For discussion
on 18 February 2025

Legislative Council
Panel on Commerce, Industry, Innovation and Technology

Frontier Technology Research Support Scheme

PURPOSE

This paper briefs Members on the Frontier Technology Research Support Scheme (the Scheme), which aims to support institutions to enhance basic research facilities in frontier technology fields for fostering collaboration in scientific research.

BACKGROUND

2. Frontier technology is visionary, pioneering and exploratory, laying important foundation for the upgrade of advanced technology and development of emerging industries in the future. The National 14th Five-Year Plan has identified seven frontier technology fields for which a series of major science and technology projects will be launched. The Third Plenary Session of the 20th Central Committee of the Communist Party of China held in July 2024 also emphasises the need to fortify basic science and technology researches, as well as step up the planning of visionary and interdisciplinary researches in key frontier areas, while supporting Hong Kong in building an international hub for high calibre talent.

3. Our country promulgated a master plan on building China into a leading country in education in January 2025. The plan emphasises the role of strengthening education in supporting technology and talents, as well as aligning with the development of international innovation and technology (I&T) centre, national high-calibre talent hub and platform for attracting and pooling talents, which are all top priorities for enhancing the overall efficacy of the national innovation system.

4. The Hong Kong Innovation and Technology Development Blueprint (the I&T Blueprint) charted Hong Kong in full steam towards the vision of an international I&T centre. Among others, the I&T Blueprint highlights the importance of strengthening support for Hong Kong's original scientific research to better complement the frontier scientific research fields in line with the country's development priorities. Specific recommendations include –

(i) strengthening theme-based research to tackle key strategic technological problems and achieve breakthroughs;

(ii) enhancing support for universities and research institutes to conduct different types of collaborative, co-operative and inter-disciplinary research, so as to catalyse more original research and development (R&D) outcomes; and

(iii) bolstering support for universities' research institutes to expand their research capacities by assisting them in upgrading or securing research equipment and laboratory fixtures, thereby injecting new impetus into the sustainable development of basic research.

5. Given its strong capability in R&D and great originality, Hong Kong possesses the abilities necessary for making innovation out of the blue. Various local institutions are among the top in international rankings in disciplines relating to data science and artificial intelligence (AI)[1], electrical engineering[2], life science and medicine[3], etc. Meanwhile, many of our scholars have made outstanding contributions to their respective frontier fields and are recognised as some of the best scientists in the world[4]. R&D teams in Hong Kong have also accomplished considerable outcomes in AI, integrated circuits and deep space exploration.

---

[1] The rankings of Hong Kong institutions in the QS World University Rankings for the subject of data science and AI are: the Hong Kong University of Science and Technology (10), The Chinese University of Hong Kong (20), The University of Hong Kong (25), The Hong Kong Polytechnic University (32) and the City University of Hong Kong (39).

[2] The rankings of Hong Kong institutions in the QS World University Rankings for the subject of electrical and electronic engineering are: the Hong Kong University of Science and Technology (29) and The University of Hong Kong (47).

[3] The rankings of Hong Kong institutions in the QS World University Rankings for the subject of life sciences and medicine are: the Hong Kong University of Science and Technology (29), The University of Hong Kong (31) and The Chinese University of Hong Kong (48).

[4] According to Research.com, an international academic website, Professor Ron Chen of the City University of Hong Kong ranks fifth globally in the field of electronics and electrical engineering, while Professor Yuen Kwok-yung of The University of Hong Kong ranks eighth globally in the field of microbiology.

6. To dovetail with the key strategic planning of the country, we must attract international top-notch talents, and promote integrated development of education, technology and talent. Given our solid research capabilities, we see the need for Hong Kong to leverage further the favourable hardware and software as well as the dynamic academic and research atmosphere, with a view to injecting more impetus into basic research, thereby lifting the quality, quantity and efficiency of our existing R&D efforts.

7. Against this background, it was announced in the 2024-25 Budget that the Scheme will be implemented with the use of a $3 billion earmarked previously. The proposed framework and implementation details of the Scheme are set out in the ensuing paragraphs.

The Scheme

Objectives

8. The proposed Scheme aims to attract international top-notch talents, promote basic research and co-operation in frontier technologies, so as to support research institutes in enhancing their research capacities including hardware facilities, research teams, equipment and fixtures, etc., thereby consolidating and boosting the strengths of the upstream sector in I&T ecosystem, driving the development of midstream and downstream industries, and fostering the comprehensive development of the I&T chain. The proposed arrangements for the Scheme are set out below.

Eligibility

9. Applications are institution-based. An applicant institution must be a local university funded by the University Grants Committee (UGC). The application may be submitted jointly by universities, research institutes and other parties; in such cases, a UGC-funded university must take on the role as the lead applicant.

10. Applicant institutions should engage in basic research activities related to the seven frontier technology fields as identified in the National 14th Five-Year Plan, namely:

(i) AI;
(ii) quantum information;
(iii) integrated circuits;

(iv) brain science and brain-inspired research;
(v) gene and biotechnology;
(vi) clinical medicine and health; and
(vii) exploration in deep space, deep earth, deep sea and the polar regions.

11. A general description of the above seven fields is at **Annex**. Noting the rapid advancement in technology, we will also take into account other frontier fields that are closely connected to the high-quality development of Hong Kong to suit the local circumstances, with emphasis on the visionary nature and originality of the proposed research. Applications will be considered on a case-by-case basis by a steering committee to be formed by the Government under the Scheme (see paragraph 23 below).

12. While institutions are encouraged to submit applications covering more than one frontier technology fields, the Scheme will not mandate the projects under application to be inter-disciplinary, in order to allow more flexibility for the institutions to make planning and attract leading talents in different fields.

Key Elements

13. An application must comprise the following major elements –

(i) *R&D co-operation led by international top-notch talents:* The research facility under application should facilitate R&D co-operation led by international top-notch talents[5]. These R&D talents should be world-class researchers, scholars or scientists in the respective fields with distinguished academic standing and proven experience, demonstrating their exemplary research capability and visionary thinking. They should also be renowned for their outstanding accomplishments in frontier technology fields. At the same time, they should demonstrate exceptional achievements and leadership in research, teaching and collaborative programmes, so as to spearhead the scientific development; and

[5] The relevant talents leading the research facilities and projects of the universities should be research personnel who have worked at a university, public/private research institute or the research arm of a private enterprise outside Hong Kong for not less than three years in the past 10 years, and may be appointed six months before the submission of application the earliest. We will accord priority to applications for talents leading the research facilities and projects of the universities on a full-time basis.

(ii) *Funding subsidy on matching basis:* Funding will be provided on a matching basis. To encourage institutions to devote resources to talent attraction, in respect of the remuneration of researchers/ scholars, the funding subsidy will be provided at a matching ratio of up to 1 (Government): 1 (applicant institution and other funding). For expenses other than remuneration, funding subsidy at a matching ratio of up to 4 (Government): 1 (applicant institution and other sources), which may include in-kind[6] and non-in-kind support[7], is proposed. Details of the funding scope are set out in paragraph 16 below.

14. Where an application is successful, the applicant institution shall enter into an agreement with the Government. The applicant institution shall ensure that the research facility under application should commence operation within 18 months from the signing of the agreement with the Government, and operate for no less than five years. If the research facility project fails to perform according to the terms of the agreement signed by the applicant institution with the Government, the Government shall be entitled to terminate the agreement early, and to recover related funding if certain subsidy amount is eventually not used exclusively for the purposes concerned.

Funding Arrangements and Scope

15. We propose that funding support in an amount between $100 million and $300 million be provided to each successful application. It is anticipated that the Scheme could support around 10 to 30 projects in total, thus further consolidating and lifting institutions' advantages in research. The amount of funding support to be recommended for each approved application will depend on the merits of individual proposal and the matching subsidies. The subsidy offered under the Scheme is one-off[8] and may be disbursed to successful applicant institutions in tranches.

[6] In-kind support can be in the form of essential equipment and/or other non-cash support.

[7] Non-in-kind contribution can be in a form of capital investment and /or sponsorships. It must be a non-repayable cash contribution or an investment with no redeemable requirement so that the contribution would not become a potential debt for the institutions. Convertible notes and equity investment with redemption clause are not acceptable.

[8] Subject to the number of applications received, their content and the final project funding granted, we do not rule out the possibility of launching more than one round of applications until depletion of the $3 billion funding.

16. Funding subsidy approved under the Scheme can be used to provide financial support to the proposed project for covering expenditure items including but not limited to the following –

(i) operating costs, including remuneration for the scholars and research teams during the subsidy period [9];

(ii) purchase of equipment;

(iii) R&D associated costs; and

(iv) set-up costs of the research facility, including one-off fitting-out/ renovation/ upgrade.

17. No funding support will be provided under the Scheme for capital/ construction costs and rental purposes. An applicant institution should arrange to secure a suitable venue and set up the research facility on its own accord. When submitting the application, the applicant institution should also provide concrete proof that the space or premises intended to be used for the research facility has already been secured.

18. Under the cardinal principle of no double benefit, an applicant institution shall not seek funding support from other programmes funded by the public coffer for any expenditure items or part thereof already covered under the Scheme. In addition, the sources of the in-kind and non-in-kind support that the applicant organisation proposes to put in place must not overlap with any other public resources.

[9] To allow some flexibility for institutions, we propose not to set a ceiling on the amount of remuneration for the staff recruited. As mentioned in paragraph 13 above, institutions shall contribute, on a matching basis, at least half of the amount with respect to remuneration expenses.

Teaching and Intellectual Property (IP) Arrangements

19. To encourage research teams in the universities to conduct R&D work, we propose that universities be allowed to make use of the funding under the Scheme to ensure that the remuneration level of staff participating in relevant research work can be maintained; or for universities to employ additional staff to strengthen support for their general teaching activities, so that staff participating in relevant projects could devote more time to and focus on the R&D work. Universities may also choose to bear the above expenses and regard such commitment as support to the research project. As the above expenses are part of the remuneration of the researchers/scholars, the ceiling of the subsidy matching ratio for these expenses is set at 1 (Government): 1 (applicant institution and other funding) in accordance with paragraph 13(ii) above.

20. Regarding the IP arrangements, we propose that research teams/inventors should be entitled to no less than 70% of the IP benefits (for IPs generated by the research teams/inventors during the research period). This practice can provide greater incentive for local, Mainland and overseas research teams to participate in the related research work under the Scheme. All parties concerned should agree on the IP benefit sharing arrangements in writing prior to the commencement of the research project.

Submission of Applications

21. An application should comprise relevant information of the proposed project to be implemented, including research team, collaborating institutions, research objectives, expected outcomes, research projects, details of inter-disciplinary co-operation, venue arrangement, manpower and resources commitment, implementation plan, IP arrangements, budget, detailed breakdown of the contributions from the applicant institution and other partners, support to be provided by relevant universities, proposed milestones, and performance indicators, etc.

22. The performance indicators should cover different aspects, such as –

(i) nurturing of talents, including the numbers of top-notch scholars and scientists recruited from the Mainland or overseas, local post-doctoral researchers and PhD students, and other participants in the research projects;

(ii) the research outcomes, including the number of research projects, the number of research papers published/ cited by scientific journals, the number of patents, and the number of start-ups spun off from the research work done in the proposed facility; and

(iii) inter-disciplinary co-operation, including the number of cross-sectoral/institutional research projects, the amount of industry sponsorship and its proportion to the overall research budget.

Assessment and Approval of Applications

23. Applications should be submitted to the Secretariat for the Scheme to be set up under the Innovation and Technology Commission (ITC). A steering committee comprising representatives from the academia and the Government, etc. will be set up for assessing the applications after preliminary vetting by the Secretariat. On merit basis, the steering committee will assess the proposals having regard to the following criteria and circumstances of individual cases –

(i) standing and reputation of the scholars and scientists involved (in particular those scholars and scientists from outside Hong Kong), and the extent of their engagement (such as time commitment) in the relevant research projects;

(ii) relevance of the I&T components and research themes to Government's policies on promoting frontier technology development and how they can benefit the I&T sector and society as a whole;

(iii) technical and management capabilities of the lead applicant institution, the research teams and research collaboration partners (including local, Mainland and overseas research teams) as well as their track records; and

(iv) the financial sustainability of the proposal (for example, the reasonableness and financial viability of the estimated expenditure, and the level of commitment from the applicant institutions and other partners) to enable the research facility under the project to operate on a self-financing and sustainable basis in the long-run.

24. Subsidies may be provided for all or part of the funding requested in an application.

Execution and Monitoring

25. As mentioned in paragraph 14 above, if an application is successful, the applicant institution shall enter into an agreement with the Government. Successful applicant institutions shall comply with the requirements as set out in the agreement signed with the Government and ensure the prudent use of public funds. Each relevant institution is required to submit regularly progress reports (on, amongst other things, how far the relevant milestones/performance indicators are achieved), audited accounts and other necessary supporting documents (e.g. proof showing receipt of funding) for approval.

26. Successful applicant institutions shall closely monitor the implementation progress of the project and report to the ITC. Funding will be disbursed having regard to the implementation progress and cash flow requirement of the project, as well as actual contributions from the applicant institution and other partners. As the funding from the Scheme is provided on a matching basis[10], if the actual amount of the contributions from applicant institution and other partners is less than that committed in the application, the funding will be reduced correspondingly and any disbursed funding in excess shall be returned to the Government.

27. If the implementation progress and performance of the project is less than satisfactory or if there are breaches of any funding conditions, the Government reserves the right to cease the funding support, terminate the agreement in severe cases, and require the applicant institution to return the disbursed funding. Each successful applicant institution shall execute in strict adherence to the agreement signed with the Government and the approved proposal. The applicant institution is also required to submit a final report and the final audited accounts upon completion of the agreement.

EXPECTED BENEFITS

28. The Scheme helps consolidate Hong Kong's strengths in upstream R&D activities with respect to frontier technology and reinforce our I&T chain, thereby facilitating the development of a vibrant I&T ecosystem.

[10] The applicant institution may submit change request if unforeseeable circumstances arise, and revise the budget within the ceiling of the approved budget if necessary.

FINANCIAL IMPLICATIONS

29. Subject to Members' support, we will seek the approval of the Finance Committee (FC) of the Legislative Council to create a new dedicated subhead with a commitment of $3 billion under the Innovation and Technology Fund (ITF) for the implementation of the Scheme. The annual cash flow will depend on the funding situation, the number of applications received and approved, and the amount of funding disbursed.

30. Preliminary estimates of the associated cash flow requirements are as follows-

Financial Year	Estimated Cashflow ($ million)
2025-26	-
2026-27	1,200
2027-28	450
2028-29	450
2029-30 and onwards	900
Total	3,000

31. As mentioned in paragraph 23, the ITC will set up a Secretariat to handle the administrative work related to the Scheme. ITC will include sufficient provision in the Estimates of the relevant financial years to meet the necessary expenditures.

IMPLEMENTATION TIMETABLE

32. The eight universities have been consulted on the framework of the Scheme in October 2024, and they welcomed the proposal. Subject to Members' support, we plan to seek approval of the FC for the creation of a dedicated subhead under ITF before mid-2025. Following approval of the dedicated subhead, we will set up the Secretariat and the steering committee, with a view to launching the Scheme and inviting applications from the universities in 2025- 26. We aim to announce the results in the first half of 2026 the earliest. Subject to responses and funding situation, we may further invite applications if needed.

ADVICE SOUGHT

33. Members are invited to support the Government's proposal to seek the approval of the FC to create a new dedicated subhead of $3 billion under ITF for implementing the Scheme. The Innovation, Technology and Industry Bureau and the ITC will continue to closely liaise with stakeholders and refine the modus operandi of the Scheme as appropriate.

Innovation, Technology and Industry Bureau
Innovation and Technology Commission
February 2025

Annex

The Seven Frontier Technology Fields
Identified in the National 14th Five-Year Plan
(with reference to the National 14th Five-Year Plan)

Technology field	General description
Artificial Intelligence	• Make breakthroughs in foundational and cutting-edge theories • Conduct R&D of dedicated chips • Develop deep learning frameworks and other platforms for open source algorithms • Make innovations in fields such as learning, reasoning and decision-making, images and patterns, voice and video, and natural language recognition and processing
Quantum information	• Conduct R&D of metropolitan-area, intercity, and free-space quantum communication technologies • Carry out R&D of universal quantum computer prototype and practical quantum simulators • Make breakthroughs in technology for quantum precision measurement
Integrated circuits	• Conduct R&D of design tools • Conduct R&D of key equipment and critical materials such as high purity targets • Make breakthroughs in advanced processes and special processes such as the insulated gate bipolar transistor (IGBT) and microelectromechanical systems (MEMS) • Upgrade advanced storage technologies • Develop silicon carbide, gallium nitride, and other wide-bandgap semiconductors

Technology field	General description
Brain science and brain-inspired research	• Conduct analysis of brain cognition principles • Carry out the drawing of the whole brain mesoscopic neural connection atlas • Conduct research on the pathogeneses of major brain diseases and possible interventions • Carry out research on the intelligence development of children and teenagers • Conduct R&D of brain-inspired computing and brain-computer interfaces
Gene and biotechnology	• Carry out research on genomics and its applications • Make innovations in technologies such as genetic cells and genetic breeding, synthetic biology, and biomedicine • Conduct R&D of new-type vaccines, in vitro diagnostics, and antibody drugs • Develop major and new varieties in such fields as farm crops, livestock, poultry and aquaculture farming, and agricultural micro-organisms • Conduct research on key biosafety and biosecurity technologies
Clinical medicine and health	• Carry out basic research on the pathogeneses of cancer, cerebrovascular and cardiovascular diseases, respiratory diseases, and metabolic diseases • Conduct R&D of proactive health intervention technologies and cutting-edge technologies such as regenerative medical techniques, microbiome, and new treatments • Carry out research on key technologies for the prevention and treatment of major communicable diseases and major chronic non-communicable diseases

Technology field	General description
Exploration in deep space, deep earth, deep sea and the polar regions	• Carry out basic scientific research on the origin and evolution of the universe and seismic tomography • Undertake space explorations such as the orbiting of Mars and asteroid roving • Conduct R&D of new-generation heavy-lift carrier rockets and reusable space transport systems, equipment for deep earth exploration, crafts for deep sea operations, maintenance, support, and equipment experiments, and stereo observation and monitoring platforms and heavy icebreakers for polar regions • Develop the fourth phase of China's lunar exploration programme, the second phase of its marine exploration programme, and the second phase of its polar exploration programme