of ERP components in the field of ERP research.

The RIDE method developed in this project has stimulated some researchers and scientists to use this tool in investigation of forebrain and cognition. Therefore, more and more Master and PhD students and research assistants have adopted RIDE in their studies and research. Through the collaboration networks, many universities around the world have cited this tool in their publications. According to the statistics in Google Scholar, 45 citations have been recorded *(https://scholar.google.com.hk/citations?user=_7Uhym4AAAAJ&hl=zh-CN)*.

Since several successful applications of RIDE have been published, it will potentially be adopted in the research community and clinical applications. The unique algorithms of RIDE have a patent filed in the USA. Currently, a toolbox with user-friendly interface and website is established in order to foster its applications and create the impact in the future.

The long-term plan of their future work will be mainly the application of RIDE algorithm in brain disease's data, for example, epilepsy, Alzheimer and autism. To incorporate with the advanced brain imaging technology, it is anticipated that this tool will contribute to the studies of the mechanism of various brain diseases.

References to the Research

1. Ouyang G., Sommer W. & **Zhou C. S.** (2015). Updating and validating a new framework for restoring and analyzing latency-variable ERP components from single trials with residue iteration decomposition (RIDE). *Psychophysiology*, 52, 839 - 856.

Patent:

1. **Zhou C. S.**, Ouyang G. & Sommer W. "Method for separating and analyzing overlapping data components with variable delays in single trials". US Patent 14/210,321, 13 March 2014.

Grant:

1. Project Title: Developing "Residue Iteration Decomposition (RIDE)" method into a pipeline for research on cognitive brain functions and testing its clinical applicability (MPCF-002-14/15)

   Funding Scheme: Matching Proof-of-Concept Fund 2014-15, UGC

   Period: 1 May 2014 - 30 April 2015

   Amount Awarded: HK$150,000

References to the Corroboration of Impact or Benefit

Name of Researcher(s) and Corresponding Institution:

1. Birgit Stürmer and her team from Humboldt University:

   http://onlinelibrary.wiley.com/doi/10.1111/j.1469-8986.2012.01479.x/abstract

2. Rolf Verleger and his team from Luebeck University:

   http://www.sciencedirect.com/science/article/pii/S1053811914005138

3. Suiping Wang and her team from South China Normal University:

   http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0117324

4. Invited talk and tutorial class for the students and researchers at Montreal University and McGill University:

   http://www.crblm.ca/events/workshop_using_residue_iteration_decomposition_ride_toolbox_erp_data

   http://www.crblm.ca/events/residue_iteration_decomposition_ride_%E2%80%93_new_method_decomposition_and_reconstruction_erps_based

Award:

1. Name: Best Young Presentation Award

   Organisation and location for presenting the award:
   The 17th World Congress of Psychophysiology, Hiroshima, Japan

Details of Impact or Benefit

There is a large community of cognitive neuroscientists using EEG measures to study cognitive brain functions by manipulating the stimulus conditions and examining the ERPs and associating them into cognitive sub-processes, such as signal perception, decision making and response programming and execution.

ERP recording, widely used in Cognitive Neuroscience, provides valuable insights into cognitive brain activities. The ERP consists of several components reflecting specific perceptual, cognitive and motor processes. In cognitive experiments the ERP is typically obtained by averaging across 10 to 100 single EEG trials per condition, synchronised to the onsets of stimuli or responses, with the assumption that each single trial contains more or less the same sequence of sub-processes and ERP components, and the residues between the average and a given single trial are just noise (Model 1, Figure 1A, left panel). However, in cognitive tasks, there is usually considerable trial-to-trial variability in reaction times (RT) and there are activity patterns systematically locked to stimulus onset and the variable RT, respectively (Figure 1B), suggesting that cognitive task processing more likely follows Model 2, depicted in (Figure 1A, right panel). This model assumes a series of cognitive sub-processes and associated ERP components, which are reliably present in most single trials. The early sub-processes and components are more closely locked to stimulus onset, while of the later components, some are locked to the response, whereas others may not have any explicit time-marker and can be highly variable in latency. The conventional stimulus-locked average ERP may strongly smear and mix different components in time and space, especially late, endogenous components (Figure 1C), and hence seriously misrepresent their time courses and topographies.

Although long recognised as a problem, the temporal variability of the EEG responses has rarely been systematically addressed. The more realistic Model 2 has not been firmly established as a new paradigm of ERP analysis although similar concepts and several corresponding ERP decomposition methods have been suggested in Hansen (1983)[1] and Zhang (1998)[2], to deal with the problems of temporal and spatial mixing of time-varying components. Previously suggested temporal decomposition methods have almost never been applied in ERP research, probably because these methods cannot deal with intermediate components without explicit time-markers and may seriously distort the components under certain circumstances, as reported in Hansen (1983)[1] and Takeda *et al.* (2008)[3]. Spatial decomposition methods, for example, Independent Component Analysis (ICA) as reported by Hyvärinen and Oja (2000)[4], also aim to separate ERP into components - usually called sources - that are statistically mutual independent. ICA obtains many independent components (ICs) as there are electrodes and it is difficult to cluster and associate all of the ICs to cognitive sub-processes and events.

In the work of Ouyang *et al.* (2011)[5], the earlier version of RIDE has overcome the limitation of existing ERP decomposition methods to deal with intermediate components without explicit time-markers, but there are still several problems: 1) serious noise amplification in the signal analysis, 2) existence of separate nonsense complementary signal components, 3) severe distortions of boundaries of signal, 4) arbitrary separation of ERP trend, and 5) the reported approach was constrained in being able to separate one central component, wherein the first estimation of said central component is poor if the first template of the ERP is poor. These problems could seriously limit the application of the earlier version of RIDE in real data.

Thus, this technology provides a robust and practical method for separating and analysing overlapping data components that consistently occur in multiple realisations but are locked to different time markers

1 Hansen J. C. (1983). Separation of overlapping waveforms having known temporal distributions. *Journal of neuroscience methods*, 9, 127-139.

2 Zhang J. (1998). Decomposing stimulus and response component waveforms in ERP. *Journal of Neuroscience Methods*, 80, 49-64

3 Takeda Y., Yamanaka K. & Yamamoto Y. (2008). Temporal decomposition of EEG during a simple reaction time task into stimulus-and response-locked components. *NeuroImage*, 39, 742-754.

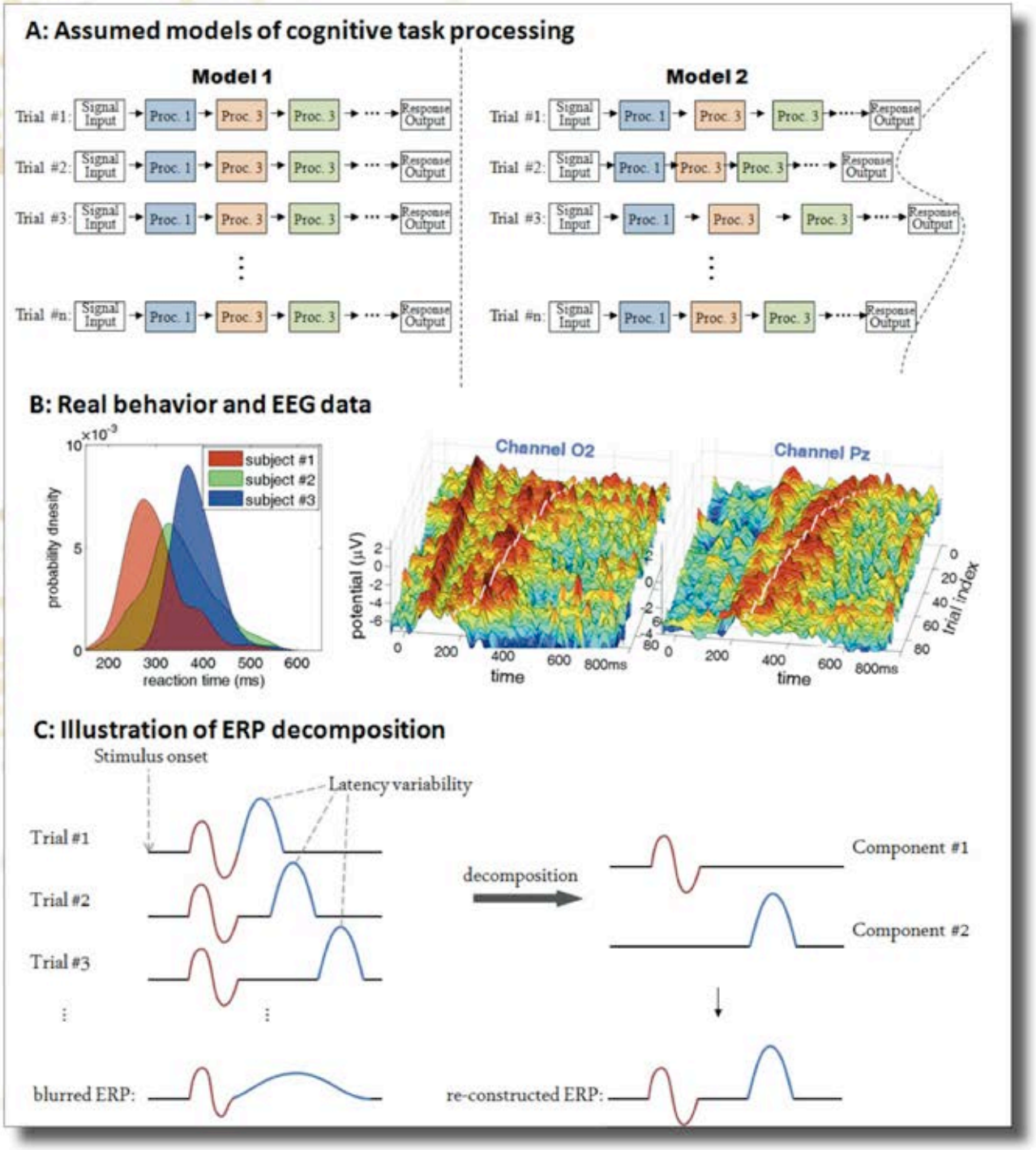
4 Hyvärinen A. & Oja E. (2000). Independent component analysis: Algorithms and applications. *Neural Networks*, 13, 411-430.

5 Ouyang G., Herzmann G., **Zhou C.** & Sommer W. (2011). RIDE: A new method to separate ERP components on the basis of latency variability in single trials. *Psychophysiology*, 48, 1631-1647.

with variable inter-marker delay (e.g. for ERP data). The extended RIDE algorithm 1) overcomes all the serious limitations of its predecessor, 2) is able to properly separate overlapping components - with or without explicit time markers - without serious distortion, 3) restores the most probable waveform of the data from the separated components, and 4) obtains the variable amplitude and latency parameters from single trials. With the present invention, EEG data can be explored more deeply to investigate brain-behaviour relationships in different dimensions.

This new method RIDE for brain EEG data analysis has been integrated into a user-friendly toolbox. The clinical data of autism patients, which will be imported when available, can further improve the toolbox. It is hoped that this technology will benefit large community as well as brain research and clinical application.

Figure 1



List of Projects Winning MPCF Grants in 2015-16

Project Title:	Biocompatible Three-dimensional Nano-matrixes for the Induction of Stem Cell Differentiation
Principal Investigator:	Prof Ken YUNG Kin-lam, Department of Biology
Co-investigator:	Prof HUANG Zhifeng, Department of Physics
Technology Area:	Biotechnology
Awarded Fund (in HK$):	150,000

Project Title:	Laser Ablation Monitor and Controller
Principal Investigator:	Prof CHEUNG Nai-ho, Department of Physics
Technology Area:	Nanotechnology and Advanced Materials
Awarded Fund (in HK$):	150,000

Project Title:	Development of 1) Gait Analysis Tool, 2) Human Balance Platform Based on Tri-axial
Principal Investigator:	Dr CHAN Mau-hing, Department of Physics
Co-investigator:	Prof Jeffrey CHEUNG T., Department of Physics
Technology Area:	Information and Communication Technologies (Health & Amusement)
Awarded Fund (in HK$):	150,000

Project Title:	A Mobile-based Fatigue Driving Detection and Alarm System
Principal Investigator:	Prof CHEUNG Yiu-ming, Department of Computer Science
Co-investigators:	Mr PENG Qinmu[1], Mr GU Fangqing[1], Mr WEN Xueping[1], Ms YI Shuangyan[2] 1 Department of Computer Science 2 IRACE in Shenzhen
Technology Area:	Information and Communication Technologies
Awarded Fund (in HK$):	150,000

Project Title:	Organic Sensor Platform Technology
Principal Investigator:	Prof ZHU Fu-rong, Department of Physics
Co-investigators:	Dr TAM Hoi-tam, Mr CHOI Wing-hong, Department of Physics
Technology Area:	Nanotechnology and Advanced Materials
Awarded Fund (in HK$):	150,000

Technology Transfer (TT) Events

Exhibitions

Hong Kong Baptist University (HKBU) was one of the supporting organisations of APAC Innovation Summit 2014, which was organised by the Hong Kong Science & Technology Parks Corporation at the Hong Kong Convention and Exhibition Centre on 1 - 6 December 2014. The flagship event comprised of the International Knowledge Transfer Conference, Tech Forums, Main Conference and Hong Kong Technology Showcase at the Inno-Design-Tech Expo. Four prominent professors from HKBU were invited to share their outstanding technology achievements and insights for the next innovation trends at the Tech Forum. The four topics presented were shown as below:

- Organic light-emitting display (OLED) - its science and technology (Prof CHEAH Kok-wai, Department of Physics)
- Indoor location analysis system for exhibition and convention industries (Prof Joseph NG Kee-yin, Department of Computer Science)
- Metallated and metal-free molecular materials for energy conversion in Organic Photovoltaics (OPVs) and OLEDs (Prof Raymond WONG Wai-yeung, Department of Chemistry)
- Innovations on stem cell harvest and engineering (Prof Ken YUNG Kin-lam, Department of Biology)

In the Hong Kong Technology Showcase at the Inno-Design-Tech Expo, Knowledge Transfer Office (KTO) showcased the following six outstanding projects from the School of Chinese Medicine and Faculty of Science:

- Diarylaminoflurene-based organometallic phosphors and organic light-emitting devices made with such compounds (Prof Raymond WONG Wai-yeung, Department of Chemistry)
- Preclinical evaluation and mechanistic study of two novel HMG-CoAR inhibitors isolated from herbal tea (Dr William TAI Chi-shing, School of Chinese Medicine)
- Fabrication of large area flexible plasmonic nanostructure using interference lithography and its potential application for organic electronics (Prof CHEAH Kok-wai, Department of Physics)
- In vivo Extraction of neural stem cells in the brain using novel nanomaterials (Prof Ken YUNG Kin-lam, Department of Biology)
- Preclinical efficacy and safety evaluation of corynoxine B for the treatment of Parkinson's disease (Prof LI Min, School of Chinese Medicine)
- A cloud-computing middleware for providing proximity information to mobile go-social networks (Dr HU Hai-bo, Department of Computer Science)

One of the HKBU's projects, titled "In vivo Extraction of neural stem cells in the brain using novel nanomaterials" was selected and highlighted as a featured project in the Hong Kong Technology Showcase. Prof Yung and his team gave an off-the-cuff interview. Subsequently, the video was broadcasted on Roadshow TVs in 1,600 buses and YouTube *(https://www.youtube.com/watch?v=3e9xjDTGi8M)*. The HKBU pavilion successfully attracted visitors including business leaders, investors, and intellectual property (IP) professionals.

KTO has participated in Business of IP Asia Forum, a co-organised event by the Government of the HKSAR, Hong Kong Trade Development Council and Hong Kong Design Centre, since 2013. This is a good opportunity for networking with business leaders, investors and IP professionals from all over the world to share experience and exchange knowledge.

In order to open up knowledge transfer opportunities for HKBU inventions to new technologies around the world, representatives from KTO and some professors joined the 2015 BIO International Convention on 16 - 18 June 2015 in Philadelphia, USA. Through this world-class biotechnology convention, KTO was able to get connected and showcased HKBU research projects and new inventions to high-level executives and influential decision makers, who were looking for new opportunities to form partnerships and evaluating some emerging technologies in the industry. During the three-day convention, HKBU representatives were able to meet with senior executives of well-known pharmaceutical and biotech companies, such as GlaxoSmithKline (GSK), Johnson & Johnson, Abbvie, Novartis, Takeda and Cedars-Sinai. The meetings were fruitful and would contribute to more collaborations and commercialisation of HKBU's intellectual properties.

Technology Transfer Seminar

With the aim of strengthening knowledge transfer at HKBU, KTO organises technology transfer seminar(s) every year. The event has become more and more popular among academic and research staff and students year by year. In this reporting year, KTO invited two distinguished professors from Cornell University, New York, who were the experts in patent application process and technology transfer, to share their knowledge in the seminar "Intellectual Property Development and Protection" which was held on 9 February 2015. The topics and profiles of the speakers were given as follows:-

- A faculty inventor's perspective and experience of patent process in a major American research university: From lab bench to bed side (Prof CHU Chih-chang, Rebecca Q. Morgan '60 Professor, Department of Fiber Science and Apparel Design, College of Human Ecology, Cornell University, New York, USA).

  Prof Chu was a guest professor of Chang-Chun Institute of Applied Chemistry, Chinese Academy of Science in China and also served on the Biology/Medicine Panel of the Hong Kong Research Grant Council from 2010-13, and is currently a member of the Hong Kong Research Grant Council Collaborative Research Fund Committee. Prof Chu served as the founding member of the Technology Transfer Advisor Committee to President of Cornell University from 2008-12, and is currently on the Start-Up New York Faculty Committee at Cornell.

- A public plant breeder's perspective on intellectual property developments in the university and in agriculture (Prof Martha Mutschler-CHU, Plant Breeding Genetics, College of Agriculture and Life Sciences, Cornell University, New York, USA).

Prof Mutschler-Chu served as the Board of the Cornell Research Foundation (CRF, the predecessor of the CU current CCTEC: Cornell Centre for Technology Enterprise and Commercialisation), and the University committee for IP policy.

About 20 participants, while the majority of them were senior professors and their research assistants, found the talks inspiring. The speakers shared useful information such as the challenges and solutions they encountered in the issues about commercialisation of IP. In the seminar, participants proactively exchanged their ideas, shared their views on IP policy and expressed interest in exploring more on IP protection and commercialisation.

Technology Start-up Experience Sharing and Road Show

In addition to the technology transfer seminar, "Technology Start-up Experience Sharing" was held on 22 April 2015 to demonstrate the successful stories of Technology Start-up Support Scheme for Universities (TSSSU) by the University's scholars, students and alumni. The event comprised of presentation and sharing sessions. Invited speakers were the awardees of TSSSU grants in 2014-2016, who shared their experiences and challenges in establishing and running their technology start-ups. The names of four technology start-ups were shown in the following (in alphabetical order):

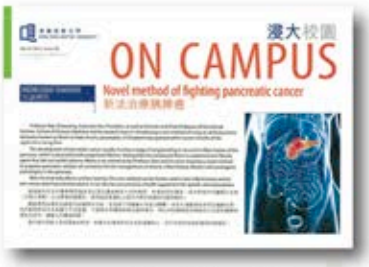
- ANA Artwork Material Analysis Company Limited;
- Cathay Photonics Limited;
- OPER Technology Limited; and
- R&P Technology Limited.

This event was successful in terms of its good response. There were around 45 participants including the Government officers, investors, external partners, alumni, University staff and students. This event built network between the start-ups and the potential investors, and also influenced the mind-set of the participants in regard to entrepreneurship.

In order to foster entrepreneurship and expose the successful stories of establishing start-ups to the University staff and students, an on-campus road show introducing the TSSSU funding scheme was held by the KTO in March and April 2015. Afterwards, the KTO received many enquiries from professors and students.

Regular Features in the University's Newsletter

Write-ups of technology transfer projects were posted regularly in the University's newsletter, "On Campus", in this reporting year. The write-ups featured the University's outstanding research projects, enriched IP knowledge and created the culture at the University to bring research impact. Three articles in this reporting year were published and extracted as indicated.



Chinese Medicine Scholars in Hong Kong Baptist University Develope Novel Method of Fighting Pancreatic Cancer

In recognition to the technology advancement at HKBU, one of the articles title Chinese Medicine Scholars in Hong Kong Baptist University Develope Novel Method of Fighting Pancreatic Cancer, has been recently highlighted in an international publication, *QS News2WOWU (May 2015 issue)*, a quarterly newsletter capturing international universities' academic achievements, experiences, and developments that are extraordinary, outstanding and unique. Definitely, this will raise the awareness of HKBU's technologies that have reached international standard and also will build HKBU's reputation.

Technology Transfer Videos

To disseminate the University's research to the industry and community, a series of technology transfer videos was produced to explain the profound theory behind the technologies in simple language. The videos are currently available on the website of KTO (*http://kto.hkbu.edu.hk/eng/channel.php?channel=video*) and the HKBUtube (*http://hkbutube.lib.hkbu.edu.hk/hkbutube/index.php*). In the meantime, the videos have been arranged to broadcast through iCandy, the TV broadcast channel on campus. These videos help to increase public awareness of the HKBU's technology achievement and also bring impacts to create more technology transfer projects, thereby advancing the technology, boosting the economy and benefiting the community. Since the videos are remarkably effective to promote HKBU's technologies, more videos will be produced and launched in the near future.

Technology Transfer Corridor

To encourage knowledge transfer and showcase some of the HKBU's prestigious works, KTO decorated a corridor with wall-mounted displays and eye-catching posters for some exemplar knowledge transfer projects, invention patents and success stories of technology start-ups. This aims to draw people's attention, promote the culture of technology transfer and serve the purpose of "show and tell" for the visitors.

Business Entrepreneurship Support and Training (BEST)

The University Grants Committee (UGC) values students' entrepreneurship as a form of effective knowledge transfer from university to the broader community. Since the academic year of 2012-13, the University has supported the BEST Programme with a three-year Strategic Development Fund (SDF) Grant. The BEST Programme aims at nurturing the creativity of students and graduates as well as developing them into socially responsible business leaders and entrepreneurs to support Hong Kong's knowledge-based economy. The BEST Programme provides experiential learning environments and opportunities for students to equip themselves with a can-do attitude, business acumen and entrepreneurial spirit. Key components of the BEST Programme are: Entrepreneurship Sharing and Networking (ESAN), Entrepreneurship Challenge (E-Challenge) and Entrepreneurship Space (E-Space). During the year, the BEST Programme successfully organised a series of events including an Entrepreneurship Seminar Series, an Entrepreneurship Innovation Lab Series, a one-day Entrepreneurship Bootcamp and three competitions. With the support of this programme, HKBU students participated in the Junior World Entrepreneurship Forum (JWEF) which took place in Macau in 2015. Besides, the first incubatee graduated from the Incubation Programme in November 2014, while two new incubatees were admitted in February 2015. Apart from these regular activities, several local and regional student competitions, a campus-wide "Favourite Local Entrepreneur Election" have been held for the first time this year. A sponsorship scheme for students to enrich their knowledge of entrepreneurship - "Massive Open Online Course" will be launched in the next reporting year. The BEST Programme has attracted more than 1,000 student participants in the academic year of 2014-15.

Ir Dr Alfred TAN
Head of Knowledge Transfer Office
July, 2015

Entrepreneurship Sharing and Networking (ESAN)

ESAN is a year-round training programme to equip students with entrepreneurial skills as well as providing local and cross-border networking opportunities.

The training programme includes an Entrepreneurship Seminar Series, an Entrepreneurship Innovation Lab Series and an Entrepreneurship Bootcamp. During the year, prominent and successful entrepreneurs or experts were invited as guest speakers to give inspiring talks and conduct training workshops for the students.

ESAN Series	Date / Speaker / Topic	No. of Attendees
Entrepreneurship Seminar Series	9 October 2014 *Mr Kenneth CHAU, Founder and CEO, iMusicTech Limited* "Entrepreneurship Experience Sharing"	70
	17 October 2014 *Mr Bill TAI, Co-Founder, MaiTai Global Venture Capitalist of Charles River Ventures* "Entrepreneurship Experience Sharing"	28
	17 November 2014 *Mr Arthur CHOW, Co-founder and COO, Six Waves Inc.* "Entrepreneurship Experience Sharing"	25

ESAN Series	Date / Speaker / Topic	No. of Attendees
Entrepreneurship Innovation Lab Series	27 January 2015 *Ms Eunice CHU, Head of Policy, Association of Chartered Certified Accountants (ACCA) Hong Kong* "How to Manage Cash Flow, Liquidity and Taxation Filing When You Start a New Business?"	20
	2 February 2015 *Mr Wilson CHAN, Manager of Incubation Promotion & Admission, Hong Kong Science and Technology Parks Corporation* "How to Turn Your Idea into a Business?"	23
	2 February 2015 *Mr Henry LAI, Manager of Investment Support Services, Hong Kong Science And Technology Parks Corporation* "One-to-One Consultation Session with University's Start-ups" (by invitation only)	8
	4 February 2015 *Ms Shirley NG, Manager, Mainland Relations, International & Mainland Relations Department, Hong Kong Trade and Development Council* "Any Resources in HKTDC to Benefit a New Company's Promotion?"	38
	27 March 2015 *Mr Edwin SIEW, Lecto IP Limited* "How to Protect Your Creative Ideas?"	15
Entrepreneurship Bootcamp	28 March 2015, morning session *Mr Raymond CHU, Assistant Director, Institute of Entrepreneurship, Hong Kong Polytechnic University* "Learn about Hong Kong Entrepreneurship Ecosystem and First-hand Industry Information"	23
	28 March 2015, afternoon session *Mr Henry LAI, Manager of Investment Support Services, Hong Kong Science And Technology Parks Corporation* "A Good Business to Attract Investors!"	

Students' Feedbacks on ESAN

Over 250 students attended ESAN activities this year. A survey was conducted to the participants at the end of each session. Approximately 50, 45 and 20 completed questionnaires were received from the Entrepreneurship Seminar Series, the Entrepreneurship Innovation Lab Series and the Entrepreneurship Bootcamp, respectively.


Mr Arthur CHOW


Mr Kenneth CHAU


Mr Bill TAI

For the Entrepreneurship Seminar Series, over 50 percent of the respondents rated positively in the following key indicators:

- Overall rating of the seminar;
- Awareness and understanding of the subject;
- Usefulness of the information presented; and
- Willingness to attend similar activity in future.

For the Entrepreneurship Innovation Lab Series, over 50 percent of the respondents rated positively on the following key indicators:

- Overall rating of the activity;
- Awareness and understanding of the subject;
- Usefulness of the information presented; and
- Willingness to attend similar activity in future.

For the Entrepreneurship Bootcamp, over 50 percent of the respondents rated positively on the following key indicators:

- Overall rating of the activity;
- The session met my expectation;
- Usefulness of the information presented; and
- Willingness to attend similar activity in future.

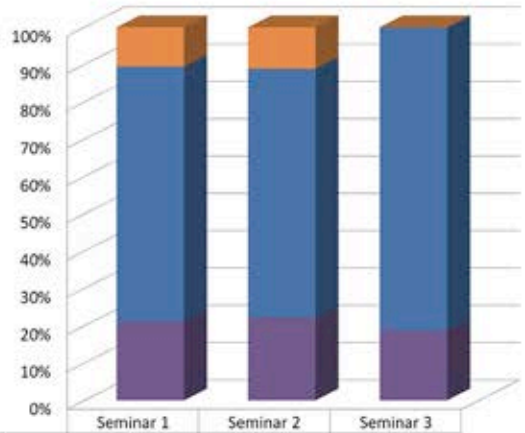

Mr Wilson CHAN


Ms Eunice CHU


Ms Shirley NG

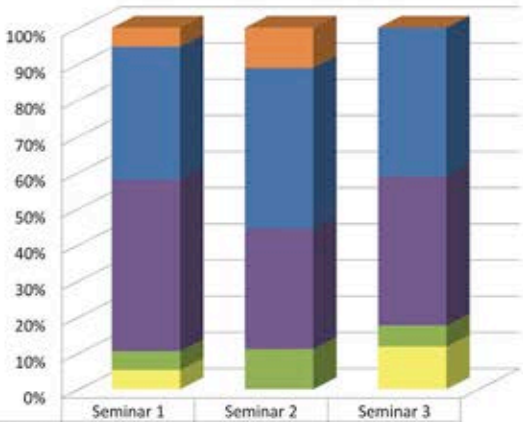

Mr Edwin SIEW

Overall rating of the seminar



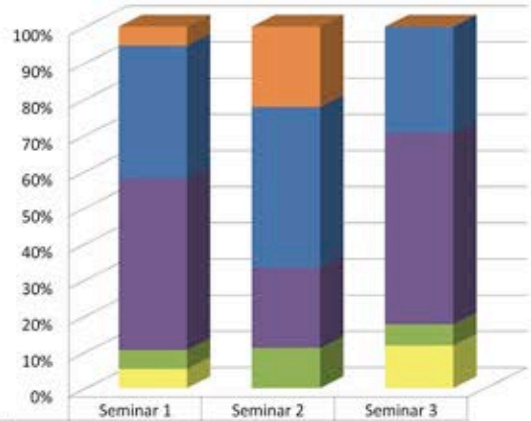
	Seminar 1	Seminar 2	Seminar 3
Very Satisfied	10.53%	11.11%	0.00%
Satisfied	68.42%	66.67%	81.25%
Somewhat Satisfied	21.05%	22.22%	18.75%
Somewhat Dissatisfied	0.00%	0.00%	0.00%
Dissatisfied	0.00%	0.00%	0.00%
Very Dissatisfied	0.00%	0.00%	0.00%

The seminar improved my awareness and understanding of the subject



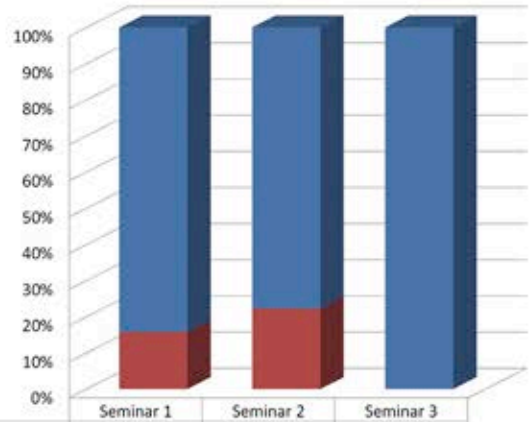
	Seminar 1	Seminar 2	Seminar 3
Strongly Agree	5.26%	11.11%	0.00%
Agree	36.84%	44.44%	41.18%
Mildly Agree	47.37%	33.33%	41.18%
Mildly Disagree	5.26%	11.11%	5.88%
Disagree	5.26%	0.00%	11.76%
Strongly Disagree	0.00%	0.00%	0.00%

The information presented was useful



	Seminar 1	Seminar 2	Seminar 3
Strongly Agree	5.26%	22.22%	0.00%
Agree	36.84%	44.44%	29.41%
Mildly Agree	47.37%	22.22%	52.94%
Mildly Disagree	5.26%	11.11%	5.88%
Disagree	5.26%	0.00%	11.76%
Strongly Disagree	0.00%	0.00%	0.00%

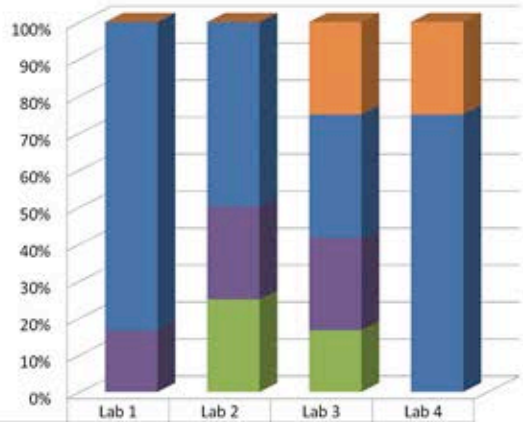
I will attend similar activities in the future



	Seminar 1	Seminar 2	Seminar 3
Yes	84%	78%	100%
No	16%	22%	0%

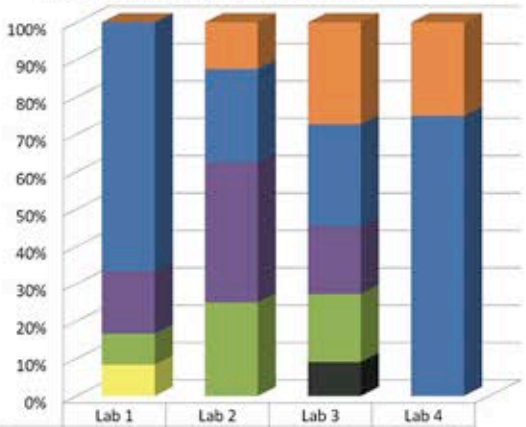
Remarks:
Seminar 1 was presented by Mr Kenneth CHAU
Seminar 2 was presented by Mr Bill TAI
Seminar 3 was presented by Mr Arthur CHOW

Overall rating of the lab



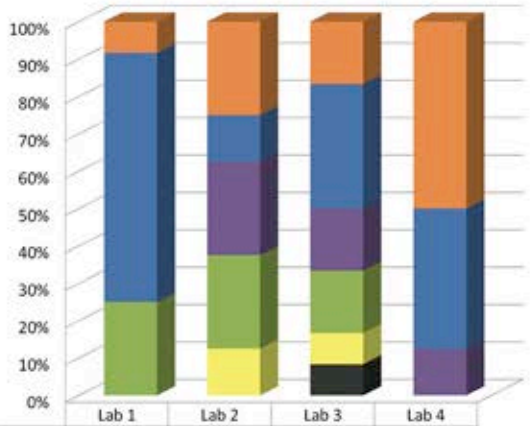
	Lab 1	Lab 2	Lab 3	Lab 4
Very Satisfied	0.00%	0.00%	25.00%	25.00%
Satisfied	83.33%	50.00%	33.33%	75.00%
Somewhat Satisfied	16.67%	25.00%	25.00%	0.00%
Somewhat Dissatisfied	0.00%	25.00%	16.67%	0.00%
Dissatisfied	0.00%	0.00%	0.00%	0.00%
Very Dissatisfied	0.00%	0.00%	0.00%	0.00%

The lab improved my awareness and understanding of the subject



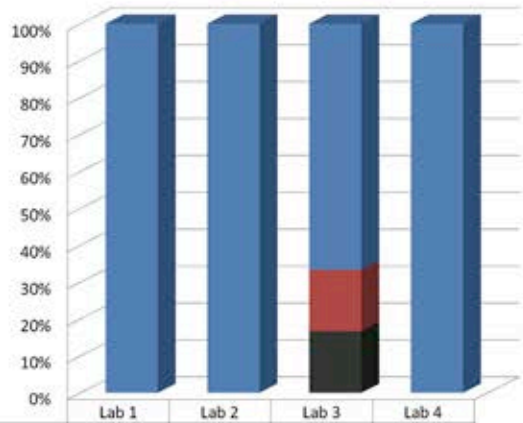
	Lab 1	Lab 2	Lab 3	Lab 4
Strongly Agree	0.00%	12.50%	27.27%	25.00%
Agree	66.67%	25.00%	27.27%	75.00%
Mildly Agree	16.67%	37.50%	18.18%	0.00%
Mildly Disagree	8.33%	25.00%	18.18%	0.00%
Disagree	8.33%	0.00%	0.00%	0.00%
Strongly Disagree	0.00%	0.00%	9.09%	0.00%

The information presented was useful



	Lab 1	Lab 2	Lab 3	Lab 4
Strongly Agree	8.33%	25.00%	16.67%	50.00%
Agree	66.67%	12.50%	33.33%	37.50%
Mildly Agree	0.00%	25.00%	16.67%	12.50%
Mildly Disagree	25.00%	25.00%	16.67%	0.00%
Disagree	0.00%	12.50%	8.33%	0.00%
Strongly Disagree	0.00%	0.00%	8.33%	0.00%

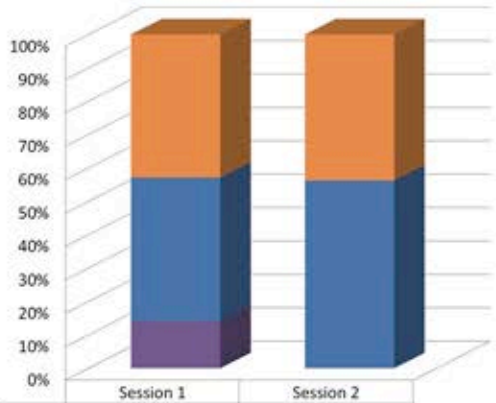
I will attend similar activities in the future



	Lab 1	Lab 2	Lab 3	Lab 4
Yes	100%	100%	67%	100%
No	0%	0%	17%	0%
Not indicated	0%	0%	17%	0%

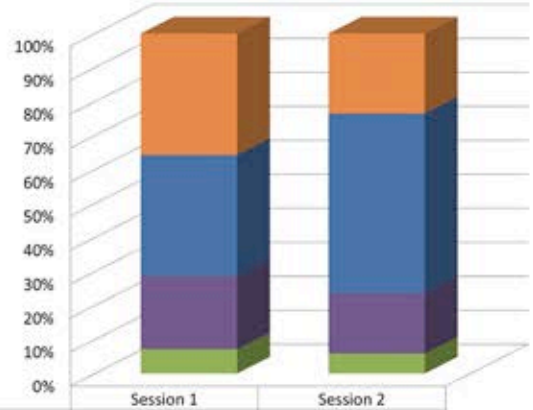
Remarks:
Lab 1 was presented by Ms Eunice CHU
Lab 2 was presented by Mr Wilson CHAN
Lab 3 was presented by Ms Shirley NG
Lab 4 was presented by Mr Edwin SIEW

Overall rating of the bootcamp



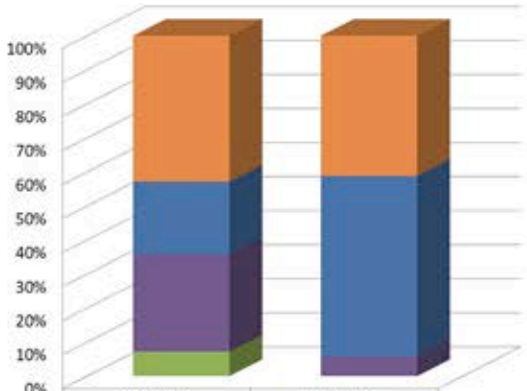
	Session 1	Session 2
Very Satisfied	42.86%	43.75%
Satisfied	42.86%	56.25%
Somewhat satisfied	14.29%	0.00%
Somewhat dissatisfied	0.00%	0.00%
Dissatisfied	0.00%	0.00%
Very Dissatisfied	0.00%	0.00%

The bootcamp improved my awareness and understanding of the subject



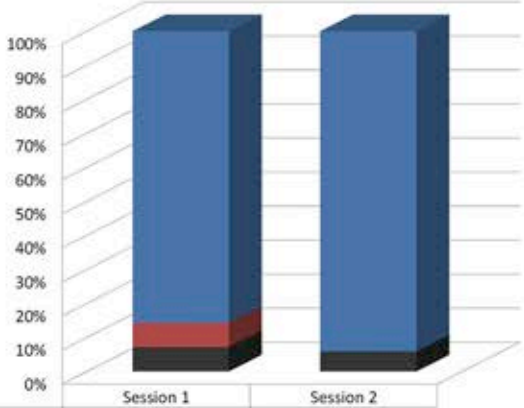
	Session 1	Session 2
Strongly Agree	35.71%	23.53%
Agree	35.71%	52.94%
Mildly Agree	21.43%	17.65%
Mildly Disagree	7.14%	5.88%
Disagree	0.00%	0.00%
Strongly Disagree	0.00%	0.00%

The information presented was useful



	Session 1	Session 2
Strongly Agree	42.86%	41.18%
Agree	21.43%	52.94%
Mildly Agree	28.57%	5.88%
Mildly Disagree	7.14%	0.00%
Disagree	0.00%	0.00%
Strongly Disagree	0.00%	0.00%

I will attend similar activities in the future



	Session 1	Session 2
Yes	86%	94%
No	7%	0%
Not Indicated	7%	6%

Remarks:
Session 1 was presented by Mr Raymond CHU
Session 2 was presented by Mr Henry LAI

Entrepreneurship Challenge (E-Challenge)

E-Challenge is a series of three-category business plan competitions. The first category is a "$500 for 1-Page" Business Idea Competition; the second category is a "$5,000 for 3-Pages" Business Proposal Competition and the third category is a "$300,000 for New Venture" Business Plan Competition. The competitions are designed to offer a platform for students to share from the simplest business ideas to more sophisticated business plans.

The judging panel of the E-Challenge competition consists of internal and external experts of the field. Furthermore, E-Challenge made partnerships with different schools and departments at the university to enrich the information sharing in teaching and research. Mr Simon SO and Dr Victor LIAO from the School of Business, as well as Mr James SHEA from the Department of Humanities and Creative Writing had invited the representatives from BEST to introduce the programme, especially the E-Challenge competitions, in their respective classes. This competition successfully motivated the students in their learning.

In April 2015, E-Challenge started a new collaboration with Dr March TO from the Department of Management for the research project titled "Knowing Who Know What: Transactive Memory, Affect, and Proactivity" that was supported by General Research Fund under the Research Grants Council in Hong Kong with a full score (i.e. 5 out of 5).

BEGINNER

The "$500 for 1-Page" Business Idea Competition is for students who are beginners to the idea of entrepreneurship. This competition aims at encouraging the students to create ideas and turn them into business plans. Each winner receives HK$500 as a token of encouragement. In the academic year of 2014-15, the competition was held between September and November 2014. A total of 65 proposals were received and 20 awards were presented in January 2015.

INTERMEDIATE

In the academic year of 2014-15, the "$5,000 for 3-Pages" Business Proposal Competition was launched between November 2014 and February 2015. There were 35 proposals received and the results were announced in March 2015. Eight teams (i.e. a total of 18 students) were awarded by a three-member judging panel, comprised of two external professionals and one BEST Advisory Committee member, in a doubly blinded review process.

	"$500 for 1-Page" Business Idea Competition	"$5,000 for 3-Pages" Business Proposal Competition
Objective	To provide an opportunity for entrepreneurship ideation for the students	To provide an opportunity for entrepreneurship business proposal formation for the students
Period	September 2014 – November 2014	November 2014 – February 2015
Submissions	65	35
Award Winners	School of Business –10 Faculty of Social Sciences – 2 Faculty of Arts – 2 Faculty of Science – 6	School of Business - 15 Faculty of Social Sciences – 1 Faculty of Science - 2

ADVANCED

The "$300,000 for New Venture" Business Plan Competition called for application from March to April 2015. Students were invited to submit a 15- to 20-pages business plan for this competition. A total of 21 entries were received and five of them were shortlisted by a judging panel of three external members from the Hong Kong Cyberport, a social enterprise, and an accounting firm. The winner was selected after the five finalists were invited to present their business plans to the judging panel in a presentation session of the competition held on 9 June 2015.

In this competition, a team called Maboo won the grand prize of the competition. The winning team, consisting of HKBU current students and alumni, was awarded HK$300,000 (in cash and in-kind), covering entrepreneurial trainings, professional business services and an one-year's rental and service contract of the Incubation Office in order to implement and put their entrepreneurial idea into practice.

Maboo aims at establishing an online platform to match up part-time job seekers and potential employees in the marketplace. The platform was initially a job matching system with an analytical tool that provided the integrity of part-time job seekers in terms of their working experiences, performances and skills. The platform would be further developed to provide an online roster and comprehensive analysis through a database of language and aptitude tests, certificates and personal portfolios.

Entrepreneurship Space (E-Space)

E-Space provides resources for entrepreneurial activities that take place on campus. It includes the following forms of support to the winners of the "$300,000 for New Venture" Business Plan Competition to start their business:

- Funding of HK$50,000 (in cash) and HK$250,000 (in-kind)
- Legal and management consultancy services
- Administrative and clerical services
- Working space

- Networking opportunities
- Promotion and marketing possibilities in conjunction with Knowledge Transfer Office (KTO) activities
- Matching possibilities with other resources and non-government organisations

The winner of "$300,000 for New Venture" Business Plan Competition 2012-13, Local Ginger, established their company (Funcon Limited) in November 2013 and graduated from the incubation programme in November 2014. Local Ginger is a hospitality e-Business platform to link up small leisure activities suppliers with end-users to supply direct one-stop reservation and transaction service.

The winners of "$300,000 for New Venture" Business Plan Competition 2013-14, Shouting Box (business venture) and Barrier-free School (social enterprise), established their companies and officially moved into the Incubation Office in November 2014 and February 2015 respectively. Shouting Box's core product is a type of social networking software that aims at providing a platform for users to communicate by voice only. The server and the prototypes have been successfully set up and developed accordingly, which are now under the stage of beta testing. Barrier-free School aims at providing e-learning materials for students with disabilities in Hong Kong. The online platform has been established for providing services to a variety of schools for those students. Meanwhile, they are building a good database of different courses for the students. At the moment, both of them are currently seeking partnerships for business development and product promotion.

The winner of "$300,000 for New Venture" Business Plan Competition 2014-15, Maboo, has established their company (Maboo Limited) and is expected to move into the Incubation Office in the academic year of 2015-16. Maboo provides online services for the matchup of the part-time job seekers and potential employees in the marketplace.

Other Events

Local and Regional Student Competitions

The BEST Programme supports student entrepreneurship activities by all possible means. All HKBU students are welcome to seek advice on their entrepreneurial projects through the BEST Programme. The BEST Programme offered support to the following projects:

Team Name	Competition / Programme	Achievement
Enactus Society (two teams)	Enactus World Cup 2015	2nd runner up
Chinese Medicine for Community Care (CMCC)	Hong Kong Social Enterprise Challenge (HKSEC) 2015	Semi-finalist
Chinese Medicine for Community Care (CMCC)	Shenzhen-Hong Kong-Taiwan Innovative and Exchange Programme 2015	Best Unit Award
Chinese Medicine for Community Care (CMCC)	Junior World Entrepreneurship Forum (JWEF) Macau 2015 *	5th Place; Most Creative Award

**Remark: JWEF Macau 2015 was hosted by the Macau University of Science and Technology (MUST) on 14-17 April 2015 while HKBU was one of the co-organisers. Two teams from HKBU participated in this Forum. In the Business Competition Section, five awards were presented and the CMCC Team from HKBU was awarded the Most Creative Award among 18 finalists from Macau, Nanjing and Hong Kong.*


Online Platform Development

The BEST Facebook page contains updated news and inspiring entrepreneurial stories. Over 300 users liked or followed the updates of the page and its promotion is still going on. With the support from the Office of the Government Chief Information Officer (OGCIO), the BEST Programme registered an account on the "iStartup" portal, in which hundreds of start-up companies in Hong Kong are connected with their latest update of activities and announcements. Through this portal, the resources and activities provided by the BEST Programme, such as the Entrepreneurship Seminar/Innovation Lab Series, can better serve the local start-up community.

Like us on Facebook
facebook.com/besthkbu

facebook.com/besthkbu

Favourite Local Entrepreneur Election

In order to encourage students to participate in entrepreneurial activities at HKBU, "Favourite Local Entrepreneur Election" (齊來票選本土創業家) was launched. At the beginning, all students were invited to nominate their favourite local entrepreneurs during 1 - 17 April 2015. Top five nominated local entrepreneurs (in no particular order) were:

1. Mr Jerry SIU, Founder of Journalize
2. Mr Timothy MA, Founding Member of the Social Entrepreneurship Forum and Vice-chairman of the General Chamber of Social Enterprise
3. Mr Ricky WONG, Chairman and Founder of Hong Kong Television Network Limited and Founder of Hong Kong Broadband Network Limited
4. Dr Royce YUEN, Chief Executive Officer of New Brand New
5. Mr Stark CHAN, "Son of the Star" and Co-founder of Bull B. Tech

An election opened to all HKBU students took place during 18 - 24 April 2015. During the voting week, a total of 677 votes were received. Mr Ricky WONG received 411 out of 677 votes and was elected as the Most Favourite Local Entrepreneur. Followed by the election, Mr Wong was invited as a guest speaker in the upcoming seminar on 22 September 2015.

Massive Open Online Course

With a generous donation from Ms Ming PANG of KADOSH Health & Beauty Co Ltd. (KADOSH), KTO further encouraged and supported the training and education of young entrepreneurs or young people who wish to be entrepreneurs at HKBU through a cash reimbursement scheme to participate in online entrepreneurship courses.

This donation would be given as grants for students at HKBU who had enrolled and completed one of the Massive Open Online Course (MOOC) entrepreneurship courses. Tentatively, 25 grants are available for students in the first round application. The suggested online course providers are listed below:

- EdX Inc. *(http://www.edx.org)*. EdX offers interactive online courses and MOOCs from the world's best universities, colleges and organisations. Online courses from MITx, HarvardX, BerkeleyX, UTx and many other universities are available. Topics include, but not limited to biology, business, chemistry, computer science, economics, finance, electronics, engineering, food and nutrition, history, humanities, law, literature, mathematics, medicine, music, philosophy, physics, science and statistics. EdX is a non-profit online initiative created by two major founding parties including Harvard University (Harvard) and the Massachusetts Institute of Technology (MIT).
- Coursera Inc. *(http://www.coursera.org)*. Coursera provides universal access to the world's best education opportunities. Partnering with top universities and organisations, they offer courses for anyone verified at a small amount of fee.

HKBU

Technology Start-up Support Scheme for Universities (TSSSU)

Up to HK$1,200,000 can be available to you!

Be ready for your start-up opportunity of a lifetime.

HKBU received a total of HK$8 million technology fund in the years of 2014-15 and 2015-16 to boost commercialisation of R&D projects

In 2014, Hon. John TSANG, the Finance Secretary of the Government of the HKSAR, announced in the 2014-15 Hong Kong Budget that the Innovation and Technology Commission (ITC) would launch TSSSU, a grant scheme up to HK$4 million per year per university, to support technology start-ups from the six public universities in Hong Kong. HKBU has proactively participated in technology transfer projects for years, thereby becoming the first local tertiary institution to attain full grants under the scheme for two consecutive financial years of 2014-15 and 2015-16.

Under the Community Engagement banner of HKBU Vision 2020, one key intended outcome is to deliver effective Knowledge Transfer (KT). The identified Key Performance Indicator(s) (KPIs) for this intended outcome are improvements in the:

- Number of KT projects, and
- Increased impact of patents.

The achievement in successfully spinning off five technology start-ups from HKBU, namely Cathay Photonics Limited, OPER Technology Limited, R&P Technology Limited, ANA Artwork Material Analysis Company Limited and Flow Imaging Technology Limited, has direct positive outcomes towards achieving the above KPIs wherein the five technology start-ups hold licensed patents developed by the faculty of HKBU. Furthermore, through these five technology start-ups, HKBU is able to increase the number and enhance the impact of the KT projects in engagement to the community-at-large. Please refer to P.85-P.93 for details.

Building on the success and good work, four technology start-ups received the second year grant on 1 April 2015 to continually develop their technologies including, advanced film thin technology for displays; optical communication and imaging; nanomaterials-based personalised medicine for the treatment of neurodegenerative diseases; patented laboratory device; and analytical technology for artwork authentication.

Acknowledgement: Innovation and Technology Fund (ITF) supported by Innovation and Technology Commission, the Government of the Hong Kong Special Administrative Region

Ir Dr Alfred TAN
Head of Knowledge Transfer Office
July, 2015

Name of TSSSU Technology Start-up:

Flow Imaging Technology Limited

Person-in-charge: Dr Robert CHAN Kai-yiu, Department of Physics
Technology Area: Environmental Protection and Green Technology
TSSSU Awarded Fund in Total: HK$1,000,000

Title

Phytoplankton Species Identification by Flow Imaging (PSI-FI) for Pollution Monitoring

Summary

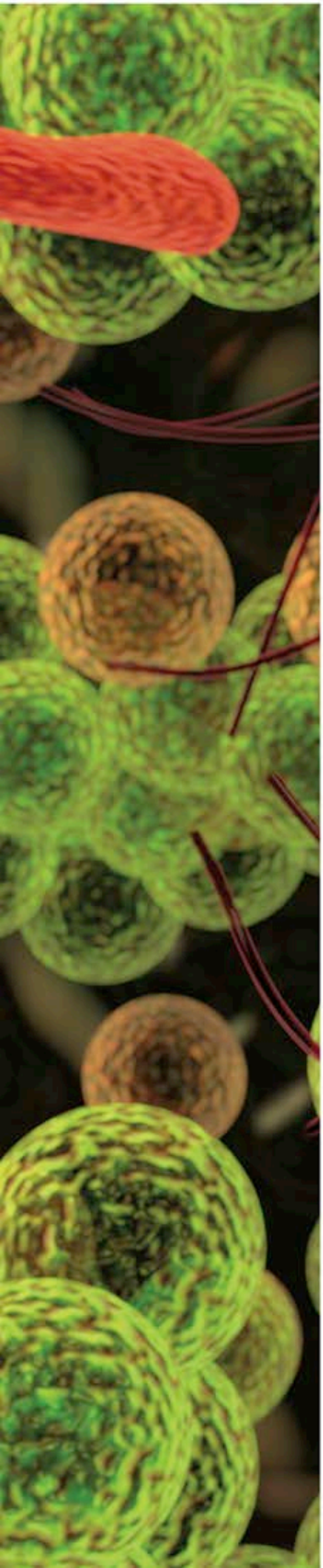
This is an environmental and economic impact case. There is an urgent need to tackle coastal water problems caused by pollution and global warming. Dr Chan's team has developed a technology called PSI-FI, an acronym for Phytoplankton Species Identification by Flow Imaging, for the pollution monitoring sector. A start-up "Flow Imaging Technology Limited", was founded in November 2014 by Dr Chan to commercialise this PSI-FI technology.

PSI-FI is a laser based instrument that combines light sheet microscopy with flow cytometry. PSI-FI detects fluorescence radiation emitted by the phytoplankton particles when excited by the laser light sheet. The fluorescence light is imaged on a scientific grade Complementary Metal Oxide Silicon (CMOS) camera. PSI-FI can perform operations of image capturing at very high flow rate and it is useful to monitor red-tides and algal blooms. This key feature has made PSI-FI competitive over existing monitoring instruments in the market.

Dr Chan believes one of the major users of this technology would be government agencies in China, who need to form a network of standalone stations that stretches along thousands of miles of the coastline for vigilant pollution monitoring. The potential sales volume of this monitoring instrument would be very high in the near future.

Underpinning Research

Global warming is a recognised phenomenon that changes our environment in a destructive way. The water way is one of the vital life support systems that we are relying on. Our oceans and lakes are becoming polluted and thus we are now facing an ever increasing daunting task of remediation. The polluted waters with many nutrients bring unwanted algal blooms and some are even toxic called



harmful algal blooms (HAB). For the lakes, these blooms and HABs desolate our drinking water supply. For the oceans, they devastate wildlife, fish stocks, shellfish, and even wipe out aquaculture business.

In Hong Kong, water sampling at key sites near aquaculture activities is performed twice a week to monitor the omnipresent of red-tides and algal blooms. In fact, phytoplankton is growing very fast and water currents may affect plankton communities in composition and abundances very quickly at a site. Some HAB species can render water toxics at extremely low concentrations, as low as about 200 particles in a litre of water. Unfortunately, the existing technologies and instruments are severely limited by their low volume throughput to sample vast amount of water. Even the very best instrument may require six hours to sample about 1/10th of a litre, or 100 ml. Clearly, this is inadequate for monitoring applications that cover the vast expanses of water.

The instrument designed by Dr Chan's team can detect phytoplankton particles hundreds time faster than existing technology. It is also capable of capturing morphological image information for species identifications, which makes it useful for water treatment and water management industries as well. Moreover, this phytoplankton monitoring system aligns with the government initiative. Based on the merits of PSI-FI, Dr Chan was awarded the TSSSU grants in the year of 2014-15 to commercialise the invention.

References to the Research

Key Peer-reviewed Publications:

1. Wu J. L. & **Chan R. K. Y.** (2013). A fast fluorescence imaging flow cytometer for phytoplankton analysis. *Optics Express*, 21(20), 23921-26.
2. Wu J. L., Li J. P. & **Chan R. K. Y.** (2013). A light sheet based high throughput 3D imaging flow cytometer for phytoplankton analysis. *Optics Express*, 21(12), 14474-80.

Patent:

1. Wu J. L., Li J. P. & **Chan R. K. Y.** 「一種流式螢光顯微成像裝置及方法」. CN Patent 201310202769.7, 28 May 2013.

Grant:

1. Name of TSSSU Technology Start-up: Flow Imaging Technology Limited (TSSSU/HKBU/14/02/1)

   Funding Scheme: Technology Start-up Support Scheme for Universities (TSSSU) 2014-15

   Source of Funding: Innovation and Technology Fund, Innovation and Technology Commission, the Government of the HKSAR

   Period: 2 December 2014 - 31 March 2015

   Amount Awarded: HK$1,000,000

Details of Impact or Benefit

A rapid expansion of marine sensing has been brought by the urgent need to tackle coastal water problems caused by pollution and global warming. Flow Imaging Technology Limited was founded to commercialise the PSI-FI technology in this area.

Technology Advancement

The development of instrumentation for studying the marine environment has not been ground-breaking due to the hostile environment of the lakes and oceans and the lack of new technology development. Instruments such as Imaging Flow Cytobot (IFCB), developed by Woods Hole Institute of Oceanography in USA, can take images of microphytoplankton underwater for an impressive length of time, are used for HAB detection. However, they are costly and have low throughput performance.

Conventional flash photography used by IFCB is inherently restrictive as it has limitations in the speed of repeating flashes. Moreover, the depth of focus (DOF) is also stringent due to the very narrow flow tubes being used to confine the particles. It also affects the performance on image capturing while the speed of the flow is increasing.

Dr Chan has over 20-year research experience in marine instrumentation including underwater optical measurement systems. His research team's latest invention in flow imaging has solved many shortcomings faced by current instruments. In combining light-sheet microscopy with flow cytometry, PSI-FI can capture fluorescence images at a very high flow rate. Since the light-sheet is placed exactly at the focal plane of the imaging fluorescence microscope, the instrument does not have motion blur problems and images can be captured at very high speed, depending on the speed of the camera. Dr Chan's team has developed and tested a field instrument that can detect phytoplankton with sizes from 1 to 300 µm, which practically covers the most important phytoplankton in the seas and lakes from picophytoplankton to microphytoplankton.

Environmental and Economic Impacts

In view of a big market demand, Dr Chan established a start-up and recruited seven staff including CEO, Office Administrator, Production Manager, Software Engineers and Product Marketing Executives. They target to develop a hand-held prototype which can be used to form a network of standalone stations that stretches along thousands of miles of coastline as a vigilant pollution monitoring system. The potential high sales volume of PSI-FI is expected to bring impact to the economy.

Name of TSSSU Technology Start-up:

ANA Artwork Material Analysis Company Limited

Person-in-charge:	Dr CAI Yue
Technology Advisor:	Prof CHEUNG Nai-ho, Department of Physics
Technology Area:	Testing and Certification
TSSSU Awarded Fund in Total:	HK$1,500,000

Title

Laser Plumes Benefiting the Authentication and Conservation of Historic Objects

Summary

This project brings an impact to economy. A start-up "ANA Artwork Material Analysis Company Limited" (ANA) was established on 31 October 2014 to bring the technique plume laser-excited atomic fluorescence (P-LEAF) to market. The company has pioneered the use of this technique for the identification of pigments, ceramics and metals in and the in situ examination of objects that are of artistic and historical importance. ANA works closely with Hong Kong Conservation Office and Laboratorie de Rechereche des Monuments Historiques (LRMH) in France to transform the technique into an important analysis tool for museums and analytical laboratories in artwork and heritage preservation.

Underpinning Research

With extensive experiences of analytical spectroscopy, Prof Cheung realised that P-LEAF could be used to investigate artist's materials in a novel way. He led his research team to enable the full realisation of the potential of P-LEAF in the non-destructive technical examination of art objects.

The initial demonstration to overcome the "one-wavelength-one-transition limitation of LEAF" was made by Prof Cheung's team in 2005. A more universal LEAF probe that could analyse a huge range of (even unknown) elements at one single excitation wavelength was also developed. The team further reviewed the mechanism and applications of the technique and concluded that P-LEAF could tackle three real-world problems due to its high sensitivity. The first was the direct analysis of thin layers of dried paint for heavy metals such as lead when detection limits were well below the regulatory level. The

second was the analysis of valuable yi xing potteries when two look-alike specimens were differentiated based on practically non-destructive single-shot P-LEAF spectra. The third was the elemental analysis of ink when characters written with different brands of ink could be discriminated non-destructively. In this way, their research works represent a fundamental contribution to analytical spectroscopy.

In the past nine years, Prof Cheung's team successfully demonstrated the strengths of this laser plumes and published a series of papers in top-tier international analytical journals. They have been successfully granted a US patent in early 2014 and awarded the TSSSU grants in the years of 2014-15 and 2015-16.

References to the Research

Key Peer-reviewed Publications:

1. Chu P. C., **Cai Y.**, Tsoi Y. K., Yuen R., Leung K. S. Y. & **Cheung N. H.** (2013). Forensic analysis of laser printed ink by x-ray fluorescence and laser-excited plume fluorescence. *Analytical Chemistry*, 85, 4311-4315.
2. **Cai Y.**, Chu P. C., Ho S. K. & **Cheung N. H.** (2012). Multi-element analysis by ArF laser excited atomic fluorescence of laser ablated plumes: mechanism and applications. *Frontiers of Physics*, 7, 670-678.
3. Chu P. C., Yip W. L., **Cai Y.** & **Cheung N. H.** (2011). Multi-element analysis of ceramic and polymeric samples by ArF laser excited atomic fluorescence of ablated plumes. *Journal of Analytical Atomic Spectrometry*, 26, 1210-1216.
4. **Cai Y.** & **Cheung N. H.** (2010). Photoacoustic monitoring of the mass removal in pulsed laser ablation. *Microchemical Journal*, 97.2, 109-112.

Patent:

1. **Cai Y.** & **Cheung N. H.**, Chu P. C. "Method and Apparatus for Measuring Amount of Material Removed from Target in Pulsed Laser Ablation". US Patent 13/192,502, 28 July 2011.

Grants:

1. Name of TSSSU Technology Start-up: ANA Artwork Material Analysis Company Limited (TSSSU/HKBU/14/04/1)

   Funding Scheme: Technology Start-up Support Scheme for Universities (TSSSU) 2014-15

   Source of Funding: Innovation and Technology Fund, Innovation and Technology Commission, the Government of the HKSAR

   Period: 2 December 2014 - 31 March 2015

   Amount Awarded: HK$450,000

2. Name of TSSSU Technology Start-up: ANA Artwork Material Analysis Company Limited (TSSSU/HKBU/14/04/2)

   Funding Scheme: Technology Start-up Support Scheme for Universities (TSSSU) 2015-16

   Source of Funding: Innovation and Technology Fund, Innovation and Technology Commission, the Government of the HKSAR

   Period: 1 April 2015 - 31 March 2016

   Amount Awarded: HK$1,080,000

Details of Impact or Benefit

Core Technology

The core technology used in the service will be introduced as follows.

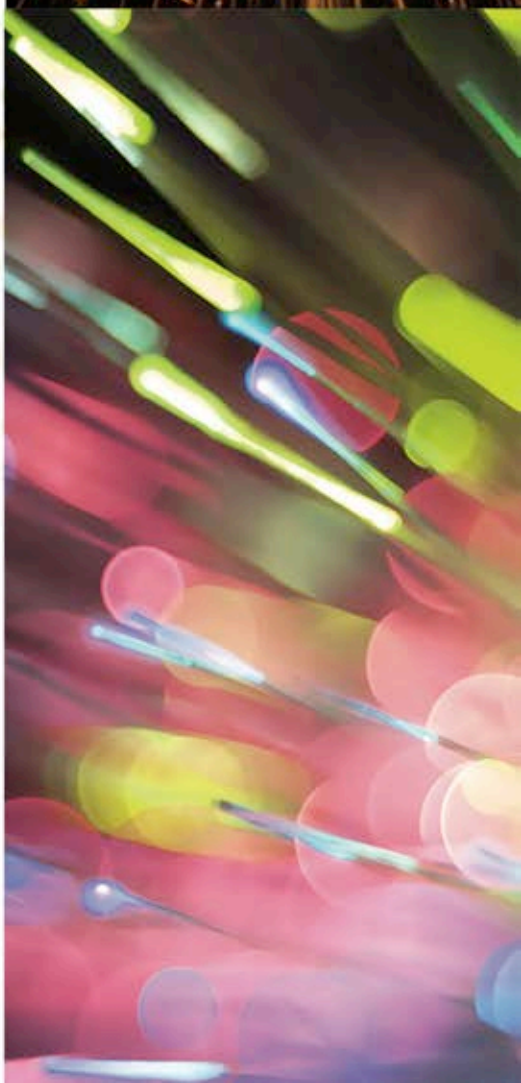
P-LEAF

P-LEAF consists of two laser beams to do the magic. As stated above, P-LEAF is Laser-excited Atomic Fluorescence of Ablated Plume. The critical differences of our technique versus conventional elemental analysis techniques are sensitivity and destructiveness. The testing procedure involves two lasers. The first laser pulse will generate a plume from the object surface and the second laser pulse will intercept the plume to induce fluorescence. The fluorescence signal will be collected by an intensified detector. The elemental information will be recorded in the computer for further data processing. The tested surface will be inspected under the microscope. No observable change will be found on the object surface. This is why it is called invisible damage testing. On the other hand, the sensitivity is incredible. In analytical analysis jargon, absolute limit-of-detection (ab-LOD) of P-LEAF could be down to attomole level and the relative limit-of-detection (rel-LOD) could be down to tens of part-per-billion level.

Technology Comparison

This section compares the P-LEAF with traditional technologies including XRF, LA-ICP-MS, and LIBS. P-LEAF has two critical edges over those conventional elemental analysis techniques: highly sensitive but practically non-destructive. The sensitivity of P-LEAF is 1,000 times higher than portable-XRF and LA-ICP-MS, and 100 times higher than LIBS' technique. These two merits are of the utmost importance to perform analytical analysis on precious objects such as Chinese paintings, ancient Chinese ceramics and gemstones. With the assistance of chemometrics, all details and features of the P-LEAF spectra will be utilised to produce meaningful results to aid authentication.

The start-up comprises of three personnel including President, Vice-President and Operation Manager to create databases for four different categories, i.e. Chinese teaware, ancient coins, Chinese inks on raw paper and Chinese ink on ripe paper. The development of pigment database is definitely of value to the conservation science field because it would be one of the first reference spectra collections for art materials. Furthermore, the research team is planning to develop an automated P-LEAF system that would potentially have a high commercial value.



List of Technology Start-up Support Scheme for Universities (TSSSU) Technology Start-ups

Name of TSSSU Technology Start-up:

Cathay Photonics Limited

Person-in-charge:	Dr LEE Ka-suen
Technology Area:	Advanced Manufacturing / Process Development, Nanotechnology and Materials Science
TSSSU Awarded Fund in Total:	HK$2,080,000

Summary

This project brings a huge economic impact. Through the extensive industry engagement over the years, Prof CHEAH Kok-wai is devoted to solving the technical problems that hindered the advancement of technology and economic growth. Recently, he has led his research team to demonstrate how to bring excellent research to the business and industry sectors, as evidenced by the support of a grant from the Innovation and Technology Fund for his start-up and a venture capital investment as well as engagement for prototypes with a few major cover screen manufacturers internationally.

This five-month-old start-up namely "Cathay Photonics Limited" (CPL) has won a venture capital investment from Radiant Venture Capital Ltd., which valued the company at about HK$50 million. The mission of CPL is to deliver low-cost, high-throughput fabrication of ultra-hard sapphire crystal thin-film. The technology would be applied to cover glass of watches and electronic devices such as mobile phones, tablets and smartphones. The tremendous ascent of CPL has both excited and mystified many.

With strong outreach efforts through the media, Prof Cheah has engaged with a few major suppliers of cover screen. In the meantime, Prof Cheah and his team won the HKBU Innovationem Award 2015 on 9 June 2015 in recognition of this outstanding work.

Underpinning Research

(Please refer to P.36 for details)

References to the Research

(Please refer to P.37 for details)

Details of Impact or Benefit

(Please refer to P.38 for details)

Name of TSSSU Technology Start-up:

R&P Technology Limited

Person-in-charge: Prof Ricky WONG Ngok-shun, Department of Biology

Technology Area: Biotechnology

TSSSU Awarded Fund in Total: HK$1,190,000

Summary

This project brings an impact on scientific research and development. In order to perform the biological testing in a more efficient, reliable and effective way, Prof Wong and his team have developed very user-friendly and highly reproducible device, which is currently marketed by the start-up R&P Technology Ltd *(http://www.rptech.com.hk/)*.

The key feature of this patented device is its eight-channel mechanical wounder, which resolves various technical problems associated with the cell migration assay. In biological science, this assay is vital and carries a lot of information to the scientists for their understanding of the mechanism of cell behaviours.

There are several advantages of this new device. Firstly, this wounder can be easily sterilised by autoclaving or with common disinfectants. Secondly, the individual adjustable pins allow even contacts on the surface of the cell culture plate so that sharp and reproducible wounds can be created. Thirdly, the guiding-bar on both sides of the wounder ensures consistent wounding position in each well. Lastly, the use of disposable plastic pipette tips for wounding can better handle the wounding process as well as minimise cross-contamination. In conclusion, this wounder can provide a large extent of flexibility on performing cell migration assay using 96-well culture plate.

Underpinning Research

(Please refer P.40 for details)

References to the Research

(Please refer P.41 for details)

Details of Impact or Benefit

(Please refer to P.42 for details)

Name of TSSSU Technology Start-up:

OPER Technology Limited

Person-in-charge:	Dr Cathy LUI Nga-ping
Technology Area:	Biotechnology, Nanotechnology and Materials Science, and Medical Device Technology and Nanomedicine
TSSSU Awarded Fund in Total:	HK$2,200,000

Summary

This is a social, public health and economic impact case. Researchers from the Departments of Biology and Chemistry have made a major breakthrough in the development of innovative technologies in personalised and nanomaterial-based medicines for the treatment of neurodegenerative diseases.

Traditionally, there is no way to harvest neural stem cells from adult subjects. Researchers usually use embryotic stem cells from embryo. Although there is another technology called Induced Pluripotent Stem Cell Technology or IPS technology, this IPS technology usually involves genetic engineering. Skin cells will be taken out from patients/donors and then their genes are modified to turning to be stem cells. One concern about this technology is to make use of "viral" vectors from virus, which is known as "pathogenic". Even though "pathogenic" vectors causing any disease from virus is not adopted, people still worry if the viruses might "immutate".

This is a pioneer group to harvest neural stem cells from the adult animals, manipulate the stem cells and transplant back into the same subject animal. After receiving the said treatment, all animals remain alive and healthy. This technique may cause significant implications in isolating individual patients' own neural stem cells for tailor-made treatments of their specific neurological problems in future stem cells therapy without the consideration of ethical issue. This patented technology in an early stage of development, may give exciting potentials in biological and clinical applications from bench to bed. Another patented technology is about the functional characteristics of carbazole-based fluorophores, which is blood brain barrier permeable, is able in imaging and treating Aβ peptides aggregation-associated diseases and preventing development and progression of said diseases. The use of carbazole-based fluorophores can be very safe due to extremely low toxicity and no radioactivity. Patents for both technologies are granted in the USA and now, the technologies are reached out to commercialisation through the technology start-up, media and website.

Underpinning Research

(Please refer P.44 for details)

References to the Research

(Please refer P.44 for details)

References to the Corroboration of Impact and Benefit

(Please refer P.46 for details)

Details of Impact or Benefit

(Please refer to P.47 for details)

Looking Forward

The Knowledge Transfer Office (KTO) at Hong Kong Baptist University (HKBU) will further explore the impact agenda, with the goal of establishing a position of leadership in Hong Kong based on the existing support of KTO's activities, its long standing and important contribution to Hong Kong welfare through the areas of academic strength at HKBU and the way in which knowledge transfer can contribute to whole person education.

Cultural and community engagement will be our main focus in the coming years. For example, engagement projects with the non-government or non-profit making organisations, including training the trainers or skill enhancement workshops, which are outside the school curricula for teachers as well as programmes to broaden the horizon and inspire thinking for HKBU's students, are strongly encouraged. It is anticipated to strengthen their partnerships with schools as well as stakeholder groups of their disciplines, such as professionals, non-governmental organisations, industries, etc.

In order to complement the efforts of the entrepreneurship in promoting an entrepreneurial culture on campus, the University will support students and staff members to establish start-ups through different funding schemes such as Technology Start-up Support Scheme for Universities (TSSSU). Furthermore, the "Massive Open Online Course" (MOOC) entrepreneurship courses and other events like local or global competitions for students would be promoted.

Through the on-going Knowledge Transfer Partnership (KTP) Seed Fund and Matching Proof-of-Concept Fund (MPCF) schemes, better connections between the research projects and community needs could be developed. Potential projects with interested community partners would be strongly supported. After the project completion, those cases can serve as examples to encourage faculty members to explore partnership projects with outside organisations and encourage them to think about the impact while planning their research projects.

Ir Dr Alfred TAN
Head of Knowledge Transfer Office
July, 2015

Appendix I- UGC Required Performance Indicators

Performance Indicators	2012-13	2013-14	2014-15	2015-16 (Projection)
Number of patents filed in the year (with breakdown by country and type)	Country	Country	Country	Country
	30 (US)	34 (US)	29 (US)	32 (US)
	4 (CN)	7 (CN)	7 (CN)	8 (CN)
	3 (PCT)	1 (EU)	6 (PCT)	7 (PCT)
		2 (PCT)	5 (HK)	2 (HK)
		2 (HK)	3 (EP)	
		1 (TW)	1 (CA)	
	Type	Type	Type	Type
	27 (A61)	1 (A47)	2 (A47)	2 (A47)
	4 (B82)	37 (A61)	28 (A61)	31 (A61)
	1 (G02)	1 (B82)	1 (A63)	1 (B82)
	5 (G06)	1 (C02)	1 (B82)	3 (C02)
		1 (C07)	3 (C02)	2 (C07)
		1 (C12)	2 (C07)	3 (G01)
		3 (G01)	3 (G01)	6 (G06)
		2 (G06)	7 (G06)	1 (H01)
			4 (H01)	
Number of patents granted in the year (with breakdown by country and type)	Country	Country	Country	Country
	3 (CN)	2 (CN)	5 (US)	4 (US)
	1 (US)	4 (US)	1 (CN)	2 (CN)
	Type	Type	Type	Type
	1 (B09)	2 (A61)	1 (A23)	5 (A61)
	1 (C07)	2 (G01)	2 (A61)	1 (G06)
	1 (C12)	2 (G06)	1 (C07)	
	1 (G06)		1 (G01) & 1 (G06)	
Number of licenses granted (with breakdown by type)	1 (Royalty)	1 (Royalty)	14 (Royalty)	15
Income (on cash basis) generated from intellectual property rights	HK$3,821,610	HK$6,504,793	HK$6,831,150	HK$7,510,000
Expenditure involved in generating income from intellectual property rights	HK$2,700,000	HK$3,000,000	HK$3,871,950	HK$4,259,145
Number of economically active spin-off companies	2 [N1]	3 [N1]	3 [N1 & N2]	3
Net income generated (or net loss arising) from spin-off companies	HK$754,000	HK$1,217,004	(HK$836,000) [N3]	HK$990,000 [N4]
Number of collaborative researches, and income thereby generated	13 HK$8,365,426	16 HK$8,974,416	16 HK$10,316,741	18 HK$11,350,000
Number of contract researches (other than those included in "collaborative researches" above), and income thereby generated	51 HK$17,109,589	40 HK$10,995,171	61 HK$23,851,333	67 HK$26,240,000
Number of consultancies, and income thereby generated	309 HK$22,404,720	246 HK$21,494,406	234 HK$19,676,326	260 HK$21,640,000
Number of student contact hours in short courses or e-learning programmes specially tailored to meet business or Continuing Professional Development (CPD) needs	62,245 [N5]	36,812 [N5]	53,153 [N5]	58,468

Performance Indicators	2012-13	2013-14	2014-15	2015-16 (Projection)
Number of equipment and facilities service agreements, and income thereby generated	209 [N6] HK$6,154,398	245 [N6] HK$7,095,461	230 [N6] HK$6,761,607	253 HK$7,440,000
Income received from CPD courses	HK$5,724,859	HK$5,022,723	HK$3,460,893 [N5]	HK$3,810,000
Number of public lectures/ symposiums/ exhibitions and speeches to a community audience	540	497	512	560
Number of performances and exhibitions of creative works by staff or students	71	108	137	150
Number of staff engaged as members of external advisory bodies including professional, industry, government, statutory or non-statutory bodies	125	138	156	170

N1 Company with some institutional ownership and using intellectual property from the institution

N2 Breakdown of the spin-off companies

* Institute for the Advancement of Chinese Medicine Ltd.
  - *Year of establishment: 1999*
  - *Size of employment: 3 (the General Manager, the Assistant Marketing Manager and the Product Development Officer), with other supporting staff contracted from HKBU*
  - *Nature of business: R&D of Chinese medicine products, testing and certification services, clinical trials, and publication of books*

* HKBU Science Consultancy Company Ltd.
  - *Year of establishment: 2011*
  - *Size of employment: All contracted out to HKBU for the experts and professionals required*
  - *Nature of business: Provision of consultancy projects on science disciplines*

* HKBU R&D Licensing Ltd.
  - *Year of establishment: 2014*
  - *Size of employment: Administrated by KTO*
  - *Nature of business: Intellectual properties commercialisation and trading*

N3 The significant decrease in the net income was due to a new additional cost for moving into Hong Kong Science & Technology Parks Corporation and a closure of laboratory.

N4 The projection was calculated by taking an average of the net incomes in 2012-13 and 2013-14.

N5 There was a significant number of free CPD courses offered in 2012-13 and 2014-15 and some expensive CPD courses reported in 2013-14 were not run in 2014-15.

N6 This number included data from Jockey Club Creative Arts Centre (JCCAC), the Academic Community Hall and The Chinese Medicine Teaching and Research Laboratory of the School of Chinese Medicine in HKBU.

Appendix II- HKBU Specific Performance Indicators

Performance Indicators	2012-13	2013-14	2014-15
Number of placements/ internships, and average length	1,196 places / 2.49 months	1,539 places / 2.87 months	1,628 places / 1.97 months [N1]
Books and other media for non-academic audiences	543	449	1,109 [N2]
Number of mentors by University and non-University staff	373	257	313
Number of videos produced by BU available for open access	1,256	1,455	1,471
Download count of postgraduate theses to addresses outside HKBU	50,962 [N3]	25,259 [N3]	30,579 [N3]
View count of BUTube outside HKBU	162,782 [N4]	141,263 [N4]	159,971 [N4]
Number of positive media impact related to knowledge transfer coverage, including print, on-line and electronic media	1,170 [N5]	1,228 [N5]	1,359 [N5]
Number of staff available for media contact	300 [N6]	331 [N6]	329 [N6]
Number of appointments of external members to HKBU advisory boards, committees or panels	238	235	261
Number of other activities related to Knowledge Application outside HKBU	39	28	46

N1 For placements/ internships running through two reporting years (2014-15 and 2015-16), the length of placements/ internships within 1/7/2014 - 30/6/2015 was reported in 2014-15 while the length of placements/ internships within 1/7/2015 - 30/6/2016 will be reported in 2015-16.

N2 According to the newly developed guidelines, regular publications were well-defined, for instance monthly articles issued were counted as 12.

N3 This number included the pageview of abstracts and actual downloads.

N4 The number included the BU staff and students download with IPs outside BU Library.

N5 The number included JCCAC data.

N6 The number was provided by the Communication and Public Relations Office of HKBU.

www.kto.hkbu.edu.hk