香 港 大 學
THE UNIVERSITY OF HONG KONG

ANNUAL REPORT 2022/23

Recurrent Funding for Knowledge Transfer
for the 2022/23 to 2024/25 Triennium

submitted to
University Grants Committee

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EXECUTIVE SUMMARY

Our knowledge exchange (KE) and technology transfer activities aim to bring knowledge created at HKU into the economy and society for the widest possible benefits. In 2022-23, the University continued to develop its commitment by: 1) reinforcing its efforts to encourage impact projects in strategic areas; 2) pioneering active industry engagement and conducive IP policies to unleash the great potential of research commercialisation; and 3) augmenting the HKU innovation & entrepreneurship ecosystem with concerted efforts and new initiatives.

On KE, the new Strategic Impact Funding Scheme was launched in March 2023 to encourage the formation of new projects with potential for significant impact in seven strategic areas – green and sustainable energy, health and medical technologies, industry 4.0, smart cities, food and nutrition, use of IT in education, and community engagement for governance and law. Each project can receive up to HK$500,000. The new scheme is in addition to our Impact Project Funding Scheme which offers up to HK$150,000 for impact projects and benefited 17 projects in 2022-23. (The University also aims for sustainability in its internal operations – it was ranked #1 locally and #34 globally by the 2023 QS World University Rankings for Sustainability. https://www.topuniversities.com/university-rankings/sustainability-rankings/2023)

On industry engagement and commercialisation, HKU signed a Memorandum of Understanding with the Hong Kong Applied Science and Technology Research Institute Company Limited (ASTRI), BICI, Shanghai Laboratory, etc. for closer cooperation in research, technology transfer and nurturing R&D talents. The University also announced a policy change to incentivise researchers to transfer their findings and technology to the community.

To augment the innovation and entrepreneurship ecosystem, the Techno-Entrepreneurship Core (TEC) was established to consolidate support and act as a platform for boosting entrepreneurship development within and beyond the campus. It officially debuted at the DreamOn2023 event in June 2023, attended by the Secretary for Innovation, Technology and Industry, Professor Sun Dong, and other dignitaries.

New funding initiatives were also launched. The Entrepreneurship Engine Fund is a university venture fund to provide seed capital for early-stage deep technologies and aims to build up a pool of $400 million. The HKU DeepTech100 is a new co-incubation of the TEC and Hong Kong Science and Technology Park (HKSTP) to nurture 100 deep tech start-ups from HKU within three years, providing up to $1.39 million in funding plus training and other benefits; 21 start-ups were admitted to the first cohort, which starts in January 2023.

These are in addition to other ongoing funding sources, including the government-funded Technology Start-up Support Scheme for Universities (TSSSU), which doubled its allocation to HKU in 2022-23 to $16 million, dispersed among 25 teams. Another seven HKU teams benefited from the new TSSSU+ scheme that provides matching funds, up to a maximum $1.5 million, for start-ups that secure private investment.

Programmes were also organised to train and support young and budding innovators and entrepreneurs. The iDendron Incubation Programme admitted 20 teams into its fifth cohort in May 2023, while the SEED Programme, another collaboration with HKSTP, provided 19 teams from HKU with up to $100,000 seed funding in 2023. The 10-week Entrepreneurship Academy attracted more than 200 applicants in its recent round, while the Tam Wing Fan Innovation Wings and Innovation Academy provided workspace for makers and researchers and opportunities to meet and learn from other scholars and entrepreneurs. Six faculties offered 29 credit-bearing courses related to entrepreneurialism during the year. And the HKU Business School also established the HKU Yuan Valley entrepreneurship based at its Shenzhen campus in October 2022 to support high-tech start-ups.

Engagement activities were also stepped up, post-COVID-19 restrictions. The InnoValley start-up competition was launched nationwide in April 2023 to showcase HKU-affiliated innovators and innovations and received more than 200 applications from six cities. Two online tech “road shows”, conducted in the Mainland during the year, attracted more than 1,000 visitors and investors to learn more about HKU’s latest cutting-edge technologies in biomedicine and engineering.

Finally, the University continued to recognise, and welcome recognition of, the groundbreaking achievements of our innovators. The HKU Innovator Award went to Professor Huang Mingxin, who has developed high-performance steels, including the world’s first anti-COVID-19 stainless steel. The KE Excellence Award went to Dr Guojun He, whose research has promoted understanding of China’s success in its war on pollution. HKU researchers also received 19 awards for 17 inventions at the 48th Geneva International Exhibition of Inventions, including two special grand prizes, one Gold Medal with the Congratulations of the Jury, six Gold Medals, six Silver Medals and four Bronze Medals (https://www.hku.hk/press/press-releases/detail/26060.html).

Looking ahead, the University is committed to using its position as the region’s top university to translate its research excellence into societal benefits in Hong Kong, the nation and the world, and to building a dynamic innovation and entrepreneurial culture in the HKU community.

1. DEEPENING INSTITUTIONAL CAPACITY FOR REALISING AND CORROBORATING IMPACTFUL RESEARCH

1.1 Strategic Impact Funding Scheme and Impact Project Funding Scheme

The Knowledge Exchange Office (KEO) introduced the Strategic Impact Funding Scheme in 2022/23 to encourage the formation of new projects that have the potential to create significant impact. Funding up to a maximum $500,000 is available under seven strategic themes, which were determined through data-driven analysis of key global and regional trends, the research prowess of HKU and the potential to contribute to HKU's KE strategy. The seven strategic themes are:

a) Green and Sustainable Energy (e.g., photovoltaic cells, enhancing energy efficiency of buildings and equipment, biodiesel, fuel cells, and new materials for energy solutions)

b) Health and Medical Technologies (e.g., cancer, AIDS, stroke, mind, post-COVID recovery)

c) Industry 4.0 (e.g., infrastructure to support Industry 4.0 including IT and high-speed Internet; manufacturing technologies; development of advanced equipment including lithography and scanning electron microscope)

d) Smart Cities (e.g., solid waste management, urban development)

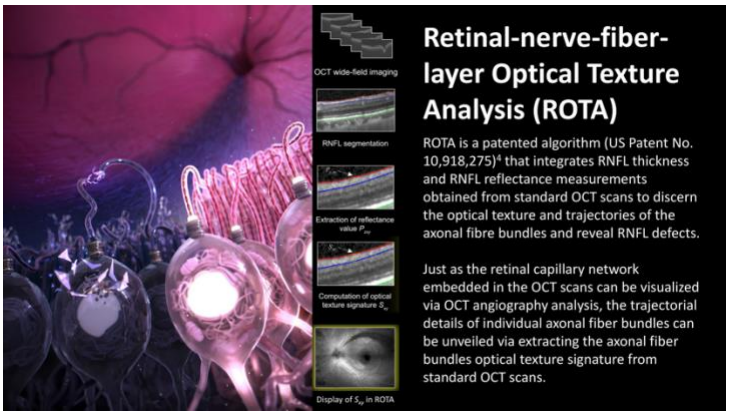
e) Food Security and Nutrition (e.g., malnutrition; biological control including pest management; food security)

f) Use of IT in Education (e.g., e-learning)

g) Community Engagement for Governance and Law (e.g., public engagement)

In addition, the KEO continues to organise the annual Impact Project Funding Scheme, which offers up to $150,000 for impact projects. In 2022-23, 17 projects benefited from this scheme. A full list of funded projects is available at the KEO website; two of these are highlighted below.

Impact Project Case 1: Deployment of a ROTA-based Screening Program for Prevention of Glaucoma Blindness



Glaucoma is the leading cause of irreversible blindness. While early detection of glaucoma with timely intervention is important to prevent permanent loss of vision, most current diagnostic paradigms cannot reliably detect early glaucoma and interpreting their results can be difficult even for seasoned ophthalmologists. In response, Professor Christopher Kai Shun LEUNG, Clinical Professor of LKS Faculty of Medicine, has partnered with Orbis Hong Kong and Topcon Japan on a funded project to deploy an innovative HKU-patented technology – ROTA, which stands for retinal nerve fiber layer optical texture analysis – that can identify undiagnosed patients with glaucoma for early treatment. This is being used in a city-wide glaucoma screening program.

Impact Project Case 2: Big-data Analysis of Hong Kong's Industry 4.0 Opportunities and Challenges in the Greater Bay Area

This multi-disciplinary project, led by Professor Hei Wai TANG of HKU Business School in partnership with the Hong Kong Productivity Council, takes a close look at the operational challenges, market orientation, willingness and challenges for firms in implementing Industry 4.0. The input includes a comprehensive survey of firms with headquarters in Hong Kong and operations in the Greater Bay Area (GBA) and other parts of the world, together with focus-group discussions with leaders in different fields. The findings will be summarized alongside experiences in other economies to formulate detailed policy recommendations that will define Hong Kong's role and required policies in helping to facilitate the transformation of the GBA into an international technology and innovation centre.

1.2 Interdisciplinary Collaboration Within and Beyond HKU

To connect the research community within and beyond HKU, the KEO organised Biomedical Engineering (BME) Mixers in 2022/23 to promote collaboration between the Faculties of Medicine, Dentistry and Engineering. The BME Mixers covered such topics as large collaborative research, collaboration with HKU Shenzhen Hospital, and applying interdisciplinary research in tech collaborations.

The University also organised a consultation forum on the HK-Shenzhen Innovation & Technology Park to explore strategies for collaborating and contributing to the development of innovation in the Greater Bay Area.

1.3 University-level Awards

The **HKU Innovator Award** and **HKU Young Innovator Award** are given to Faculty members whose innovations have exceptionally high potential impact (legacy or projected legacy) for transformative results. The winners in the 3rd round were Professor Mingxin Huang of the Department of Mechanical Engineering (HKU Innovator Award) and Dr Shuofeng Yuan of the Department of Microbiology.

The university-level **KE Excellence Award** is given to one project every year that has had significant economic, social, environmental or cultural impacts that have benefited society. The 8th round of the KE Excellence Award in 2022-23 attracted many high-quality entries, reflecting the commitment of HKU staff to KE, and was awarded to Dr Guojun He in the HKU Business School for his project, 'The Extraordinary Success of China's War on Pollution'.

Details of the winners are below.

HKU Innovator Award 2022 : Professor Mingxin Huang

Professor Huang from the Faculty of Engineering has been developing high-performance steels at HKU for the past 13 years. He and his team invented Super Steel, which holds two world records in terms of strength, ductility and toughness in metallic materials and was the focus of two studies published in the prestigious journal *Science*. He also invented the world's first anti-COVID stainless steel that can be used to produce lift buttons, doorknobs, etcetera, and has been licensed for the global market (see 2.2). Professor Huang is also a co-founder of a start-up company that invents and commercializes ultra-high strength automotive steels and, since 2022, has had its materials used by major carmaker Great Wall Motors.

Professor Mingxin Huang received the HKU Innovator Award for his exemplary research and its wide potential and achieved impact. More details of his innovations can be found in the KEO website at: https://www.ke.hku.hk/story/video/prof-mingxin-huang-from-the-department-of-mechanical-engineering-wins-the-hku-innovator-award

HKU Young Innovator Award 2022 : Professor Shuofeng Yuan

Microbiologist Dr Shuofeng Yuan has used state-of-the-art disease models and technologies to identify important targets and directions for tackling the SARS-CoV-2 virus that causes COVID-19 and other infectious diseases. He and his collaborators have used their findings to design new strategies, methods and leads for early and rapid diagnosis, develop immunization with live attenuated and synthetic vaccines, and develop therapeutic treatment targeting either SARS-CoV-2 or the host.

Apart from the academic impact of Dr Yuan's work, which has been published widely in such publications as *Nature*, *Science* and *The Lancet*, his findings have significant potential to help society manage the threats posed by emerging infectious diseases. For this work, Dr Yuan was awarded the HKU Young Innovator Award 2022. More details can be found in the KEO website at: https://www.ke.hku.hk/story/video/dr-shuofeng-yuan-from-the-department-of-microbiology-wins-the-hku-young-innovator-award.

KE Excellence Award 2022: '"The Extraordinary Success of China's 'War on Pollution'"

Dr. Guojun He's research has helped to promote understanding of China's success in its "war on pollution." He studied the costs and benefits of China's recent strategy to shift away from prioritizing economic growth over environmental concerns and the results were published in high-impact journals and covered widely by international media. Dr He then led an international research team to encourage Chinese volunteers to monitor major industrial polluters and file complaints about violations. This resulted in a 60 per cent reduction in these firms' violations and significant improvements in air and water quality across the country.

Dr. He has disseminated his findings to organisations such as the Ministry of the Environment and Ecology and the Asia Development Bank, as well as the public. He received the University's Knowledge Exchange Excellence Award 2022 for the impact of his efforts. More details can be found in the KEO website at: https://www.ke.hku.hk/story/video/the-extraordinary-success-of-china-s-war-on-pollution

1.4 Faculty KE Awards

The Faculty KE Awards Scheme recognizes significant KE impact by HKU academic staff at the Faculty level. The 12th round was held in 2022-23 and received 22 entries, illustrating the strong interest in KE in faculties. Two examples are described below.

Faculty KE Award, Case 1: Promoting Oral Health of Non-institutionalised Older Adults with A Non-governmental Organisation in Hong Kong

A team from HKU Dentistry has been collaborating with the NGO Project Concern to address the lack of regular dental care for older, non-institutionalised elderly in the community. Since 2014, their joint mobile service has provided free dental checkups and emergency treatment to more than 2,000 older adults. At the same time, staff at Project Concern have gained know-how in organising oral health promotion activities for this group.

This service, which has been supported by the HK Jockey Club Charity Trust Fund and local District Councillors, has potential to be a model for other aging societies globally, particularly in bridging oral and general health. The programme is led by Dr Amy Wai Yee Wong and her team members Professor Chun Hung Chu, Dr Duangporn Duangthip, Dr Conson Yeung, Dr Iris Xiaoxue Yin, Dr Ollie Yiru Yu, Dr Walter Yu Han Lam and Dr Katherine Chiu Man Leung. Collectively, they received the Faculty KE Award 2022 of the Faculty of Dentistry. More details are at Annex I-A.

Faculty KE Award, case 2: HKU AI Lawyer: Sentencing Predictor for Drug Trafficking

The first AI-assisted Sentencing Predictor for drug trafficking in Hong Kong was developed by Professor Anne Cheung of the Faculty of Law with colleagues from Law and Computer Science, including Professor Ben Kao, Professor Reynold Cheng, Dr. Felix Chan, Mr. Eric Cheung, and Mr. Michael Cheung. The Sentencing Predictor integrates legal domain knowledge from more than 3,100 judgments with machine learning models to give the public a better understanding of the likely legal consequences of committing drug trafficking offences and provide access to relevant legal judgements.

The Sentencing Predictor is especially helpful for social workers, who can have more confidence in advising arrestees and family members, and lawyers who can reduce time and cost demands. It has an accuracy rate of 92.12% and has been used by more than 5,100 users as of 2022-23. The project was a recipient under the KE Funding Scheme in 2019 and the team received the Faculty KE Award 2022 of the Faculty of Law. More details are at Annex I-B.

2. TECHNOLOGY TRANSFER AND INDUSTRY ENGAGEMENT

2.1 Partnerships and Outreach

HKU scholars and the Technology Transfer Office (TTO) continued to build up connections and collaborations with industry in the region and reached out to companies and investors to make them more aware of our innovations.

Engaging with a leading enterprise

Continuing to actively participate in discussions with top companies in the industry regarding collaboration opportunities in the fields of green technology, life-science technology, and digital technology. These discussions remained ongoing until the conclusion of the academic year in 2022-23, including with companies such as China Merchant Group.

Engaging with a government enterprise – Hong Kong ASTRI

HKU and the Hong Kong Applied Science and Technology Research Institute Company Limited (ASTRI) signed a Memorandum of Understanding (MoU) on 19 September 2022 for closer cooperation in research, technology transfer and nurturing R&D talents. ASTRI was founded by the HKSAR government in 2000 to enhance Hong Kong's competitiveness through applied research. The MoU sets a framework for facilitating research, development and commercialisation of joint projects, including shortening and streamlining the process for launching joint R&D projects for both HKU and ASTRI, as well as affiliated institutions of HKU. The two parties will also explore opportunities for collaborations through contract research. Altogether, the framework aims to make better use of resources to improve R&D quality, accelerate and improve the commercialization process, and bring advanced technologies from HKU to the world https://www.hku.hk/press/news_detail_25058.html.

Reaching out to Chinese industry and investors through tech 'roadshows'

The Technology Transfer Office co-organized two online tech 'roadshows' with the TechHUB of the HKU Beijing Center in November 2022 and March 2023 to highlight the latest cutting-edge technologies from HKU professors and spin-offs in biomedical and engineering areas. Each roadshow attracted over 1,000 visitors including leading investors in China. This platform not only promotes our scientific and technological achievements to the public but also creates opportunities for industrial collaboration, technology licensing and investment in potential spin-offs https://mp.weixin.qq.com/s/fw8QA1zASjirPCVfXHPJsQ.

2.2 Transferring HKU Technology

HKU has long brought its inventions to the community through patenting and licensing. In 2022-23, there are 90 newly granted patents and the income generated from IP is HK$27.78M. More importantly, they have been able to achieve impact with far-reaching consequences, as illustrated by the two examples below related to COVID-19.

Example 1: HKU anti-COVID-19 steel adopted by major kitchenware maker

An anti-COVID-19 stainless steel developed by Professor Mingxin Huang of the Department of Mechanical Engineering (also HKU Innovator of the Year, see 1.3) and patented through TTO was successfully licensed to one of the largest cookware and kitchenware manufacturers in China and globally. The company plans to develop anti-COVID-19 utensils for Hong Kong, Mainland China and elsewhere.

Example 2: HKU COVID-19 vaccine gets historic approval for emergency use in Mainland

An intranasal COVID-19 vaccine developed by HKU researchers in the Department of Microbiology in collaboration with Xiamen University and Wantai BioPharm gained approval from China's National Medical Products Administration for emergency use in the Mainland on 5 December 2022. The vaccine development started in January 2020 and patent filing followed soon after. The following two years entailed Phase I, II and III clinical trials by licensee Wantai BioPharm in various countries, such as the Philippines, South Africa, Columbia and Vietnam. By the end of 2022, the company had launched the first sale of the vaccine in Beijing https://www.hku.hk/press/press-releases/detail/25507.html.

2.3 Strong Performance at the 48th Geneva International Exhibition of Inventions

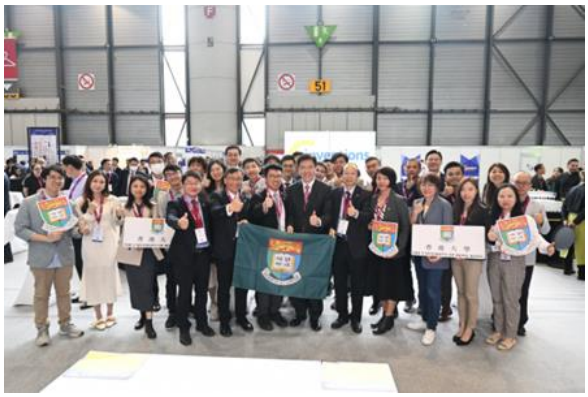
The Geneva International Exhibition of Inventions, held annually in Switzerland, is the top global event dedicated to inventions, where public and private organisations showcase their research and new products. After two years of being held virtually, the 48th edition was held in person in April and featured nearly 1,000 inventions from Asia, the Middle East and Europe that were reviewed by an international jury, which awarded HKU 19 awards for 17 inventions – a record for the University – including two special grand prizes (the Invention & Innovation CAI Award (China Delegation) and the Prize of the Delegation of Malaysia), one Gold Medal with the Congratulations of the Jury, six Gold Medals, six Silver Medals and four Bronze Medals. Two HKU winners are highlighted below https://www.hku.hk/press/press-releases/detail/26060.html.

Multiple award-winner developed AI technology to detect anomalies in human movements

The Artificial Intelligence MGF Network for Anomalies Detection, also called Glance and Focus AI Anomalies Detection, was developed by Dr Wilton Fok's team from the Department of Electrical and Electronic Engineering. It uses AI to analyse human posture and movements in real-time video to identify anomaly scenarios such as abuse, drowning, and criminal behaviour. The invention captured the two special grand prizes mentioned, as well as a gold medal, in keen competition.

Gold medal winner offers new, optimal platform to grow cells for clinical trials

The Programmable Cell Niche Engineering Platform, developed by Professor Barbara Chan's team from the Department of Mechanical Engineering, is ground-breaking technology that mimics the biological environment for cell growth to ensure accurate functions and enable effective innovations for drug screening, disease modelling, scaffold development and other regenerative medicine applications. It was awarded a Gold Medal with the Congratulations of the Jury.



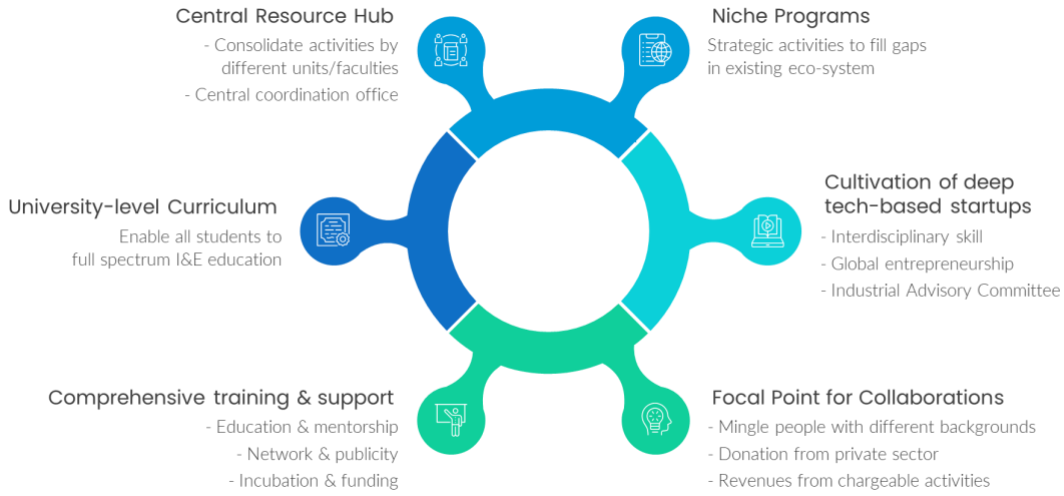
3. ENTREPRENEURSHIP DEVELOPMENT

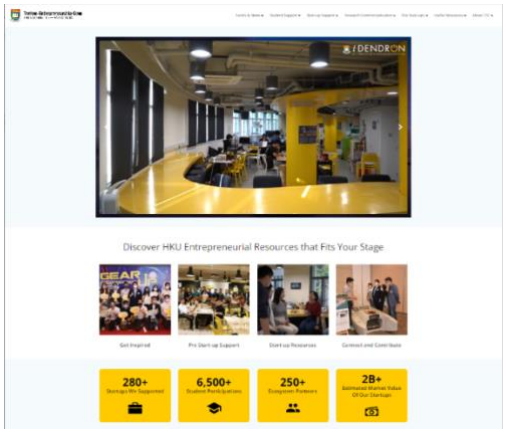
3.1 Transforming HKU's Entrepreneurial Landscape

HKU implemented new strategies in 2022-23 to boost entrepreneurship development. As an immediate incentive, it was announced that the University's typical stake in HKU emerging businesses would reduce from 10% to 5% and inventors could retain up to 80% of the profit from their intellectual property, up from about one-third. We also launched three major initiatives – the HKU Techno-Entrepreneurship Core, the Entrepreneurship Engine Fund and the nationwide InnoValley start-up competition – to attract and empower HKU-affiliated innovators.

3.1.1 Techno-Entrepreneurship Core: HKU's Entrepreneurship Resource Hub

Established in late 2022, the HKU Techno-Entrepreneurship Core (TEC) is a platform and hub for transforming HKU's entrepreneurial landscape and creating a robust and dynamic ecosystem within and beyond the campus. It has six functions: central resource hub, university-level curriculum, comprehensive training & support, development of niche programs, cultivation of deep tech-based startups and focal point for collaborations.





HKU TEC Website: Gateway to Entrepreneurship

The TEC launched a comprehensive website in June 2023 to be a centralized platform for collaboration, resources, advice and other support for HKU members on their entrepreneurial journey.

DreamOn 2023: HKU Innovation and Entrepreneurship Day

The University organised DreamOn 2023 on June 5, an annual innovation and entrepreneurship event that highlights HKU's latest innovation and entrepreneurship initiatives (this also marked the official debut of the TEC and Entrepreneurship Engine Fund). More than 400 students, graduates, researchers, investors and stakeholders attended the event, which showcased more than 40 HKU start-ups supported by the University's DeepTech 100 (see 3.3.1) and TSSSU@HKU programmes. There were also panel discussions with successful HKU entrepreneurs, live pitches from aspiring techno-entrepreneurs, and networking opportunities. Honorary guests included the Secretary for Innovation, Technology and Industry, Prof. Sun Dong, the former Chief Executive of the Hong Kong Exchanges and Clearing Ltd, Mr Charles LI, and HKU President Prof. Xiang Zhang.

3.1.2 University Venture Fund: Entrepreneurship Engine Fund

Starting the engine: launch ceremony of Entrepreneurship Engine Fund at DreamOn 2023

The University has approved the establishment of the Entrepreneurship Engine Fund (EEF), a university venture fund that aims to build up a funding pool of HK$400 million that will provide critical seed capital to early-stage deep technologies and help bridge the gap between concept and commercialization.
The EEF will also actively collaborate with investors and industry partners to co-invest in promising yet highly risky disruptive tech start-ups, leveraging their knowledge and resources to provide further support and opportunities for these budding start-ups.

3.1.3 InnoValley: 2023 HKU Innovation and Entrepreneurship Challenge

InnoValley: 1st Nationwide Start-up Competition by HKU

The pioneering InnoValley start-up competition was launched nationwide In April 2023 to connect and showcase HKU-affiliated innovators and innovations from across the country. The competition received over 200 applications from six cities, including Beijing, Shanghai, Shenzhen, Guangzhou, Chengdu, and Hong Kong. It was co-organized by TEC and the HKU Institute for China Business and was followed by a regional showcase in July 2023, leading up to a grand finale at HKU in December 2023.

3.2 Student Support: Cultivating Innovators and Entrepreneurs at HKU

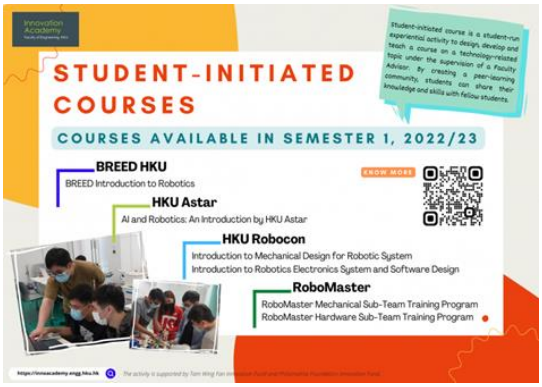
3.2.1 A World-class Hub to Catalyse Innovation

Innovation exploration at HKU has a dedicated space. The **Tam Wing Fan Innovation Wings** and **Innovation Academy** of the **Faculty of Engineering**, established in 2020, provide an open environment for students and teachers to engage in hands-on and interdisciplinary innovation. **Innovation Wing One** is a makerspace where students work with advanced technologies in areas such as

smart technology, advanced materials, aviation technology, and healthcare technology. Innovation Wing Two and the Edge are a platform for researchers in engineering and other fields to collaborate across disciplines, tackle grand challenges, deliver impactful research outputs, and hold open TechTalk sessions.

The Innovation Academy provides programmes to nurture, train and inspire future innovators – be they students, teachers or stakeholders – and showcase their work to each other, industry experts and the community. About 200 activities and events were held in 2022/23 that attracted over 10,000 participants. Highlights included:

- InnoInduction tours: Visitors were given tours of Innovation Wing One to showcase facilities, projects, and student communities.
- InnoHub: Selected students from all faculties were invited to this platform for cross-disciplinary collaboration.
- Sharing by innovators: Guest speakers shared insights and success stories related to innovation.
- Hands-on workshops: Small group workshops let participants have a go at such things as Robot Operating System, VR applications, and electronic beginners' skills.
- Project pitching: Students presented innovative ideas, recruited teammates, and secured academic advisors for project development.
- The Engineering Inno Show: Students presented their work, received feedback, and exchanged knowledge at this showcase carnival.
- Student-initiated courses: Students ran courses on topics outside the formal engineering curriculum.
- Research exhibition: Exhibitions featured cutting-edge research projects and InnoHK projects, addressing themes like "Engineering for Better Living" and "Digitalization."



3.2.2 Cultivating Change-makers through Global Experiential Learning

The HKU Business School has developed a series of strategies and programmes to promote innovation and entrepreneurship among students. The aim is to train students in the 'know-how' and creativity of innovation and entrepreneurship and to encourage learning by doing in collaboration with industry. Examples in 2022-23 include:

Global Entrepreneurial Experience in Beijing, Shenzhen, Tel Aviv and Ho Chi Minh City

This online event, held in December 2022, featured 28 high-profile speakers from around the world, including Nobel Peace Prize Laureate Muhammad Yunas, who spoke on the theme 'Poverty Reduction and Sustainable Development 2022'. More than 500 students and alumni attended the event, which was co-organised by the HKU Business School, HKU Beijing Centre, Shenzhen Campus, HKU-Tel Aviv Innovation Hub, and the HKU Representative Office in Vietnam.

"Creativity, Innovation & Entrepreneurship in China" Summer Programme

This 10-day programme brought together students from around the world to interact online with leaders from such firms as Alibaba Cloud, China Resources Capital Management, Presslogic, SaSa International, Ellalain (law firm), SenseTime, FTI Consulting, Grand Field Group Holdings, SquarefaceChan (Social Media), and Yello Marketing. More than 40 students participated on each of the 10 days. The event was held in summer 2022 and was conducted online due to COVID-19 restrictions.

"Innovation and Entrepreneurship Internship"

Fifteen students had the opportunity to enhance their innovation and entrepreneurship experience through this programme in 2022-23. They contributed to the analysis, trial and development of innovation projects in such industries as banking, insurance, web3, finance and marketing.

3.2.3 Student-driven Entrepreneurship Initiatives

Entrepreneurship Society

The Entrepreneur Society (ESo) is a student-led club and platform to foster an entrepreneurial spirit in the HKU community. In 2022-23, ESo events and activities attracted more than 400 student participants. A new initiative was also launched, called ESo Ventures, to bridge early-stage start-ups with angel investors in Hong Kong through the preparation of due diligence reports. In April 2023, an investment pitching competition, x Demo Day, was held were students pitched their due diligence materials for four start-up ventures.

Web 3.0 Hackathon@HKU - Interdisciplinary Innovation Event

This student-led event focused on Web 3.0 social applications on the theme "Into the Socialverse" and was jointly supported by the TEC, HKU Business School, HKU Law Faculty and other units in the University. Over 200 students from HKU and other local universities joined the 3-day event to learn about the latest developments in Web 3.0 and interact with industry veterans and successful entrepreneurs in this field.

3.2.4 Building Entrepreneurial Competencies

The **Entrepreneurship Academy** operated under iDendron (see 3.3.1) is a 10-week programme to bolster an entrepreneurial mindset and abilities. The programme resumed in-person sessions in the first semester of 2022, attracting over 200 applications from HKU students, staff, and the general public. The attendees gained invaluable insights into the start-up landscape from venture capitalists, start-up founders, and domain experts.

Entrepreneurship Academy Experiential Venture (EAEV)

In 2022, HKU received a private donation from an alumnus to experiment with a new initiative that allows students to try out the venturing process, from forming a team and brainstorming a business idea to bookkeeping and reporting. Five student teams applied what they learned to real-life situations during the Entrepreneurship Academy and developed business proposals.

3.3 Start-up Support

The University had several programmes in 2022-23 to nurture start-ups from early stage to highly evolved, and to develop the entrepreneurial capabilities of participants.

3.3.1 Nurturing Disruptive Tech Ventures

HKU DeepTech100 is a new co-incubation programme of HKU TEC and HKSTP aiming to nurture 100 deep tech start-ups from HKU within three years, and drive research commercialisation through start-ups. It offers up to HK$1.39M funding, structured entrepreneurship training, community and networking, one-year iDendron membership, public exposure, and fast track to the HKSTP Incubation Programme.

The first cohort of 21 start-ups started their incubation journey with HKU TEC in January 2023, working in cutting-edge fields ranging from 3D perception and AI-driven disease monitoring to advanced biomaterials and gene editing. Two cohorts of HKU DeepTech100 will be run every year. In the second round, which closed in late May 2023, more than 50 quality applications were received from start-ups run by HKU students, staff and alumni.

3.3.2 Supporting Early-Stage Start-ups

In 2022, the second round of the SEED Programme, which is also a collaboration with HKSTP, attracted about 150 applicants who were keen for a chance to receive entrepreneurship training opportunities, public exposure and up to HK$100,000 seed fund from HKSTP's Ideation Programme. Of these, 19 teams comprising about 50 participants were selected. This transformative programme will strengthen their foundation for future innovations and

successes.

The fifth cohort of HKU's **iDendron Incubation Programme**, was selected in May 2023. The six-month programme is designed to accelerate the growth of high-potential HKU start-ups through mentorship, legal and other professional support. Twenty teams were selected covering a range of industrial sectors, such as robotics, Web 3.0 and fintech.

3.3.3 Embracing GBA Opportunities

Innovation opportunities are accelerating across the entire Greater Bay Area (GBA) and HKU has been encouraging students and staff to embrace these. The **Gear Up programme,** funded by The Youth Development Commission, boosts youth entrepreneurship by providing funding and support to start-ups, enabling them to accelerate business growth in the GBA. From April 2021 to April 2024, it is supporting 14 HKU start-ups, which are making good progress – about one-third of them have started collaborations with companies in the Mainland.

The HKU Business School has established the **HKU Yuan Valley** entrepreneurship base at its HKU Business School-Shenzhen Campus. The base offers incubation and support service plus physical workspace and meeting rooms etc. for high-tech start-ups in a convenient location in Futian District, Shenzhen. Since October 2022, more than 10 start-up teams have been accepted in three rounds through the review panels of HKU professors and industrial experts.

3.4 TSSSU@HKU Strengthens Support for Innovators

The Technology Start-up Support Scheme for Universities (TSSSU), which is funded under the government's Innovation and Technology Commission (ITC), entered its 9th year of operation in 2022-23 with a substantial increase in funding. The allocation under TSSSU@HKU was doubled to HK$16m and dispersed among 25 teams to support them in starting technology businesses and commercialising their R&D results. The two top recipients are described below:

- ***MetTactics Limited*** from the School of Biological Sciences will produce a precise microfluidic chip for modelling cancer cells in metastatic state

- ***EC Innovation Limited*** from the Department of Chemistry will provide solutions

for environmental problems through innovative electrocatalytic technology

In addition to the original scheme (now called TSSSU-O), the ITC introduced **TSSSU+** in the third quarter of 2022 to provide dollar-to-dollar matching funds for start-ups that secure private investment. Seven HKU teams were selected to receive this funding in FY2023/24, with two showing especially promising results and being awarded the maximum HK$1.5 million in matching grants:

- ***Hong Kong Univisual Intelligent Technology Limited*** from the Department of Electrical and Electronic Engineering uses AI technology to analyse human movements and is a spinoff from the team led by Dr Wilton Fok that won multiple awards at the 48th International Exhibition of Inventions of Geneva (see 2.3). With support from the Smart Traffic Fund, they will explore using thermal images to analyse pedestrian movements and postures at traffic light junctions, so those in need, such as the elderly, children or people in wheelchairs, can be given extended time to cross the road https://www.881903.com/news/amp/local/2486115.

- ***BayVax Biotech Limited*** from the School of Biomedical Sciences develops synthetic vaccines and novel immunotherapy to prevent and treat different diseases. The start-up, led by Prof. Jiandong Huang and his team, also offers partners an AI-generative antigen design platform to support precise immune programming. The core technology won a gold medal in the 48th International Exhibition of Inventions of Geneva and was admitted to the Incubio program at the Hong Kong Science and Technology Park this year https://www.tto.hku.hk/f/newsletter/1757/newsletter%20issue%203%20Aug%202023%20success%20story%20final.pdf.

3.5 Start-up Successes

In 2022-2023, many start-ups supported by HKU TEC earned important awards or achieved commercial milestones, including successful fundraising from local or international investors. Several recent successes are highlighted below.

a. Archireef Limited

Archireef Limited, a green tech startup featured in Forbes Asia's 100 to Watch, revolutionizes coral reef restoration by combining marine biology, material science, and advanced 3D printing technology. Using eco-friendly terracotta, Archireef creates innovative 3D printed coral reef tiles, offering a sustainable solution to revive marine ecosystems. This promising venture has secured seed funding from an Abu Dhabi-based investment and holding company, ADQ. and was among the 15 Finalists of Hello Tomorrow APAC 2022, propelling it towards a brighter future for our oceans.

b. Gense Technologies Limited

Gense Technologies, a trailblazing startup, is revolutionizing healthcare by enabling at-home medical checkups. Their innovative medical-imaging device and app facilitate early detection of lung, kidney, and liver diseases, while also monitoring chronic conditions affecting vital organs. Recognized on Forbes Asia's 2022 100 to Watch list, Gense Technologies reached the finals of Hello Tomorrow APAC 2022 and participated in the esteemed Hello Tomorrow Global Challenge in Paris.

c. Open Ocean Engineering Limited (Clearbot)

Launched in 2019, Clearbot began as a student project aimed at aiding Indonesian surfers in cleaning waterways. The Hong Kong-based startup specializes in creating self-driving electric boats that collect waste, conduct remote inspections, and transport cargo. With a 20-kilometer range and 200-kilogram payload capacity, Clearbot has contributed to cleanup initiatives in Hong Kong and India and emerged victorious in competitions organized by Alibaba and Microsoft. The JUMPSTARTER 2022 Global Pitch Competition winner secured seed funding from Alibaba Entrepreneurship Fund, Gobi GBA, and CarbonX Global.

d. Vispek Technology Co. Limited

Vispek Ltd is a startup founded by researchers from the Department ofChemistry. Vispek develops state-of-art, low-cost spectral sensors and AI algorithms for a variety of industrial and consumer applications. Vispek has raised over US$6 million since its incorporation, including the latest Series A+ round from Gaolue Capital and XY Capital in December 2022.

4. QUANTITATIVE INDICATORS AND FINANCIAL REPORT

HKU uses a broad definition of KE, hence our performance indicators include not only those required by UGC, but also other indicators that are germane to the University's KE efforts. Two tables on the UGC and HKU performance indicators are at Annex II.

5. LOOKING AHEAD

HKU is committed to sharing its forward vision for fostering innovation and entrepreneurship within our community. As a leading institution with a long-standing history of academic excellence, we recognise the importance of cultivating an environment that encourages the development of creative, forward-thinking ideas. Our strategic focus on innovation, KE and entrepreneurship is a testament to our commitment to nurturing future generations of leaders who will contribute to the global knowledge economy.

In recent years, HKU has made significant strides in promoting innovation and entrepreneurship. In 2022-23, we launched the Innovation and Entrepreneurship Hub, known as Techno-Entrepreneurship Core (TEC). It serves as a one-stop coordinating office to synergise and enhance HKU's efforts in promoting innovation and entrepreneurship, build a vibrant ecosystem to nurture startups, and act as a collaborative space for students, alumni, and industry partners. Additionally, our Technology Transfer Office continued to facilitate the commercialisation of numerous research projects, turning groundbreaking ideas into real-world solutions. This dedication to transforming knowledge into societal impact has led to HKU's consistently high ranking among the top universities globally for innovation and knowledge exchange.

Looking ahead, HKU will continue to hone its strategic KE efforts, introduce new initiatives, forge more partnerships and extend the impact of our research in Hong Kong and beyond. We will drive the entrepreneurial landscape forward with a three-pronged approach: **Dream Big** – to instil the spirit of ambition and imagination, encouraging students and researchers to push the boundaries of what is possible; **Innovate Deep** – to continue empowering start-ups working on cutting-edge technologies such as AI, advanced materials, and biotech, with the goal of 100 game-changing ventures within three years; and **Stay Resilient** – to foster resilience and adaptability and to equip innovators with the mindset and skillsets for overcoming obstacles.

HKU will also continue to invest in state-of-the-art facilities and resources to

support our vibrant ecosystem of innovative research and entrepreneurial endeavours. By fostering strategic partnerships with industry, government, and international organisations, we will expand the reach and impact of our efforts. Furthermore, we are committed to integrating innovation and entrepreneurship into our curriculum across various disciplines, ensuring that all students can develop the skills and mindset required to thrive in the rapidly evolving global landscape – in 2022-23, six faculties offered 29 credit-bearing undergraduate courses on these topics. Together, we will continue to build a future where HKU remains at the forefront of innovation and entrepreneurship, inspiring and empowering our community to drive positive change in the world.

The University of Hong Kong
July 31, 2023

University: The University of Hong Kong (HKU)

Faculty: Dentistry

Title of case study: Promoting oral health of non-institutionalised older adults with a non-governmental organisation in Hong Kong

1. Summary of the impact (indicative maximum **100** words)

Dental treatment need of the 1.3 M Hong Kong older adults is large but the non-institutionalised older adults have no subsidised dental service. Most (78%) older adults had no regular dental care. HKU Dentistry has been collaborating with Project Concern in co-organising mobile dental care since 2014. In the past 10 years, more than 2,000 older adults received free dental checkup and emergency treatment. This service was subsequently funded by the Jockey Club Charity Trust till August 2022. This service demonstrated the success of HKU Dentistry to empower a non-governmental organisation to promote oral health of the needy older adults.

2. Underpinning research (indicative maximum **500** words)

The number of Hong Kong people aged 65 or above is expected to reach 2.5 million in 2039, thus becoming one-third of the population [1]. Surveys found most of the older adults suffered from tooth decay and gum disease [2]. Although the government has been supporting various dental care to older adults, non-institutionalised older adults have no subsidised dental service. Untreated dental problems and diseases will lower individuals' quality of life and their wellbeing. Unfortunately, most (78%) of the older adults did not seek regular dental check-up.

The HKU Dentistry has been monitoring oral health care of the older adults through conducting epidemiological surveys [3,4], and clinical researches for the older adults [5,6]. These researches developed effective strategies to improve oral health of older adults through oral health promotion and outreach dental treatment, including mobile dental care.

Project Concern Hong Kong is a non-governmental non-profit organisation established in 1961. The aim of the organisation is to provide dental services to poor and needy people. Project Concern Hong Kong has a dental team consisting of dentists and dental assistants, as well as and three mobile dental clinic vehicles serving various districts in Hong Kong. In the past, the dental service provided by Project Concern Hong Kong was largely secondary oral health care such as dental fillings and extraction. Working with the HKU Dentistry, the organisation realises that there is a need for them to provide a cost-effective primary oral health care service that focuses on prevention of oral diseases. The organisation has invited Professor C H Chu to join as an honorary board director to offer professional assistance and advice to improve their dental service, so that it can improve dental health of the people in need and to help in promoting the mobile dental clinic vehicles. By using the deployment of the mobile dental service, the dental care provided has improved the affordability, accessibility and availability to the people in need, particularly for the people with special needs, such as frail older adults or those who live in deprived communities [3-6].

The HKU Dentistry has been collaborating with Project Concern Hong Kong in co-organising this outreach dental service titled Smiley Action Day program since 2014. The program has served older adults residing in 19 neighbourhoods in 17 districts. So far more than 2,000 Hong Kong older adults have benefitted from this outreach program by receiving free dental checkup and fluoride therapy. Some had on-site scaling to improve their poor gum condition, and some had teeth extraction for pain relief. Evaluation showed this service has been well received by the community.

The HKU Dentistry has supported Project Concern Hong Kong to receive a grant of 2.52M in 2016 and a subsequent grant of 4.64M. Part of these grants was used to provide free dental care for the older adults till August 2022. The main activities are oral health education, dental examination, topical fluoride therapy, scaling and extraction to relief pain and infection in the mobile dental clinic.

3. References to the research (indicative maximum of six references)

1. Chan AKY, Tamrakar M, Leung KCM, Jiang CM, Lo ECM, Chu CH. Oral Health Care of Older Adults in Hong Kong. *Geriatrics* 2021 Oct 8;6(4):97. doi: 10.3390/geriatrics6040097
2. Chan AKY, Tamrakar M, Jiang CM, Lo ECM, Leung KCM, Chu CH. Common Medical and Dental Problems of Older Adults: A Narrative Review. *Geriatrics* 2021 Aug 6;6(3):76. doi: 10.3390/geriatrics6030076
3. Gao SS, Chu CH, Young FYF. Oral Health and Care for Elderly People with Alzheimer's Disease. *International Journal of Environmental Research and Public Health* 2020 Aug 7;17(16):5713. doi: 10.3390/ijerph17165713
4. Gao SS, Chen KJ, Duangthip D, Lo ECM, Chu CH. The Oral Health Status of Chinese Elderly People with and without Dementia: A Cross-Sectional Study. *International Journal of Environmental Research and Public Health* 2020 Mar 15;17(6):1913. doi: 10.3390/ijerph17061913
5. Gao SS, Chen KJ, Duangthip D, Lo ECM, Chu CH. Oral Health Care in Hong Kong. *Healthcare* 2018 May 11;6(2):45. doi: 10.3390/healthcare6020045
6. Gao SS, Yon MJY, Chen KJ, Duangthip D, Lo ECM, Chu CH. Utilization of a Mobile Dental Vehicle for Oral Healthcare in Rural Areas. *International Journal of Environmental Research and Public Health* 2019 Apr 7;16(7):1234. doi: 10.3390/ijerph16071234.

4. Details of the impact (indicative maximum **750** words)

Untreated oral diseases are significant economic and health burden, affecting millions of people globally [1,2]. The costly dental treatment and the insufficient dental supply or skewed distribution of dental workforce make it impracticable to control oral diseases in disadvantaged communities [3]. Mobile dental vehicles have been proposed as an alternative strategy to supplement the conventional dental services in many regions [4]. They have been used to provide dental care to the underserved populations, homeless or migrants [5]. The advance of dental devices enables mobile vans to be operated in a self-sufficient manner [6].

In the early 2014, The HKU faculty of Dentistry has been partnering with Project Concern Hong Kong by organizing public dental service program. The program started from 2014 to 2016 as the first phase with support of the HKU KE Impact Project Fund. The program was then named as Smiley Action Day. It focused on preventing and controlling common dental disease including tooth decay and gum disease. The program promoted oral health among poor and disadvantaged people. In the first two years, annual oral health promotion fairs called "Love & Clean Teeth Day" were held in 7 districts with the assistance of the district councillors and their team members. Results of seven events showed that a total of more than 500 older adults in total attended the fairs and more than 250 older adults received free dental checkup and emergency treatment including tooth extraction for pain relief. This project enhanced the availability and accessibility of dental care because the events were held in the venues where people are routinely gathered and with the support of the district councillors.

With HKU knowledge transfer and professional support, staff of the Project Concern Hong Kong have been trained and empowered to implement an effective outreach dental service. Furthermore, the capabilities of the staff of the Project Concern Hong Kong for planning, implementing and evaluating community services have been strengthened. Due to the success and benefit of the project implementation in Phase I, Project Concern Hong Kong, as the HKU oral health partner, successfully applied for a 2.52 M grant from the Hong Kong Jockey Club Charities Trust. The project is named "HKJC Smiley Action Day" which has been scaled up and expanded to offer service to the older adults in nearly all districts in Hong Kong. In 2016, the HKU Dentistry helped Project Concern Hong Kong to successfully get another 4.64 M grant from the Hong Kong Jockey Club Charities Trust to continue the service till August 2022.

The outreach dental services were held in 19 venues for older adults in need in different districts in Hong Kong. They reached a large number of older adults and their family members or care takers.

The venue of the events being held were as follows:

Tung Chung, Sha Tin, Tsz Wan Shan and Tin Shui Wai in 2014-15,

Tai Po, Kwai Hing and Sham Shui Po in 2015-16,

Kwun Tong, Tuen Mun, Wong Tai Sin and Tsim Sha Tsui in 2016-17,

Tseung Kwan O, Siu Sai Wan, Sha Tin and Kowloon City in 2017-18,

Ap Lei Chau, Kennedy town, Kwai Chung, and Fanling in 2018-19,

Sham Shui Po and Kwun Tong in 2019-2020,

No service due to COVID in 2020-2021,

Tin Shui Wai, Tuen Mun, Tsz Wan Shan, Ap Lei Chau, Tai Po, Sheung Shui and Tung Chung in 2021-2022

In summary, the outreach dental service was held in 17 districts in Hong Kong (only Wanchai district was not included). In total, approximately 2,000 Hong Kong older adults benefitted from this program by receiving dental checkup. Some of them received fluoride therapy, scaling and tooth extraction for pain relief in the mobile dental van. Approximately 5,000 older adults and their family members and care takers attended the Smiley Action Day Fair in 2014-2022.

Besides the clinical deliverables, results from the surveys using self-reported questionnaire surveys were conducted. The majority of the participants (96%) returned the completed questionnaires. The results showed that the service was well received by the older adults with high satisfaction. Most of them (93%) were satisfied or very satisfied with the program. In addition, the service raised dental knowledge and awareness of the older adults and their family members and care takers. Approximately 83% of them reported that the program was helpful or very helpful in raising their dental health knowledge and 90% of them reported the increased awareness towards their oral health.

5.Sources to corroborate the impact (indicative maximum of **10** references)

1. 東方日報網頁: 港人口腔健康意識低　牙科車駐沙田免費檢
   https://hk.on.cc/hk/bkn/cnt/news/20150321/bkn-20150321124722108-0321_00822_001.html

2. 東方日報網頁: 牙保健如汽車保養　港大牙醫師生到社區搶修
   https://hk.on.cc/hk/bkn/cnt/news/20191130/bkn-20191130040023834-1130_00822_001.html

3. University of Hong Kong website: HKU Faculty of Dentistry to hold "Smiley Action Day"
   https://www.hku.hk/press/news_detail_17412.html

4. Project Concern HK website: 2019 Oral Health Education Program
   http://www.projectconcern.org.hk/en/node/576

5. HKU Faculty of Dentistry Website: Smiley Action Day 2018
   https://facdent.hku.hk/news-and events/Smiley_Action_Day_2018.html

6. Facebook: 康耆英鄰舍牙科服務
   https://www.facebook.com/ProjectConcernHK

7. YouTube: 愛牙潔齒日 2015
   https://www.youtube.com/watch?v=YcZs_37A61s
8. YouTube:愛牙潔齒日 2016 - 2017
   Smiley action day video 2017: https://www.youtube.com/watch?v=a6u_LVxSd6o
9. YouTube:愛牙潔齒日 2017/2018
   Smiley action day video 2018: https://www.youtube.com/watch?v=bfSAyFuY-S0
10. YouTube:賽馬會流動牙科服務愛牙潔齒在社區-疫情下的新常態
    Smiley action day video 2021: https://www.youtube.com/watch?v=9DTnPr2zztI

University: The University of Hong Kong (HKU)

Faculty: Law

Title of case study: HKU AI Lawyer: Sentencing Predictor for Drug Trafficking

1. Summary of the impact (indicative maximum 100 words)

The research team developed the first AI-assisted Sentencing Predictor for drug trafficking in Hong Kong. The Predictor provides a convenient tool to the public to find out the likely legal consequences of committing drug trafficking offences, access relevant legal judgments, and aid deterring offences. In particular, it helps social workers to make confident predictions at the early stages in advising arrestees and their family members, thus relieving the stress of the latter arising from the uncertainty of legal consequence. It also benefits lawyers by reducing time and cost. By 10 May 2022, more than 5,100 users have used the Predictor.

2. Underpinning research (indicative maximum 500 words)

Drug trafficking is a prevalent problem in Hong Kong but many may not know the full legal consequence. The youth may easily fall into prey in the hands of drug syndicates. Arrestees and their family members are under stress arising from the uncertainty of the severity of legal consequence. Social workers often take great pains to obtain the sentencing information from news which is an unreliable source of information. Lawyers may spend much time to cross-check sentencing information. The process can also be time-consuming and costly.

Leveraging the advancement of AI technology, the research team designed a reliable AI-powered sentencing predictor for layman and professionals (social workers and lawyers) to be familiar with sentencing guidelines and consequences, and to provide a convenient tool for lawyers to cross-check legal information and cases.

Interdisciplinary and Collaborative Research with Department of Computer Science

Much attention has been placed internationally on how AI informs decisions about sentencing and how to use AI to assist people to obtain and make use of sentencing information. AI can be used to handle, process and discover legal knowledge embedded in a vast number of legal documents. It can draw insights from past judicial decisions to predict future outcomes.

In the first of its kind in Hong Kong, Professor Anne Cheung and her team consisting of Professor Ben Kao, Professor Reynold Cheng, Dr. Felix Chan, Mr. Eric Cheung, and Mr. Michael Cheung from law and computer science were awarded HKU Interdisciplinary KE Project Fund in 2019 to leverage AI technologies to develop a sentencing predictor for drug trafficking.

The Sentencing Predictor can predict sentencing in relation to 8 types of drugs commonly trafficked in Hong Kong. Based on a user's responses to four questions about the facts of his case, the sentencing predictor generates an estimation of the term of imprisonment and suggest highly relevant court cases. The predictor also explains the effect of individual factors on the overall sentence, i.e. the extent of enhancement or reduction of the length of imprisonment.

Compared with the traditional time-consuming way of conducting legal research by finding and reading a long list of relevant judgments to make a prediction, the user only needs to spend a minute to input information and then get a result from the Sentencing Predictor. The time and cost of doing the prediction task is therefore substantially reduced. For the professionals, the

Sentencing Predictor serves as a trustworthy and immediate accessible source of information.

The Sentencing Predictor integrates legal domain knowledge with machine learning (ML) models. The legal team captured legal domain knowledge by studying how human judges decide on sentences, identifying 82 common features of drug trafficking sentencing cases, extracting the features from 3,172 judgments, and selecting 11 salient features which are determining factors of sentencing for constructing predictor models. The Computer Science team applied ML techniques to construct the predictor which gives the accuracy of 92.12% (3.1).

The research also examined the role of explainability, the use of explanation techniques and the explainability requirements in the field of AI and law (3.2).

3. References to the research (indicative maximum of six references)

Book Chapter

(3.1) Tien-Hsuan Wu, Ben Kao, Anne SY Cheung, Michael MK Cheung, Chen Wang, Yongxi Chen, Guowen Yuan & Reynold Cheng, Integrating Domain Knowledge in AI-assisted Criminal Sentencing of Drug Trafficking Cases, in *Legal Knowledge and Information Systems: JURIX 2020: The Thirty-third Annual Conference*, pp.174-183 (Serena Villata et al. eds., IOS Press, 2020)

Conference Paper

(3.2) Yongxi Chen, Michael MK Cheung, Anne SY Cheung, Tien-Hsuan Wu, Ben Kao, Chen Wang, Guowen Yuan & Reynold Cheng, AI-Assisted Criminal Sentencing of Drug Trafficking Cases: A Model for Combining Human and Algorithmic Legal Decision-Making, in *Machine Lawyering Conference: Human Sovereignty and Machine Efficiency in the Law*, CUHK, Hong Kong, January 2021

Research grant:

"Artificial Intelligence for Legal Services: Sentencing Wizard on Drug Trafficking" (KE-ID-2018/19-21)

Funding Scheme: HKU Interdisciplinary KE Project Fund
Co-Project Coordinators: Professor Anne Cheung and Professor Ben Kao
Period: 2019-2021
Amount Awarded: HK$175,000

4. Details of the impact (indicative maximum 750 words)

Our Beneficiaries: NGOs, Lawyers & Public

The Sentencing Predictor has been widely used by social workers of Hong Kong Federation of Youth Groups (HKFYG) to provide drug counselling services to their clients. The sentencing predictor was evaluated favourably by HKFYG (5.10):

> "Prof. Cheung's and Prof. Kao's initiative to develop a sentencing predictor was heralded as a significant positive step towards translating obscure legal knowledge to comprehensible legal information … Our social workers and service users recognized the sentencing predictor is easy to use and the user interface is user friendly. They used the sentencing information generated by the sentencing predictor to design counselling plans and sometimes they used the sentencing predictor together with our clients. The sentencing predictor can handle cases involving different aggravating and mitigation factors. The terms used in the sentencing predictor are clearly explained with additional information in tooltips. The prediction page

shows prediction figures of different items in a clear way."

The Sentencing Predictor is recognized by legal practitioners as a useful tool in their practice:

1. "Provide great assistance to calculations and rough starting points"
   Mr. Freddy Woon, a criminal barrister of over 35 years' experience

2. "Give me an instant answer"
   A barrister of over 10 years' experience

3. "The sentencing predictor offers an extreme easy way to provide a preliminary view of sentence which I found very useful and helpful. I would also use it to double confirm my research on sentence as well. Thank you for providing such a good work for legal practitioner."
   Mr. Colin Leung, a barrister of 10 years' experience

Voice for Prisoners, a Hong Kong NGO helping imprisoned drug trafficking victims, lists the Sentencing Predictor as a resource on its website (https://www.voiceforprisoners.org/resources).

From 19 May 2021 to 10 May 2022, the Sentencing Predictor had recorded 5,173 users and made 7,922 times of prediction.

Workshop
A workshop to introduce the background of HKU AI Lawyer with a demonstration of how to use the Sentencing Predictor was held on 18 May 2021 at HKU. It was well received with 200 participants including lawyers, social workers and members of the public. The event was reported by local and foreign media outlets and online platform including HK01, Wen Wei Po, Oriental Daily News, South China Morning Post, Mirage News (Australia), OpenGov Asia (Singapore) and Hong Kong Lawyer (5.1-5.7). Subsequently, our team members were invited by Sing Tao News for a featured interview to introduce the project (5.8).

Invited Demonstration
The research team was invited by Hong Kong Science and Technology Parks Corporation to showcase the Sentencing Predictor at the 2021 World Artificial Intelligence Conference - Hong Kong Forum on 8 July 2021 at Hong Kong Science Park. The Conference was attended by more than 100 participants (5.9). The Forum brought together government officials, academic scholars, business leaders, pioneers, and entrepreneurs to share their unique insights on topics over the future development trends of artificial intelligence. Mr Michael Cheung, Research Officer of the Law and Technology Centre, and Mr Kevin Wu, Ph.D. candidate of the Department of Computer Science, introduced and demonstrated the use of the sentencing predictor to participants.

5. Sources to corroborate the impact (indicative maximum of 10 references)

(5.1) 港大推「人工智能律師」估算販毒罪量刑　　冀可作教育用途, HK01, 18 May 2021
https://www.hk01.com/%E7%A4%BE%E6%9C%83%E6%96%B0%E8%81%9E/626726/%E6%B8%AF%E5%A4%A7%E6%8E%A8-%E4%BA%BA%E5%B7%A5%E6%99%BA%E8%83%BD%E5%BE%8B%E5%B8%AB-%E4%BC%B0%E7%AE%97%E8%B2%A9%E6%AF%92%E7%BD%AA%E9%87%8F%E5%88%91-%E5%86%80%E5%8F%AF%E4%BD%9C%E6%95%99%E8%82%B2%E7%94%A8%E

9%80%94

(5.2) 港大研發「AI 律師」 估算量刑九成準, Wen Wei Po, 19 May 2021 http://paper.wenweipo.com/2021/05/19/HK2105190006.htm

(5.3) 港大研發 AI 販毒罪量刑估算程式 便利社工進行輔導, Oriental Daily News, 19 May 2021 https://hk.on.cc/hk/bkn/cnt/news/20210518/bkn-20210518161513108-0518_00822_001.html

(5.4) Hong Kong drug offenders get clearer view of options as new computer program scans thousands of cases to determine likely sentences, South China Morning Post, 19 May 2021 https://www.scmp.com/news/hong-kong/law-and-crime/article/3134048/hong-kong-drug-offenders-get-clearer-view-options-new

(5.5) HKU Law and Technology Centre launches HKU AI Lawyer: Sentencing Predictor for Drug Trafficking, Mirage News (Australia), 23 May 2021 https://www.miragenews.com/hku-law-and-technology-centre-launches-hku-ai-564813

(5.6) HKU Law and Technology Centre launches HKU AI Lawyer, OpenGov Asia (Singapore), 24 May 2021 https://opengovasia.com/hku-law-and-technology-centre-launches-hku-ai-lawyer

(5.7) HKU Law and Technology Centre Launches HKU AI Lawyer: Sentencing Predictor for Drug Trafficking, Hong Kong Lawyer, June 2022 https://www.hk-lawyer.org/content/hku-law-and-technology-centre-launches-hku-ai-lawyer-sentencing-predictor-drug-trafficking

(5.8) 港大研「人工智能」量刑 設販毒罪刑期方程式, Sing To Daily, 29 June 2021 https://std.stheadline.com/daily/article/2371075/%E6%97%A5%E5%A0%B1-%E6%B8%AF%E8%81%9E-%E5%B0%88%E8%A8%AA-%E6%B8%AF%E5%A4%A7%E7%A0%94-%E4%BA%BA%E5%B7%A5%E6%99%BA%E8%83%BD-%E9%87%8F%E5%88%91-%E8%A8%AD%E8%B2%A9%E6%AF%92%E7%BD%AA%E5%88%91%E6%9C%9F%E6%96%B9%E7%A8%8B%E5%BC%8F

(5.9) Invitation email from Mr. Dennis Mok of Hong Kong Science and Technology Parks Corporation dated 17 June 2021

(5.10) Support letter from Ms. Bob Lee, Supervisor (Youth Crime Prevention) of the Hong Kong Federation of Youth Groups dated 22 April 2022

Annex II

Quantitative Indicators

Table 1

Performance Indicators Laid Down by UGC	2022/23
Number of patents filed in the year (with breakdown by country and type) Note 1	363 Note 2
Number of patents granted in the year (with breakdown by country and type) Note 1	90 Note 3
Number of licenses granted (with breakdown by type) Note 1	169
Income (on cash basis) generated from intellectual property rights	$27.78M Note 4
Number of economically active companies with knowledge transfer and other related companies Notes 1 & 5	251
Net income generated (or net loss arising) from spin-off companies Note 6	$1.512M
Number of collaborative researches, and income thereby generated Note 7 - no. of projects - income generated	 50 $169.58M
Number of contract researches (other than those included in "collaborative researches" above), and income thereby generated Note 8 - no. of projects - income generated	 1090 $1,116.41M
Number of consultancies, and income thereby generated Note 9 - no. of projects - income generated	 1101 $92.73M
Total of collaborative researches, contract researches and consultancies Note 10 - no. of projects - income generated	 2241 $1,378.72M

Performance Indicators Laid Down by UGC	2022/23
Number of student contact hours in short courses or e-learning programmes specially tailored to meet business or continuing professional development (CPD) needs	7,416,892 Note 11
Income received from CPD courses Notes 12	$1,494M Note 11
Number of equipment and facilities service agreements, and income thereby generated - no. of agreements - income generated	 76 $30.36M
Number of public lectures/symposiums and speeches to a community audience Note 13	1,767
Number of performances and exhibitions of creative works by staff or students Note 13	123
Total of public lectures/symposiums/speeches to a community audience and performances and exhibitions	1,890
Number of staff engaged as members of external advisory bodies including professional, industry, government, statutory or non-statutory bodies	389 Note 14

(Data as of early July)

Notes:

1. The number of patents granted is unrelated to the number of applications in a particular year.
2. The number of inventions involved is 264 (this is the updated 2022-23 figure).
3. The number of inventions involved is 74 (this is the updated 2022-23 figure).
4. The reduction of income is predominantly due to the reduction in the cash dividend received in this reporting year.
5. The reported figure adopts the definition of the latest UGC Common Data Collection Format (CDCF) Guidance Notes 2021-22 to include the number of all economically active startups that have been established by staff, graduates or students and are now operationally independent of the university. They were either supported by the University's entrepreneurship programmes or other resources (including HKU DreamCatchers, iDendron, TSSSU@HKU, InnoWing, etc.), or obtained technology licenses from the University.
6. For reporting in the current year of 2022-2023, the Net Income Generated (or Net Loss Arising) received from the University's spin-off companies are reported. Past figures were reporting on the Net Income Generated (or Net Loss Arising) of the University's spin-off companies.
7. ITF projects with industrial sponsorship and other collaborative projects with at least two partners (one of which being a government or public body) were included.
8. Contract research projects commissioned by external organizations, and projects supported by funding schemes that allow non-higher education institutions to apply, including ITF projects without industrial sponsorship, Public Policy Research projects, and projects funded by the Food and Health Bureau, the SK Yee Foundation, Construction Industry Council, and Standing Committee on Language Education and Research (SCOLAR), were included. NIH projects have been classified as Contract Research since 2016/17.
9. Consultancy and service projects for KE commissioned by external organizations to the University or Versitech, and consultancies undertaken by individual staff as outside practice (excluding clinical service and teaching in other tertiary education institutes) were included.
10. It is considered more appropriate to group collaborative researches, contract researches and consultancies together because it is sometimes not easy to classify projects into these categories.
11. Starting from 2018/19, the number of CPD courses includes self-funded Ug/TPg programmes and programmes offered by HKU School of Professional and Continuing Education (HKUSPACE) which are identified as for CPD purpose in accordance with the definitions of CPD set out in UGC's Common Data Collection Format (CDCF).
12. Net income was provided.

13. Community, cultural and KE-related events organised by the University and those delivered by academic staff at the invitation of external organisations were included.
14. Some public advisory bodies have gone through reviews and streamline of size and membership in the past years, which may have contributed to a drop of number of academia members engaged.

Table 2

Other Performance Indicators of HKU	2022/23
Number of external advisory bodies membership held by HKU staff	1,807
Number of postgraduate theses on open access Note 1	30,990
Download count of postgraduate theses to addresses outside HKU Note 1	232,849
Number of publications on open access Note 1	35,565
Download count of publications to addresses outside HKU Note 1	1,151,187
View count of HKU Researcher Pages from outside HKU Note 1	5,339,922
View count of HKU Research Postgraduate Student Pages from outside HKU Note 1	46,335
Number of staff available for media contact	592
Number of placement/internships	8,904

(Data as of early July)

Notes:

1. These six indicators refer to the University's efforts in making knowledge accessible to society.

July 31, 2023