

APEC Technology Commercialization Demand Side Program Study Report

APEC Policy Partnership for Science, Technology and Innovation

March 2024



**Asia-Pacific
Economic Cooperation**



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APEC Project: PPSTI 08 2021A

Produced by

International Technology Transfer Network (ITTN)

Telephone: (86) 010 84351699

Email: limuqian@ittn.com.cn

For

Asia-Pacific Economic Cooperation Secretariat

35 Heng Mui Keng Terrace

Singapore 119616

Tel: (65) 68919 600

Fax: (65) 68919 690

Email: info@apec.org

Website: www.apec.org

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Preface

This study is the research publication of APEC funded project "Workshop on Catalyzing Quality STI Demand Raised by Demand-side of Technology Commercialization" (PPSTI 08 2021A), which is the following work of the "Handbook on Technology Commercialization Practices in APEC Economies". As the previous achievement, the standard concept and process of technology commercialization in APEC region was clarified, especially from the view of supply side entities such as universities and academies. Therefore, this project is focusing on the demand side of technology commercialization, to further explore prospects of this field.

According to the main tasks of the project, this study gives an overview on demand side issues of technology commercialization, include its definition, relevant issues, and suggested approaches on facilitating technology commercialization from demand side. Several detailed terms, for instance, application scenarios, university-industry collaboration, are selected to be comprehensively introduced due to their relevance to the concept, in the meaning time, a policy recommendation is named as "Huai an Initiatives" as one of the achievements. All references to any form of technology transfer are understood to mean technology transfer on voluntary and mutually agreed terms.

International Technology Transfer Network (ITTN) as the project overseer (PO) team organized two official events from 2022 to 2023, the first event was a workshop held in City of Huai an, China, to collect practical cases and diversified viewpoints in this research field, when the second event was a dissemination meeting in City of Seattle, the United States, as part of APEC 3rd Senior Official Meeting in 2023. Thanks to guidance and support of APEC Secretariat and focal points team from China, 15 member economies took part in this project, and more than 40 experts were involved during these events and study.

In the future, our team will take more efforts in the whole process of technology commercialization, to find out a mode on its ecosystem. If necessary, we will keep on applying for funding support from APEC Policy Partnership of Science, Technology and Innovation (PPSTI) working group and try to push it into a long-term mechanism.

Muqian (Liam) LI, Project Overseer (PO)

Chief Researcher of International Technology Transfer Network (ITTN)

Part I

Study of Demand-Side Subjects

The demand side in the process of technology commercialization refers to the application parties or user groups of technological innovations or solutions generated by scientific and technological advancements. The demand side includes enterprises, organizations, individuals, and market demands who apply the technological achievements.

The demand side plays a crucial role in the process of technology commercialization. It serves as the driving force behind technological innovation, determining the market adaptability and commercial potential of technological achievements. By understanding the needs, problems, and challenges of the demand side, technology suppliers can better position their technological innovations, optimize and customize them to better meet market demands.

The demand side also acts as a market promoter and facilitator for the wider application of technology. The actual demands of the users prompt technology suppliers to continuously innovate and improve their offerings to meet market needs. Furthermore, the demand side contributes to the commercialization and implementation of technological achievements through procurement, investment, and collaboration, thereby accelerating the process of technology transfer and adoption.

Therefore, in the process of technology commercialization, it is essential for technology suppliers to closely interact and collaborate with the demand side. By understanding the needs, preferences, and market behaviors of demand-side stakeholders, technology suppliers can guide their innovation efforts and focus on aligning technological achievements with market demands, thus achieving an effective match and commercial application of technology and demand.

The project workshop sought to collate the perspectives of various organizations regarding the demand side. Non-profit organizations, companies, government departments and research institutes were invited to partake and present their analysis on the link between supply and demand, as well as the intricacies of the demand side. This section provides an overview of the demand side, as well as research on the supply and demand aspects of commercializing scientific and technological achievements.

1.1 Introduction to the Basic Research of the Demand Side of Technology Commercialization Program

International Technology Transfer Network (ITTN) is an international technology commercialization institute, it was founded in January 2011 under guidance of Ministry of Science and Technology of China with the mission of promoting cross-border innovation technology commercialization practice between China and other economies. As an international technology transfer organization, ITTN develops fourth-party international technology transfer platform with market-oriented mechanism, organizes high-quality resources of international technology innovation in supply, and builds innovation cooperation network that connects 928 international technology transfer institutions in 56 economies around the world and 168 outstanding industry leaders recruited into the International Committee of ITTN. Meanwhile, ITTN has established 8 overseas sub centers and representative offices. On the demand side, ITTN explores cooperation demand of domestic industries, promotes professionalization of third-party intermediary entities, and integrates professional service capability for “value-chain” of cross-border innovation technology commercialization.

1.1.1 Handbook on Technology Commercialization Practices in APEC Economies (APEC PPSTI 01 2017A)

The Handbook on Technology Commercialization Practices in APEC Economies is a result document formed during the execution of the APEC PPSTI 01 2017A project titled "Advancing APEC Balanced and Sustainable Economy: Study on Innovation City and Regional STI-driven Development Assessment" by ITTN from 2017 to 2019. The guidelines were jointly written by a total of 72 official representatives from various APEC economies, including experts from the International Technology Transfer Network (ITTN), Georgia Institute of Technology, Association of University Technology Managers (AUTM), Australasian Knowledge Commercialization Society, and other universities and technology transfer industry organizations. It represents a consensus among 21 economies in the APEC region, including Australia; Canada; China; Hong Kong, China; Japan; Republic of Korea; Malaysia; The Russian Federation; Chinese Taipei; Thailand; United States and Viet Nam, on the knowledge outline for cultivating talents in technology commercialization.

The methods presented in Handbook on Technology Commercialization Practices in APEC Economies are derived from the research outcomes of the project. The aim is to assist emerging

economies in the Asia-Pacific Economic Cooperation (APEC) region in implementing innovation-driven economic growth plans and further facilitate the adoption of validated technology commercialization knowledge systems from developed economies.

1.1.2 APEC PPSTI 08 2021A Project: Workshop on Catalyzing Quality STI Demand Raised by Demand-side of Technology Commercialization

Based on the research conducted under the PPSTI 01 2017A project, we have now focus on the demand side of technology commercialization in the process of commercializing scientific and technological achievements. This has led to the development of the current project, PPSTI 08 2021A - Workshop on Catalyzing Quality STI Demand Raised by Demand-side of Technology Commercialization.

Based on Handbook on Technology Commercialization Practices in APEC Economies, technology commercialization is essential for economic growth, in which high-quality science, technology and innovation (STI) demands play an important role. High-quality STI demands can promote the development of regional technological innovation solutions and technology commercialization. High-quality STI demands will contribute to the achievement of regional development goals driven by technological innovation among member economies of the Asia-Pacific Economic Cooperation (APEC), accelerating economic recovery post the COVID-19 pandemic.

By looking for high-quality STI demands raised by the demand-side, the Project aims to build a more effective technology commercialization chain targeting at high-quality STI demands to promote a sustainable economic recovery in the APEC region.

1.1.3 Demand Side Focuses on Key Elements: Risks, Application Scenarios, Intellectual Property Rights

Risk: As part of the commercialization process, the demand side comprehensively assesses and manages the risks associated with the technology. This includes identifying potential risks, assessing their potential impact on the business, and putting the proper risk mitigation strategies in place. By proactively understanding and addressing risks, the demand side can improve the success and sustainability of commercialization efforts.

Application Scenarios: The demand side will understand the specific application scenarios and market needs by carefully analyzing the target market, identifying the pain points or opportunities that the technology can address, and determining how the technology fits into

existing workflows or industry practices. By aligning the technology with the right application scenarios, the demand side can maximize its business potential and bring value to the end user.

Intellectual Property Rights (IPR): Protecting IPR is a top priority for technology commercialization. The demand side will ensure that appropriate measures are taken to protect the IPR associated with the technology. This may include filing patents, copyrights, trademarks, or entering into confidentiality agreements with relevant parties. By protecting IP, the demand side can ensure its competitive advantage, attract investors and maintain control over the technology commercialization trajectory.

1.2 Typical Institutional Cases

During the two workshops, we gathered many excellent examples of private sector-based innovative companies, technology parks, incubators, accelerators, and so on, of supply and demand cooperation in the commercialization of science and technology. This part is summarizing their background introduction and ideas on STI Demand.

1.2.1 ZGC Tianhe Technology Transfer Center: Assessment and Evaluation for High-Quality STI Demand

Innovative enterprises mainly refer to those that possess intellectual property rights and well-known brands, have strong international competitiveness, and rely on technological innovation to gain market advantages and achieve sustainable development. The key aspects of promoting the construction of innovative enterprises include guiding companies to strengthen strategic planning for innovation, enhancing innovation capacity building, establishing sound internal mechanisms for technological innovation, strengthening technology innovation management, and leveraging the important role of employees in technological innovation.

Enterprise technological innovation capability refers to the ability of enterprises to develop or introduce new technologies to meet or create market demands, enhance product functionalities, and ultimately achieve optimal economic and social benefits.

The evaluation of the level of enterprise technological innovation system capability should be conducted from three dimensions: core technological capabilities, business management capabilities, and external contextual factors. Core technological capabilities are primarily evaluated based on innovative products and innovative driving forces. Business management capabilities are assessed based on three aspects: enterprise management, experience performance, and marketing capabilities. External contextual factors are evaluated based on two aspects: target market and resource environment.

The three key elements for weighting and assigning evaluation indicators in assessing the maturity of enterprise technological innovation capability are core technological capabilities, business management capabilities, and external contextual factors. Among them, core technological capabilities account for 30% of the total weight.

Technological innovation is the core content of enterprise innovation activities. It provides necessary support and assurance for organizational implementation and process management. An increasing number of companies have recognized its importance. Large multinational companies around the world invest billions of dollars annually in research and development, mainly to support innovative practices of their strong R&D institutions and teams, enabling them to maintain vigorous innovation vitality and become winners in international market competition. In recent years, Chinese companies such as Huawei, Haier, Lenovo, etc., have also increased their investment in research and development.

Technological innovation plays a crucial role in improving production methods and processes. On the one hand, technological innovation improves the utilization of material production factors and reduces inputs. On the other hand, it lowers costs by introducing advanced equipment and processes. In enterprise competition, cost and product differentiation have always been core factors. Technological innovation can reduce product costs, while a new production method can assist in product differentiation. If a company can fully leverage its innovative capabilities, it can defeat competitors and gain a competitive advantage in the market. However, technological innovation itself requires high investment and carries high risks. Therefore, it is necessary to establish a favorable market environment and policy conditions to fully stimulate the intrinsic driving force for innovation within enterprises and create maximum value for them.

Technology parks, incubators, and accelerators provide a converging platform for innovators and businesses. Innovators can showcase and promote their technological achievements through these platforms, while businesses can find innovative technologies or solutions that suit their needs. This integration of supply and demand facilitates the transformation and application of technological achievements and improves the efficient utilization of resources. It also establishes an innovative ecosystem for innovators, entrepreneurs, and investors. Within this ecosystem, the various parties can collaborate and develop together, promoting technology exchange, resource sharing, and cooperative innovation. This collaboration and exchange contribute to accelerating the commercialization process of technological achievements and driving the development of technological innovation.

1.2.2 International Technology Transfer Network (ITTN): Technology Parks, Incubators, Accelerators Play Crucial Roles in Integrating the Supply and Demand Relationship and Improving the Efficiency of Commercializing Technological Achievements

The Solved digital innovation and entrepreneurship platform

Solved was established in 2013 and is headquartered in Finland. In 2014, it started building the Solved platform with its own team of experts in clean technology and sustainable development. Utilizing digital collaborative tools, the platform aims to create an international ecosystem for online interactive innovation among professionals. It facilitates cooperation between academia, industry, research institutions, and leading innovators (PIs) in entrepreneurship and innovation development.

Currently, the platform has gathered over 25,000 highly active expert resources from more than 120 economies worldwide. Over 80% of these experts specialize in decarbonization, clean technology, and sustainable development, while others focus on areas such as smart cities and innovative services. In the future, the platform plans to expand its talent pool to include experts in artificial intelligence, digital technology, and other innovative fields.

Over the past three years, Solved has experienced explosive growth in its business, covering markets in Finland, Slovakia, North America, and Europe. It has provided customized white-label innovation ecosystem platforms for over 200 Fortune 500 companies, international technology innovation organizations, and overseas municipal departments, including HP, ABB, Deutsche Telekom, and the European Bank. Based on this foundation, Solved has successfully supported over 1800 cross-border collaborative innovation and entrepreneurship projects.

Solved has over 25,000 highly active international expert resources in the field of green technology. It customizes and creates innovative ecosystem platforms for innovation and entrepreneurship clients, serving over 1800 cross-border collaborative innovation and entrepreneurship projects. It is based on information platform technology capabilities and deeply integrates with the infrastructure of cooperative industrial parks in the region. It takes a "1+N" innovation and entrepreneurship development layout with a focus on the digital economy, including 5G, artificial intelligence, block-chain, as well as mergers in bio-medicine and green energy. With cross-border green technology transfer and talent exchange as entry points, it seizes the opportunities in "green" and "decarbonization" development. In relevant industries, it builds innovative characteristics of "green technology+" in innovation and

entrepreneurship, introduces cross-border management and operation teams, and realizes an incubation model that is organized, planned, focused, and of high added value.

By fully connecting the resources of cooperative economic entities and regional talent development support policies, Solved leverages its abundant international expert resources to organize collaborative innovation and entrepreneurship needs, explore green technology application scenarios, plan and promote international collaboration among academia, industry, and research institutions, and generate incremental international innovation and entrepreneurship projects, creating a distinctive model of "talent empowerment."

The Solved digital innovation and entrepreneurship platform in Finland aligns its business with the platforms of local industrial parks, matching and integrating with different stages of innovation and entrepreneurship development in the parks, forming a regional multi-dimensional integrated industrial incubation ecosystem pattern, including "digital virtual incubation - pre-incubation (co-creation space) - regular incubation (incubator) - acceleration incubation (accelerator) - industrial park."

The P4 Precision Medicine Accelerator

The P4 Precision Medicine Accelerator, established in 2019 by Professor Phil Beales and Nathan McNally, stands as a beacon of innovation and progress in the realm of precision medicine. Nathan McNally's leadership over multi-million-pound European tech initiatives over the past decade underscores his experience in supporting tech entrepreneurs. Complementing his acumen, Professor Phil Beales has dedicated two decades to the rare disease and precision medicine sphere. His journey includes founding genomics-based precision medicine enterprises as well as taking on the role of Chief Medical Officer and CEO for successful Series C companies.

P4 Precision Medicine Accelerator has run five programs to date. Within these initiatives, P4 has championed over 200 health-tech enterprises. The programs have translated into tangible results, with these companies securing over GBP40 million in government grant funding as well as raising over GBP200 million in equity funding from VCs and Angels. This has led to the creation of more than 1,000 high-quality jobs. Testifying to the accelerator's efficacy, two startups have already achieved successful exits to date.

Lifebit was in the first cohort of the P4 Precision Medicine Accelerator when it was founded in 2019. Since joining the accelerator, Lifebit has gone from strength to strength. Lifebit is a pioneering AI company that has made significant contributions to the genomics industry and

biomedical research. Their platform has made genomic data analysis more accessible and efficient, accelerating research and improving patient outcomes. Their work on COVID-19 has also played a crucial role in advancing our understanding of the virus and developing effective strategies for combating the pandemic. With their continued innovation and commitment to democratizing access to genomic data analysis, Lifebit is well positioned to continue making important contributions to the field.

Lifebit's platform is built on top of cloud computing infrastructure, which provides flexibility and scalability for processing large datasets. The platform uses machine learning algorithms and other advanced technologies to automate data analysis and make it more efficient. It also provides a user-friendly interface that allows researchers to easily access and analyze their data, without requiring specialized technical expertise.

One of the company's notable achievements was the development of a machine learning model that can predict a patient's response to cancer treatment. The model was trained on data from over 10,000 patients and was shown to be highly accurate in predicting treatment outcomes. This technology has the potential to improve personalized treatment plans for cancer patients, leading to better outcomes and reduced healthcare costs.

Another achievement of Lifebit was the creation of the COVID-19 Data Portal, a platform for sharing and analyzing COVID-19 genomic data. The portal provides researchers with access to data from over 160,000 COVID-19 genomes, which is crucial for understanding the evolution and spread of the virus. This platform has played an important role in advancing our understanding of COVID-19 and developing effective strategies for combating the pandemic.

Part II

Description of Technological Commercialization Demands and Application Scenarios

During the workshops, we found that many experts expressed that both the supply and demand sides often struggle to accurately describe their technological advantages or demands during the commercialization process of scientific and technological achievements. Based on the opinions and suggestions of the participating experts, we have summarized this issue and will discuss it further in this section.

2.1 Technological Demands Description

Accurate technological requirements ensure that the developed products or services can meet customers' expectations and needs, avoiding misunderstandings and unnecessary development work. Clear technical requirements can reduce project risks. Through detailed requirement analysis and specifications, potential issues and challenges can be identified in advance, and corresponding measures can be taken for risk management. It plays a crucial role in ensuring the development of products or services that meet customer needs, saving costs and resources, improving development efficiency, reducing risks, and promoting collaboration and communication.

2.1.1 Forms of Expression of Technological Demands

Matalab: High-quality STI supply-demand cooperation

Matalab is a service platform for the commercialization of technology achievements focusing on technology innovation digital intelligence services.

As introduced by its Head of technology resources and senior technology consultant, Ms. Zhongwen Jiang, the development philosophy of Matalab is to persistently uphold the principle of "unleashing the value of technology" and continuously evolve in a demand-driven manner, while establishing a platform for the convergence of technological elements. Research achievements from universities and institutes play a crucial role in the enterprise demand market, where the value of technological achievements is as significant to businesses as budgeting. By acquiring technological achievements applicable to product research and development, enterprises can gain access to innovative technologies and solutions that are vital to their development. These achievements can bring tangible commercial value and competitive advantages to the company.

Matalab's business model is the "Regional Science and Technology Grand Market" To B (business-to-business) line, which involves serving the science and technology departments of local governments and building a platform for technological elements to address the needs of local industries and enterprises. As of now, Matalab has served over 30 regions, reaching over 150,000 companies, and collaborating with more than 200 research institutes. They have also trained over 4,000 technology managers, facilitated over 2,000 technology transfers and conversions, and achieved technology transaction contracts worth over RMB10 billion.

Matalab's main service recipients include universities with research achievements, enterprises with demands, and government agencies in charge of management. Ms. Jiang focused on introducing the business model between Matalab and government management agencies. After constructing a government platform suitable for local supply-demand integration, the platform will be based on enterprise needs to match users with appropriate technological achievements. Leveraging years of accumulated data and resources, Matalab has established underlying supports such as the Science and Technology Regional Innovation Database. The platform provides targeted terminal systems for different usage scenarios, expands data collection and integration channels, and opens data to various partner organizations, breaking down information barriers across the industrial chain.

The University of Malaya

For universities, focusing on research is a key priority. "The Valley of Death" is a significant challenge in the process of technology commercialization. Universities need to go through this entire process to bring their research technologies to the market. To ensure the healthy operation of research work, achieving the transformation of scientific and technological achievements is a necessary goal. The University of Malaya's attempt to address the challenge of "The Valley of Death" is aimed at promoting the implementation of the InnovateUM program.

Their objectives are: To enhance the transitional & commercialization process of UM's research, so that it contributes directly to the Malaysia's innovation and economic ecosystem; to propose a dynamic structure for industrial innovation through uptake of university research by establishing a technology transfer pipeline with University Malaya as a best practice model; to strengthen the skills and capabilities of public universities and local industries during the technology and innovation transfer process thus maximizing investment returns from public research; and to expand the model to regional economies

In order to actively participate in the commercialization process of scientific and technological achievements, the University of Malaya engages in the following four forms: First, Collaborating directly with enterprises to meet their specific needs. Second, collaborating with researchers to provide more mature experiences and assistance in commercializing technological achievements. Third, providing opportunities for University of Malaya students to establish startup companies. Last, reinvesting returns into scientific research and actively participating in the commercialization of technological achievements.

San Martin de Porres University

Demand rises when the problem has been identified that technology can solve. In force and possible technologies have been identified and possible competition of the proposed technology. Collaborative institutions for development/experimentation (joint action plan, roles, and joint investment) have been identified. Definition of requirements and performance levels optimos already defined for the final design. The type of environment is known in which the product/service could be commercialized.

China EV100 Low Carbon Integrated Development Institute

Since 2021, demand for refined-petroleum products has sparked. By 2060, the demand for hydrogen in China is 2-3 times than that in 2020, reaching about 100-130 million tons per-year. Green hydrogen will account for 75%-80%, i.e., 75-80 million tons of green hydrogen will be needed in China.

Policy-led Forms of Technology Demand Expression: an Example from China

On 3 November 2020, the Central Committee of the Communist Party of China officially released the "Recommendations on Formulating the Fourteenth Five-Year Plan for Domestic Economic and Social Development and the Long-Range Goals for 2035." In the field of scientific and technological innovation, it proposed to "improve the organization and management of scientific and technological projects and implement systems bringing the concept of "Open Competition and Leadership" back into public view.

"Open Competition and Leadership" also known as the scientific and technological reward system, is a research funding mechanism that rewards researchers based on their research achievements. It is generally used to address specific technical problems in society. The government organizes a non-periodic research funding arrangement open to the whole society, specifically seeking innovative scientific and technological achievements. The principle behind this system is "regardless of origin, anyone who has the ability can compete for the

opportunity." It aims to allocate projects to individuals who are truly capable and results-oriented, regardless of qualifications or restrictions, with the goal of achieving practical results.

The Fourteenth Five-Year Plan development blueprint emphasized the implementation of systems such as "open competition and leadership" and "competition among projects," as well as the improvement of a funding mechanism that combines awards and subsidies. The "open competition and leadership" system helps to address the most urgent research challenges by mobilizing intellectual potential from all sectors of society through open innovation, with the aim of finding practical and feasible solutions as quickly as possible.

The "open competition and leadership" system fully reflects the importance attached by the domestic to enhancing the capacity of scientific and technological innovation when planning the development pattern for the next five years and envisioning the development for the next 15 years. Relying on a well-established socialist market economy, the "open competition and leadership" system is conducive to fully stimulating the enthusiasm of innovation entities, achieving breakthrough innovations in key core technologies, and improving the overall efficiency of the innovation chain.

2.1.3 The Referential Expression of Technological Demands Based on the Study Conducted in Project PPSTI 08 2021A

Based on the two workshops, the PPSTI 08 2021A PO team has summarized a set of referential expressions of technical demands to be used in common situations.

2.1.3.1 Technology Application

First, a call for high-quality cases will be issued. Among them, requirements are made for the qualification of project enterprises.

For Technological Innovation, there are 3 key points,

(1) Describe the technological advancement and innovation (assess the technological advancement and innovation, mainly describe the comparison of similar products or technology in the domestic and international markets, including but not limited to the publicly disclosed technical parameters) .

(2) Describe the current development of the technology (mainly used to evaluate the maturity and industrialization level of the technology, mainly describing the current stage of the technology, including the level of technology, technological process, supporting resources, technology life cycle and others of industrialization).

(3) Describe the sustainability and irreplaceable of the technology advantages (mainly assess the potential risks of the technology, including technology achievability risk, technology reliability risk, intellectual property rights infringement risk, application feasibility risk, market competition risk, policy risk, team risk, etc.)

And for Technology Business Value, the key points are as follows,

(1) Intellectual property rights (mainly used to evaluate whether the technology has the core IP rights that can be transformed as the subject).

(2) Describe the potential application scenarios and target customers of the technology (mainly used to evaluate whether the technology has a clear target customer, market demand)

(3) Product description (whether the technology has been a product, and the designability and creativity of the product)

(4) Describe the ideal cooperation ways in details (including the ideal cooperation organization <properties, field, industry status and others> cooperation business, cooperation targets, etc.)

(5) Current investment and financing needs (for evaluating the current market value of the technology)

2.1.3.2 Project Selection

After gathering information about the projects, they are placed into a pool of high-quality cases that subsequently go into a screening process.

First Round, Judges will score the projects shortlisted and select 1,000 projects among 3,000+ for the first round online in the expert scoring system on the official website.

Second Round, 10 expert judging sessions focusing on the different fields will be held with 9 key cities. And 300 projects among 1,000 will be selected.

Final Round, 3 final round comprehensive judging sessions are planned to be held with 3 key cities. And 100 projects among 300 will be final selected.

2.1.3.3 Supply meets demand

Provide suppliers with product information release and display, case release, regular maintenance of information, user and commodity information statistics, user feedback view, supply and demand activities browse and other functions.

For the demand side to provide demand information release, intentional supplier view, supplier service resources browsing and search, key supplier collection, product and service experience feedback, supply and demand activities browsing and other functions.

Part III

How to Accurately Express Technological Commercialization Demands and Achieve Supply-demand Matching

Accurately expressing the demands for technology commercialization and achieving a balance of supply and demand is an important issue, and this part mainly summarizes the practical experience of the participating experts.

3.1 Operation Process

3.1.1 PAIF Patent Technology Investment Operation Co., Ltd.

Mr. Sheng Yan, President of Intellectual Ventures China, Founder & CEO at PAIF Patent Technology Investment Operation Co., Ltd. gave a presentation on how to discovery technology demands, he believes that the three-step process of initial screening and in-depth discovery of technology demands is the most important part of solving technology problems.

PAIF's self-developed process for demands exploration consists of three steps:

First, evaluation. Quantitative evaluation is a reliable and scientific innovation and comprehensive strength assessment system that follows a closed-loop approach with a high level of fairness. It is designed to identify the weaknesses in corporate innovation and accurately address them, achieving an accuracy rate of 90%.

Second, exploration. Demand-driven exploration of technological and patent requirements is an important step towards achieving patent and technology transfer. The process involves asking precise questions and creating a comprehensive profile, such as drafting RFI or RFS, which is essential for efficiently addressing problem-solving suggestions.

Third, profiling. Infringement warnings and risk mitigation are vital aspects to ensure smooth business operations and achieve closed-loop capital financing and listing. One of the core components for providing improvement suggestions through completing an FTO report is establishing a high-quality patent layout.

PAIF' s mature evaluation system and personalized development evaluation system include patent requirements, technological requirements, research and development requirements, payment and conversion capability evaluation, participation of numerous companies in the jurisdiction, and quantitative evaluation, serving as tools to assist companies in exploring their needs.

The process from proposing requirements to providing solutions involves several steps, including problem identification, brainstorming, writing requests, sending requirements, preliminary selection of solutions, joint selection of solutions, and implementation. Throughout this process, it is necessary to consider warning and risk mitigation, stimulate patent requirements, analyze patents related to products, compare existing patent portfolios, provide infringement warning reports, determine the execution plan, and select technology achievements that meet the requirements.

After years of practice, PAIF has summarized 7 steps for patent suppliers to commercialize technological achievements:

- (1) Intelligent Fast Screening: An intelligent, percentile-based patent quality and value evaluation system that generates rankings and explanatory reports. The efficiency is hundreds of times greater than manual screening.
- (2) Patent Flash Analysis: Flash analysis reports are provided specifically for top-tier patents, outlining the patent quality, maturity, and potential functionalities, to prepare for patent classification and combination.
- (3) Patent Grouping: Based on the results of fast screening and flash analysis, patent grouping recommendations are provided by assessing the predicted functionalities and maturity of the patents through cross-domain brainstorming sessions.
- (4) PPT Business Plan: A 10-page concise and focused business plan report is prepared based on the preliminary industrialization or commercialization plan, highlighting key points, and subsequently entered the platform.
- (5) Cloud Platform Inclusion: Accurate profiling and description of the projects are done using uniform terminology, then the potential cooperation partners are intelligently and experimentally matched, and jointly promoted by ecological cooperative parties.
- (6) Feasibility Validation: Discussions with potential cooperation partners are held regarding business logic, resource allocation, and cooperation models for the included projects, and a feasibility research report is completed and issued.
- (7) Implementation: Implementation is carried out in hierarchical levels according to the plan and feasibility report. For the patents that are not included in the platform, they are put into the observation group, and the tail-end patents are bundled and sold as a whole.

3.2 Capacity Building of enterprises as demand side of technology commercialization

When science, technology and innovation are regarded as one of the main driven forces of economic growth in modern economies, some of the member economies in APEC region have already delivered their own policies and strategies for capacity building of enterprises, mostly for innovative enterprises. According to discussion and exchange with experts from these economies (e.g., Australia; China; the United States), those approaches below are listed as possible solutions:

Favorable polices

To provide favorable polices to enterprise, such as tax reduction and exemption, institutional reform etc., so that those innovative enterprises could enjoy better environment for technology commercialization and other innovative behaviors.

Mechanisms Collaboration

To provide increasing opportunities to enterprises, such as the authorities on policy making, standard research and modification, so that the government could address their development priorities according to real demands of enterprises.

Technology Research

To help enterprises develop their abilities on technology research by addressing the goals, for instance, letting internet enterprises put resources into digital technologies growth, or building up innovation unions (the entities co-developed by universities and enterprises).

Innovation Ecosystem

To establish more innovation entities, such as incubators, accelerators, S&T parks and clusters, to provide professional services and resources for MSMEs, as these types of enterprises are always based on advanced technologies or relevant intellectual properties.

Talents, Capitals, Application Scenarios

To increase required resources to those enterprises, such as science and technology professionals, frontier capitals, and to release more application scenarios to enterprises instead of existing public sector institutions.

Internationalization

This is always an efficient solution for enterprises to enhance innovation, through which developed economies and emerging economies could make use of their diversified advantages.

3.3 Innovative Strategies

The pursuit of maximizing profit and economic benefits, obtaining maximum benefits at the lowest cost, is the goal pursued by demand-side entities and the driving force behind their active application of technological achievements. Demand-side entities applying new innovations must have the potential to increase revenue and maximize profits. The application should enhance the technological content, value-added, and core competitiveness of their products. If technological achievements cannot be transformed into competitive advantages and market advantages for products, it will not only result in resource waste but also cause both supply and demand sides to lose their development momentum and become unsustainable.

Increasing the involvement of the technology supply side can, on one hand, provide more accurate understanding of the requirements from the demand side. This enables the technology suppliers to have a deeper engagement with the demand side, understand the specific technical needs and requirements of customers, and better grasp the market demands. Consequently, they can develop more targeted and innovative solutions, providing precise technology products or services that meet market needs. At the same time, they can also receive feedback and challenges from the market, allowing them to make timely technological optimizations and innovations. They can adjust their technological direction and strategies based on the actual situation and requirements of the demand side, enhancing the competitiveness and adaptability of their products. This in turn promotes the development and growth of the technology supply side itself.

3.3.1 Technology manager: an Example from China

In 2021, the Science and Technology Evaluation Center and the China Association for Science and Technology Evaluation and Achievement Management compiled and published the "Guidelines for Technology Commercialization". The guidelines provide systematic and practical guidance and reference for technology management departments, universities, research institutions, and enterprises to promote the transformation of scientific and technological achievements. Meanwhile, the association, together with the evaluation center and the Beijing Technology Market Association, actively participated in the revision of the "Occupational Classification Code of the People's Republic of China" by the Ministry of Human Resources and Social Security. The proposal for adding professional information for "technology managers" has passed the approval process. Technology managers have been added as a new profession to the second category of "professional and technical personnel" in

the "Occupational Classification Code of the People's Republic of China" with the number 2-06-07-16. The "Occupational Classification Code of the People's Republic of China" clearly defines the role of technology managers as professionals engaged in the discovery, cultivation, incubation, maturity, evaluation, promotion, and transaction of achievements in the transfer, transformation, and industrialization of scientific and technological achievements, as well as providing related services such as finance, legal, and intellectual property.

On 19 September 2022, the group standard CASTEM-TBJH202205 "Specification for Competence Evaluation of Technology Managers" jointly researched and compiled by ITTN and the China Association for Science and Technology Evaluation and Achievement Management, was officially released. The standard provides a professional competency grading framework for technical managers in terms of knowledge level, practical skills, experiential effectiveness, and professional qualities. It also specifies the competency requirements corresponding to different levels of technical managers and the general requirements for evaluating their competencies.

In 2022, under the guidance of the Department of Science and Technology Achievement Transformation and Regional Innovation of the Ministry of Science and Technology, the Science and Technology Evaluation Center of the Ministry of Science and Technology, in collaboration with the China Association for Science and Technology Evaluation and Achievement Management, actively built a standardized system for the integrated development of technical manager's professional competence, career development, and grading evaluation. This initiative aimed to enhance the professional capabilities of technical managers. As part of this effort, the "Technology Managers' Advisory Committee on Professional Capacity Building" was established.

3.3.2 University-Industry Collaboration

The new-type R&D institutions are independent legal entities that focus on technological innovation needs and primarily engage in scientific research, technological innovation, and R&D services. These institutions have diversified investment entities, modern management systems, market-oriented operational mechanisms, and flexible employment mechanisms. They can be registered according to the law as non-enterprise units, public institutions, or enterprises in the field of science and technology. By developing new-type R&D institutions, it is possible to further optimize the distribution of research capabilities, strengthen the supply of industrial technology, promote the transfer and transformation of scientific and

technological achievements, and drive deep integration between scientific and technological innovation and economic and social development.

The industry-university-research alliance refers to a regional collaborative entity consisting of universities, research institutions, and high-tech enterprises within the same area. It establishes effective connections and cooperation in high-tech research, emerging industry development, and education improvement. The collaboration between industry, academia, and research integrates and synergizes different social roles and resources in research, education, and production. It conforms to the laws of social productivity development and technological innovation, and possesses strong mechanisms for technological innovation. It is an effective form and approach for optimizing corporate scientific and technological behaviors.

The work path of the industry-university-research innovation alliance is led by a central mechanism. Based on cooperative intentions and agreement, it links domestic and international partners. It collaborates with domestic large enterprises in the industrial sector, and deepens involvement with renowned foreign universities in the research field. It considers professionals related to technology transfer, technology commercialization, and scientific and technological achievements transformation as core resources. It regards universities, research institutions, and other technology suppliers, as well as innovative enterprises and industrial parks, as professional institutions representing technological demands. By efficiently allocating cooperative channels for scientific and technological innovation management and services, it gradually forms the achievements and ecological system of integrated development between science, technology, and economy, thereby promoting the establishment and introduction of industry-university-research alliances.

Actively constructing an integrated innovation ecosystem of "government-industry-academia-research-finance-application" to promote the integration of industry, academia, and research innovation. "Government-industry-academia-research-finance-application" refers to various fields encompassing research, education, industry, promotion, and management. "The so-called 'government-industry-academia-research-finance-application' means that the government leads the creation of an innovative environment, the enterprises serve as the main innovators, academic disciplines activate talent potential, scientific research and development yield results, finance provides strong support, intermediary services enhance efficiency, and the transformation of achievements increases benefits."

University-industry cooperation, whether in developing or developed economies, can effectively promote technological innovation, facilitate technology transfer and enhance industrial competitiveness. By leveraging the knowledge and research resources of academia, the industry can benefit from this collaborative model, while academia can translate research outcomes into practical applications. This creates a win-win situation that enhances business prospects. Here is a selection of practices for university-industry collaboration, from both developing and developed economies.

3.3.2.1 Developing Economies

The Yangtze River Delta region

The Yangtze River Delta region plan was officially approved and implemented by the State Council on 24 May 2010. It is a major decision to implement the "Guidelines of the State Council on Further Promoting the Reform, Opening-up, and Sociology-economic Development of the Yangtze River Delta Region" and further enhance the overall strength and international competitiveness of the Yangtze River Delta region. The "Outline of the Plan for Integrated Development of the Yangtze River Delta Region" released in 2019 requires substantial progress in the integrated development of the Yangtze River Delta region by 2025. Cross-border regions, urban-rural areas, and other regional sectors will achieve a high level of integrated development. Basic integration will be achieved in fields such as scientific and technological innovation industries, infrastructure, ecological environment, and public services. A comprehensive institutional mechanism for integrated development will be established.

Currently, the Yangtze River Delta region faces the arduous task of enhancing innovation capabilities, easing resource and environmental constraints, and promoting reforms and breakthroughs. It is at a crucial period of transformation and upgrading. The implementation of the plan is beneficial to further eliminating the impact of the international financial crisis on this region, accelerating the transformation of the development mode, continuously improving the level of development, and driving the rapid and sound economic development of the Yangtze River Basin and even the entire economy.

Beijing-Tianjin-Hebei collaborative innovation community

The coordinated development of Beijing-Tianjin-Hebei is a major strategy. Under the grand goal of China's pursuit of becoming a world-leading science and technology power, accelerating the construction of the Beijing-Tianjin-Hebei collaborative innovation community and achieving integrated development driven by innovation in the region not only supports the

major strategy of building an innovative economy but also constitutes an important task for comprehensive innovation and reform experiments, with profound significance. Through this strategy, the development gap can be bridged, the industrial chain can be connected, and regional resources can be re-planned to promote the coordinated development of the Beijing-Tianjin-Hebei region.

In recent years, Beijing, Tianjin, and Hebei have seized opportunities, taken proactive measures, and conscientiously implemented the outline for the coordinated development plan. They have made solid progress and achieved significant results in promoting regional collaborative innovation through multi-level, multi-sector, and multi-channel efforts. Currently, industrial cooperation and collaboration among the three regions are gradually expanding from traditional sectors such as agriculture, forestry, chemistry, and machinery to fields such as finance, technology, and commerce. In order to accelerate the construction of the Beijing-Tianjin-Hebei collaborative innovation community, it is necessary to seize the opportunity of "Comprehensive Innovation, Comprehensive Reform", adhere to the requirements of the Outline for Coordinated Development of Beijing-Tianjin-Hebei, and under the guidance and support of the government, expedite the flow of innovation elements, accelerate the pace of narrowing the development gap, promote industrial cooperation based on complementary advantages, facilitate smooth industrial innovation chains, use deepening institutional and mechanism reforms as a driving force, reorganize regional innovation resources, and speed up the realization of a collaborative innovation pattern in which Beijing, Tianjin, and Hebei achieve policy consistency, industrial complementary, joint construction of innovation carriers, factor sharing, and benefit sharing.

Guangdong-Hong Kong-Macao Greater Bay Area

The construction of the Guangdong-Hong Kong-Macao Greater Bay Area is a major decision. It is a strategic need to create a model of high-quality development in China, continuously enhance economic innovation and competitiveness, optimize functional layout, promote the formation of a new pattern of coordinated regional development, build a new system for an open economy and a new platform for international economic cooperation, and create an important support for the Belt and Road Initiative. It is also a strategic need to enrich the practice of "one economy, two systems" and maintain long-term prosperity and stability in Hong Kong, China and Macao, China.

(1) Building the Guangdong- Hong Kong-Macao Greater Bay Area and developing world-class city clusters is conducive to enriching the practice of "one economy, two systems" and further enhancing exchanges and cooperation between the mainland and Hong Kong, China and Macao, China. It provides more opportunities for the economic and social development of Hong Kong, China and Macao, China, as well as for Hong Kong, China and Macao, China compatriots to develop on the mainland, ensuring their long-term prosperity and stability.

(2) It is conducive to implementing the new development concept, deepening supply-side structural reforms, accelerating the cultivation of new drivers of development, and achieving innovation-driven development. It provides support for continuously enhancing China's economic innovation and competitiveness.

(3) It is conducive to further deepening reform and opening up, establishing a new open economic system that is aligned with international standards, and building a high-level platform for participating in international economic cooperation.

(4) It is conducive to advancing the Belt and Road Initiative. Through regional two-way opening-up, it will construct an important support area for the integration of the Silk Road Economic Belt and the 21st Century Maritime Silk Road.

Chile Domestic Agency for Research and Development (ANID): : Strengthening Innovation Capacities in Chilean Universities in Connection with the Industry

The Domestic Agency for Research and Development of Chile (ANID) is an autonomous and functionally decentralized corporation, with its own assets and legal personality of Public Law, aimed at advising the President of the Republic of Chile in the planning of scientific and technological development. ANID is the main state agency to finance research and development in STKI in Chile. Approximately 50% of public Budget in STKI is executed by ANID.

- ~80 application calls are executed during 2023.
- +12,000 projects are received each year from scholarships to research centers.
- +4,000 benefits delivered; almost 30% of applications received were financed.
- +12,000 projects administrated yearly.
- 3,6% of ANID's Budget went to operational costs.

- ~ 400 collaborators form ANID's team in 2023.

The University of Malaya

UMDT Accelerator Programme is an Idealization Stage Market Validation programme. It is set up to validate commercially UM Researched products. At the same time to nurture the researcher's group and the idea to enter to the right market. It is a structured and guided incubation programme to minimize failure for a startup.

To select UM Intellectual Property(IP) researched products and technologies - Commercialization grant to validate market with prototyping

A team - The team must consist of at least 1 UM Researcher and at least a business co-founder. The UM Startup Co-Founder Search Day can assist to find a suitable team.

UMDT Selection Committee approval - The team must apply for UMDT Selection Committee for approval.

Up to MYR50,000 grant - Grant awarded to the researcher as a grant recipient, not to the team or a startup company.

Equity Participation- The researchers will form their own separate startup companies. They are willing to share the equity of their company with their chosen business co-founder(s).

Startups are Independent of UM - The startup companies, under UMDT Accelerator Programme, are private and independent Sdn Bhd from the University of Malaya. The direction and growth of the company are in the hands of the startup founders.

Saturday Class - Compulsory attendance for business co-founder from 9am - 3pm.

3.3.2.2 Developed Economies

UK Catapult Centers

The UK Catapult Centers initiative was launched in October 2010, funded by the UK government and developed by the UK Technology Strategy Board. It is positioned as a world-class technology innovation center with the aim of promoting the industrialization of technological achievements in the UK and accelerating the development of a technology innovation system that integrates technology and the economy.

The establishment of Catapult Centers focuses on emerging technology fields, aiming to make the UK a world leader in these areas and occupy a significant share in the high-end of the value

chain. The UK Catapult Centers are considered an important step in the UK's efforts to create a world-class technology innovation center.

Catapult Centers operate in a networked and collaborative manner. In 2019, a total investment of GBP1 billion was made in Catapult Centers, collaborating with 2,260 academic institutions and 12,379 enterprises, with 491 international cooperation projects and involving 4,389 small and medium-sized enterprises. In the future, the UK government plans to establish Catapult Centers in key areas such as green economy, climate change adaptation, robotics, genomics, next-generation computing, the Internet of Things, intelligent resilient infrastructure, food safety, low-carbon transportation, non-animal testing technology, and synthetic biology.

Currently, the UK has established 11 Catapult Centers, which mainly include: High-Value Manufacturing, Cell and Gene Therapy, Transport Systems, Offshore Renewable Energy, Satellite Applications, Digital, Future Cities, Energy Systems, Precision Medicine, Medicine Discovery, Compound Semiconductor Applications.

In addition, the Digital, Precision Medicine, and Satellite Applications Catapult Centers have established regional hubs and together form a network of Catapult Centers.

University of California, Riverside: Leveraging University Assets to build Regional Strategic Partnerships

The UCR EPIC International Incubation Challenge support technology-based startup companies from Latin America that want to explore opportunities to commercialize their innovations in the US Market. Six (6) LATAM startups will be selected to receive USD 100,000 in prizes (USD40,000 in cash + USD 60,000 in expert mentoring support from UC Riverside + a trip to Riverside California for the winner).

3.3.3 Regional Strategy

3.3.3.1 Innovative city

Innovation city, a region or city taking science, technology and innovation (STI) as the core driving force to realize economic development, is a typical mode for regional innovation development. The concept of innovation cities centers on making cities engines of innovation and leaders of growth through the establishment of science and technology parks, science and technology clusters and the promotion of science, technology and innovation (STI). In an innovation city, science, technology and innovation are closely aligned with urban development, and expertise and technological capabilities in specific fields are fully utilized.

The concept of innovation cities is emerging in APEC member economies and is having a positive impact on cross-border co-operation and economic growth. Developed economies, such as the United States, have achieved typical examples such as San Francisco Silicon Valley, while developing economies are actively trying to develop similar program and are committed to the task of promoting regional integration.

3.3.3.2 Policy Mechanisms Support

In addition to the participation of both supply and demand sides, it is also necessary for the government to provide support at the institutional level.

In the process of building innovative cities, besides the participation of both supply and demand sides, it is crucial for the government to provide guarantees at the institutional level. The government can establish plans and policies, provide financial support, develop infrastructure, cultivate talent, promote cooperation and communication, and drive the development of innovative cities. Government participation and support can create a favorable innovation ecosystem and provide strong assurance for the construction of innovative cities.

Huai'an is a developing city located in eastern China, with relatively limited innovative resources. To achieve the goal of making "technological innovation" a new economic growth driver, the government of Huai'an has explored an effective development model called the "Huai'an Model" over the years. The core of this model lies in establishing a government-led, industry-university-research collaboration, and enterprise participation framework, which forms an innovation ecosystem guided by the government and driven by market operations.

The "Huai'an Model"

First, seize new opportunities for regional coordinated development, investigate the actual development situation of the region, and actively explore development models that are in line with the actual conditions of the region. Huai'an is a developing city with relatively limited innovative resources. In recent years, the Huai'an government has made efforts to integrate into the Yangtze River Delta region's integrated development opportunities, the Grand Canal cultural belt, the Huai River ecological economic belt, and other strategies, in order to accelerate its integration into the Yangtze River Delta science and innovation community. In terms of supporting regional coordinated development, firstly, efforts are being made to promote the high-end transformation of mature industries by introducing policies, nurturing enterprises, cultivating distinctive industries, and promoting their scale production.

Second, efforts are being made to build a high-tech production base by strengthening cooperation with high-tech universities, research institutions, and enterprises in Beijing, Shanghai, Guangzhou, and Shenzhen. Exploring a collaborative development model where research and development incubation takes place in remote areas while industrialization occurs locally. This is aimed at adapting to the landing of more innovative achievements in Huai'an. Moreover, endeavors are being made to integrate into the Nanjing Innovation Development Zone and seize more opportunities for collaboration.

Third, explore the potential of the digital economy. Introduce practical measures for the development of the digital economy, such as the intelligent transformation of the manufacturing industry and digital transformation, through the implementation of the "Three-Link Action". Vigorously promote the digitization and industrialization of industries, fostering deep integration of innovation chains, industrial chains, capital chains, and talent chains, in order to create an advanced manufacturing and technology zone for integrated development in the Yangtze River Delta region. Make efforts to develop distinctive and advantageous industries, accelerate the establishment of new energy and green industries. Additionally, build well-known brand events to create a new business card for the development of Huai'an city.

Part IV

Policy Recommendation: Huaian Initiative of Academy-Industry Cooperation on Technology Commercialization in the Asia-Pacific Region

As stated previously, the aim of PPSTI 08 2021A - Workshop on Catalyzing Quality STI Demand Raised by Demand-side of Technology Commercialization is to encourage the creation of management techniques and indicators for the commercialization of demand-side technology within the region. This provides a theoretical and practical groundwork for the advancement of demand-side management techniques and indicators. Our research has led us to the following understanding:

Entering the post-pandemic era, the global economy has been affected to varying degrees and now is facing the risk of a prolonged recession. The economic recovery of the Asia-Pacific region faces a significant challenge so it becomes critical to foster regional collaboration in supporting the development of science and technology. APEC member economies intend to enhance mutual science, technology and innovation (STI) cooperation to promote the commercialization of scientific and technological achievements, foster new drivers for economic development, and strive to achieve the goals of *APEC PUTRAJAYA VISION 2040* and the *Sustainable Development Goals (SDGs)* of the United Nations.

Following the aims of the PPSTI 08 2021A and the framework of the APEC Policy Partnership on Science, Technology and Innovation (PPSTI), we hereby present the following initiative sections:

Section 1. Consensus

We recognize that,

1.1 Promoting open, inclusive, balanced, innovative and sustainable development is critical for economic revitalization in the Asia-Pacific region;

1.2 The demand side of the technology commercialization includes regions, clusters, S&T parks, innovative enterprises and other innovation actors that require innovative technologies;

1.3 The supply and demand sides of technology commercialization deserve equal attention, as the potential value created on the demand side determines the success rate and effectiveness of the technology commercialization;

1.4 Technological demands and application scenarios from private sectors can point out the direction STI maybe pushed forward;

1.5 Incubators, accelerators and other innovation carriers/projects can serve the process of technology commercialization, as well as being one of the main bodies implementing innovative technologies in the process of technology commercialization, and can contribute to innovation capacity building and development on the demand side;

1.6 Key resources, such as funds, facilities and labor, as well as technology management components, such as intellectual property, laws/regulations, finance, and capital, should be considered in the context of STI business;

1.7 It is important to jointly explore high-quality technological demands in the Asia-Pacific region by building collaborative mechanisms for connectivity; and

1.8 Professionals and services for the transfer and commercialization of scientific and technological achievements can play their distinctive and vital roles in technology commercialization.

Section 2. Actions

We propose that APEC member economies consider to ,

2.1 Keep open and inclusive, to advance innovation and technology commercialization cooperation in the Asia-Pacific region, to facilitate deep integration of economy and science & technology, to respond to the three priorities of " Interconnected, Innovative and Inclusive", to establish methodologies that serve science & technology innovation, and to work towards economic recovery and high-quality transformation and development;

2.2 Connect and integrate with APEC technology supply side, demand side, professionals, technological elements and key market elements, support the elements to flow among all member economies, and form the innovation ecosystems and collaborative networks for technology commercialization;

2.3 Strengthen the cooperation between enterprises and universities in the region for promoting the coordination of R&D and application, especially for major technological projects, and better improve the efficiency of transferring and commercialization of the scientific and technological achievements by forming an ‘innovation consortium’ which is an effective joint research innovation mode for enterprises to carry out technological innovation, with a structure of being led by the demands of large enterprises, supported by the STI achievements of universities, and stakeholders cooperating with harmony;

2.4 Summarize the applicable tools or methods for sorting out high-quality STI demands

and analyzing application scenarios, and generally strengthen the capacity on the demand side in the region, so as to fully deploy the STI resources and capacity of the public sectors, and jointly cope with the low efficiency of commercialization of the scientific and technological achievements caused by lower technological demands during the pandemic;

2.5 Facilitate the development of MSMEs and start-ups: Facilitate their access to international markets and supply chains by promoting an open and inclusive trade and investment environment, to encourage MSMEs to identify their STI development needs;

2.6 Create an environment conducive to the career development of female science and technology practitioners, improve relevant policies and laws/regulations, and increase the participation of female science and technology practitioners in sorting out technology demands, carrying out technology and innovation, as well as engaging in technology commercialization and STI exchanges;

2.7 Pay attention to the value and serviceability of professionals in the transfer and commercialization of scientific and technological achievements, and strengthen their professionalism in organizing, coordinating, managing and consulting in the process of technology transfer and commercialization of scientific and technological achievements;

2.8 Carry out continuing education on technology commercialization through official and non-governmental cooperation, so as to enhance the capacity building of the professionals, to realize the voluntary and mutually agreed sharing of advanced knowledge resources and practical opportunities, and improve the theoretical level and operational ability of the professionals; and

2.9 Strive to form the evaluation index systems, international standards and guidelines for technology commercialization, as well as accreditation standards for professionals to facilitate cooperation in technology commercialization and technology transfer in the Asia-Pacific region.

Section 3 Plans

Building on the consensus and actions stated in Articles 1 and 2, we intend to:

3.1 Further apply and promote the outcome document of the APEC-funded project PPSTI 01 2017A, *Handbook on Technology Commercialization Practices in APEC Economies*, and continue to enhance demand-side capacity building in the Asia-Pacific region, including but not limited to innovative projects and talent development; and

3.2 Explore forming the ‘Index System of Science, Technology and Innovation Demands in the Asia-Pacific Region’ as an official output of the APEC-funding project and as a

consensus among all APEC member economies.

5 December 2022

Huaian, China