



Commercialization examples conducted by Korean commercialization agency

November 7, 2018

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- 1. Korea's technology trade status**
2. Government's direction of support for commercialization
3. Practice areas of private commercialization support agencies
4. Best commercialization examples

1. Korea's technology/product trade status

- Korea's **technology exports** have been steadily growing from USD 600 million in 2001 to over USD 10 billion in 2015, but they are extremely **low compared to Korea's product exports**.
- Korea's technology exports exceeded 1% of the product exports in 2013 for the first time, and the **technology exports in 2015 accounted for only 1.98% of its product exports (27th place in 2014)**.

Technology trade and Product trade status (2011 ~ 2015)

(M\$, %)

Year	Technology trade			Product trade			Tech EXP/ Product EXP (%)
	Export	Import	-	Export	Import	-	
2011	4,032	9,900	-5,868	555,399	524,374	31,025	0.73
2012	5,311	11,502	-5,741	547,860	519,584	28,276	0.97
2013	6,846	12,038	-5,193	559,625	515,585	44,040	1.22
2014	9,765	15,540	-5,775	572,651	525,514	47,137	1.71
2015	10,408	16,409	-6,001	526,757	436,499	90,258	1.98

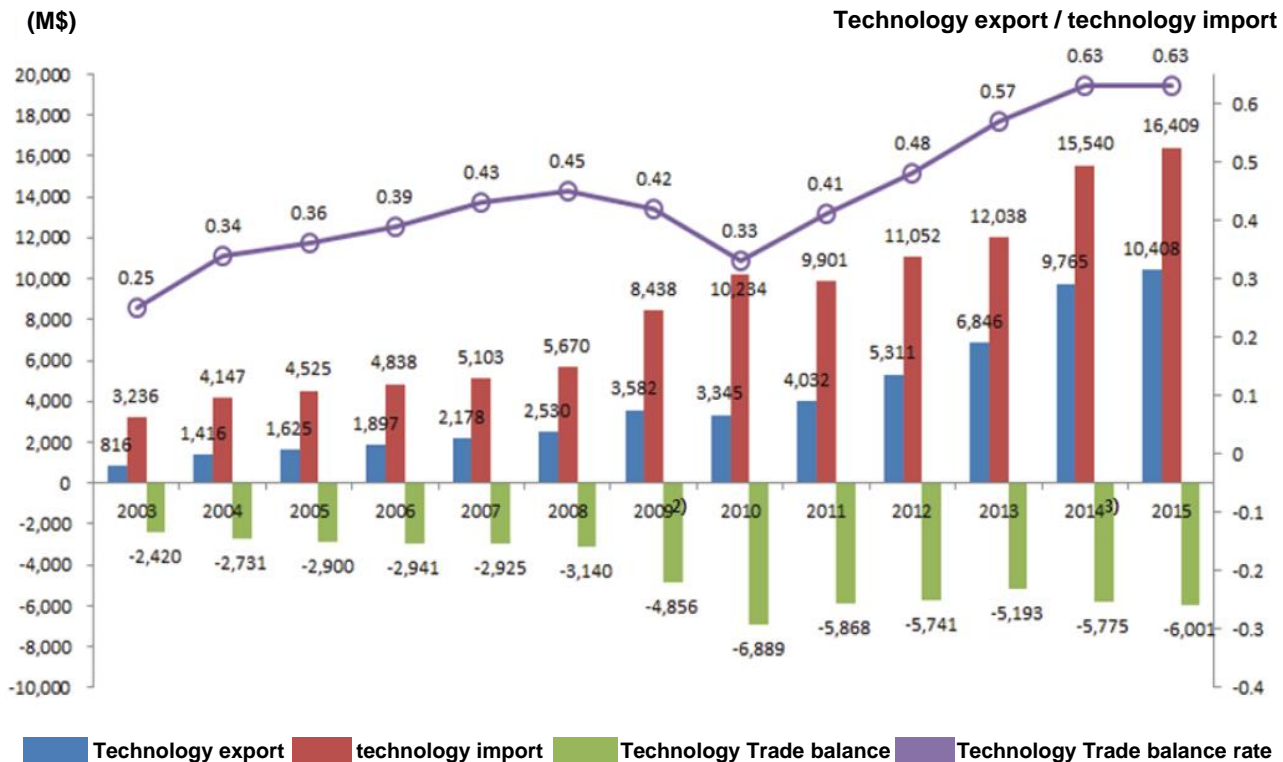
Comparison of OECD export rate of technology exports relative to Product exports (2014)

- 1) Ireland (61.06%)
- 2) Luxembourg (23.83%)
- 3) Israel (22.08%)
- 4) Sweden (16.57%)
- 5) Finland (15.53)
- ⋮
- 8) United Kingdom (9.04%)
- ⋮
- 10) United States of America (8.41%)
- 11) Japan (5.01%)
- ⋮
- 15) Germany (4.78%)
- ⋮
- 27) Korea (1.71%)**

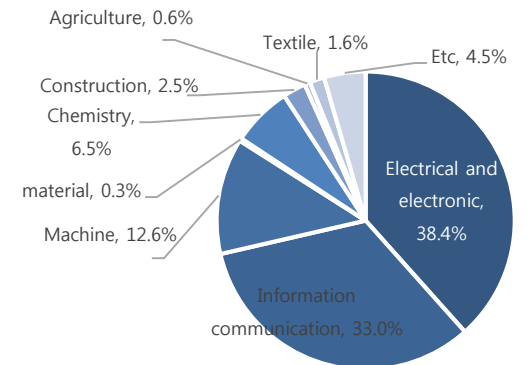
※ Source : 2017 Technology Trade Statistics Report, Korea Industrial Technology Association

2. Korea's technology trade trends

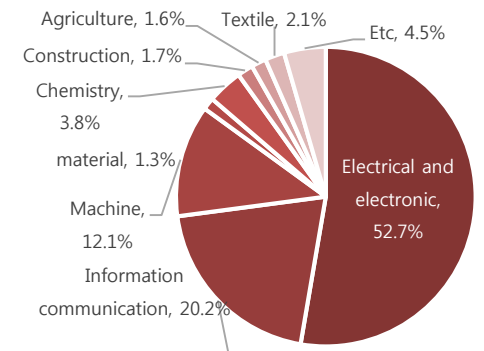
- Korea's technology trade volume has been steadily increasing up to USD 26.817 billion in 2015.
- In 2015, the technology exports grew YoY by 6.6% to USD 10.48 billion and the technology import also grew YoY by 5.6% to USD 16.49 billion, while the **technology trade balance recorded a deficit of USD 6.01 billion**.
- The technology trade is centered on the fields of electrical electronics, telecommunication, machinery, etc.



Technology export



technology import

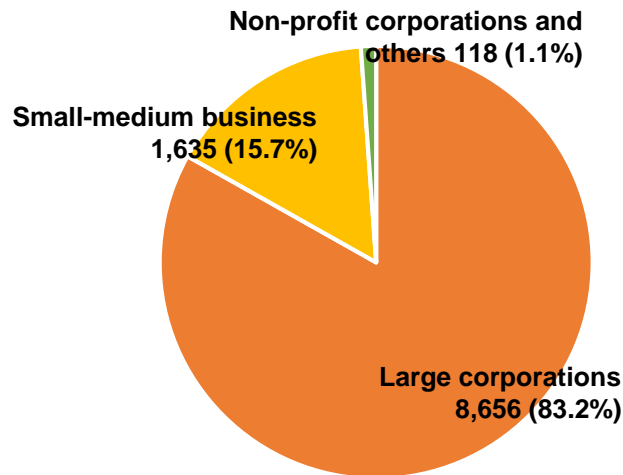


※ Source : Korea Industrial Technology Association, 2016

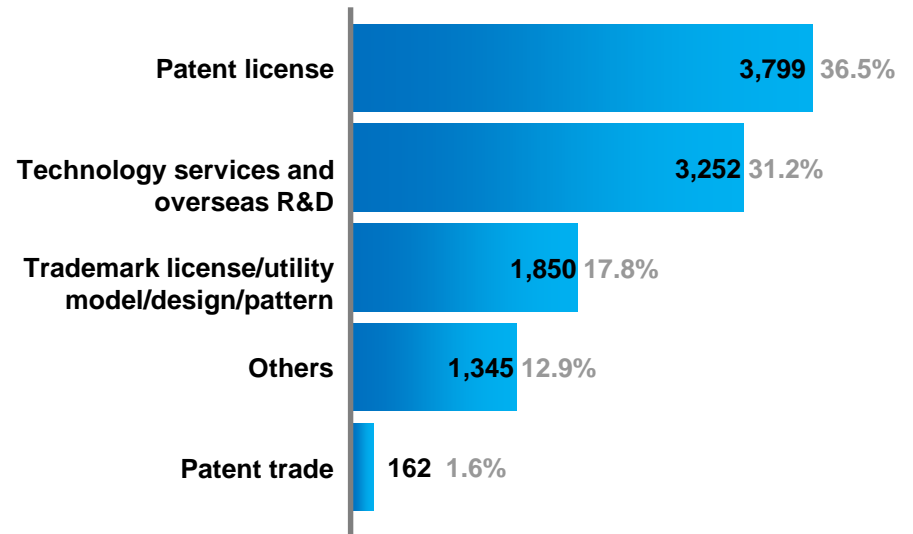
3. Technology trade status by type of institution in Korea

- ▶ **The technology trade is centered on large corporations.** Large corporations exported USD 8,656 million worth of technology, which occupied 83.2% of the total, small-medium businesses USD 1,635 million (15.7%), and the technology exports of non-profit corporations and others accounted for 1.1% of the total.
- ▶ Upon reviewing the technology exports by technology type, **patent license offer led with 36.5%**, followed by technology services and overseas research and development, which occupied 31.2%.

Technical Trade (exp) Status by Institution Type (2015)



Technology trade (exp) status by technology type (2015)



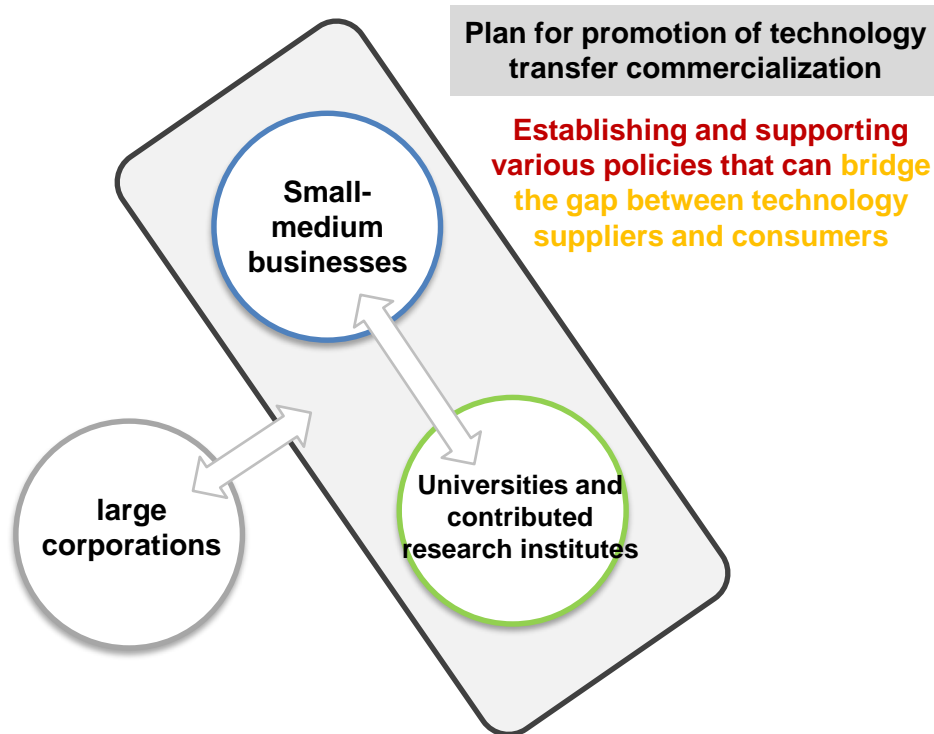
※ Source : Korea Industrial Technology Association, 2016

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4. Government's support for commercialization

- The technology commercialization policies of the government of the Republic of Korea have been established and implemented by the Ministry of Trade, Industry and Energy. The Ministry has established and implemented a **plan for promotion of technology transfer commercialization** every three years by putting together the plans notified by the relevant central administrative agencies in accordance with Article 5 of the **Technology Transfer and Commercialization Promotion Act** (currently, the 6th plan is in progress).
- Implementation of a support policy for utilization and expansion of excellent research results of **small-medium businesses and public institutions** (universities and contributed research institutes)



- ❖ Achievements of **1st to 5th plans**
 - ✓ Establishment of **an organization exclusively responsible for technology transfer commercialization** and a technology trade network
 - ✓ **Introduction and implementation of market-oriented R&BD projects** such as establishment of commercialization-linked technology development (2006), support of joint laboratories of small-medium businesses (2014), and R&D rediscovery project (2014)
 - ✓ **Support to provide a solution for commercialization funding** by setting up the new growth engine fund (2009) and the initial commercialization fund (2013) and establishing the technology evaluation system (2014), etc.

6th

- ❖ **Expansion of the demand base of Buy R&D**
 - ✓ Promotion of technology import by providing business expenses, coaching support, tax benefit, etc to the businesses importing technology
- ❖ **Providing the desired technology of the demand enterprise**
 - ✓ Establishment of an innovation model of private sector-led commercialization, expansion of product-based portfolio models, promotion of technology startup
- ❖ **Clearing the gap between consumers and suppliers**
 - ✓ Demand-oriented improvement of the technology market platform, creation of a private sector-centered technology trading market, expansion of technology finance
- ❖ **Establishment of a cross-ministry collaboration system**
 - ✓ Establishment of a cross-ministry technology commercialization policy council, operation of a system for finding difficulties in technology commercialization

[Reference] Strategy to promote the 6th plan for promotion of technology transfer commercialization

VISION

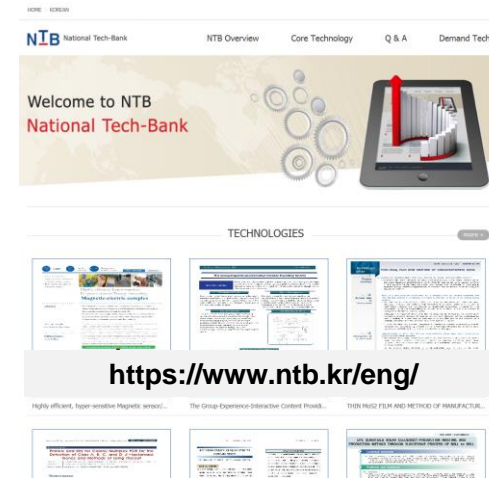
Establishment of an environment for **promotion of open innovation for advancement of the industry structure** centered on new industries

Goal	<ol style="list-style-type: none"> ① Proportion of the acquisition of open technology by companies: 13.5% (2015) → 30% (2019) ② Technology transfer rate of public institutions: 31.7% (2015) → 40% (2019) ③ Commercialization success rate after introduction of public technology: 12.4% (2015) → 20% (2019)
Paradigm shift	<ol style="list-style-type: none"> ① Focused on own technology → Culture of buying and selling technology ② Tech Push → Market Pull ③ R&D centered on quantitative input → expansion of R&D achievement utilization

Implementation strategy		Detailed projects
DEMAND	Buy R&D Expansion of demand base	<ol style="list-style-type: none"> ① Introduction of an open Innovation type B&D system ② Further discovery of competent technology demand groups ③ Improvement of technology trade promotion systems
SUPPLY	Providing the desired technology of the demand enterprise (Buyable R&D)	<ol style="list-style-type: none"> ① Establishment of a model for support of technology commercialization project corporations ② Strengthening the marketability of public R&D ③ Promotion of high value-added technology startup
INFRA	Clearing the gap between consumers and suppliers	<ol style="list-style-type: none"> ① Establishment of an online-offline convergent technology market platform ② Improvement of systems for promotion of private sector-centered technology trade ③ Support for technology-based enterprises to overcome death-valley ④ Improvement of awareness on Buy R&D through education and publicity
SYSTEM	Establishment of a cross-ministry collaboration system	<ol style="list-style-type: none"> ① Enhancement of collaborative governance of technology commercialization ② Ordinary regulation of technology commercialization - establishment of a system for finding difficulties

❖ Online Platform

✓ NTB



✓ IP-Market

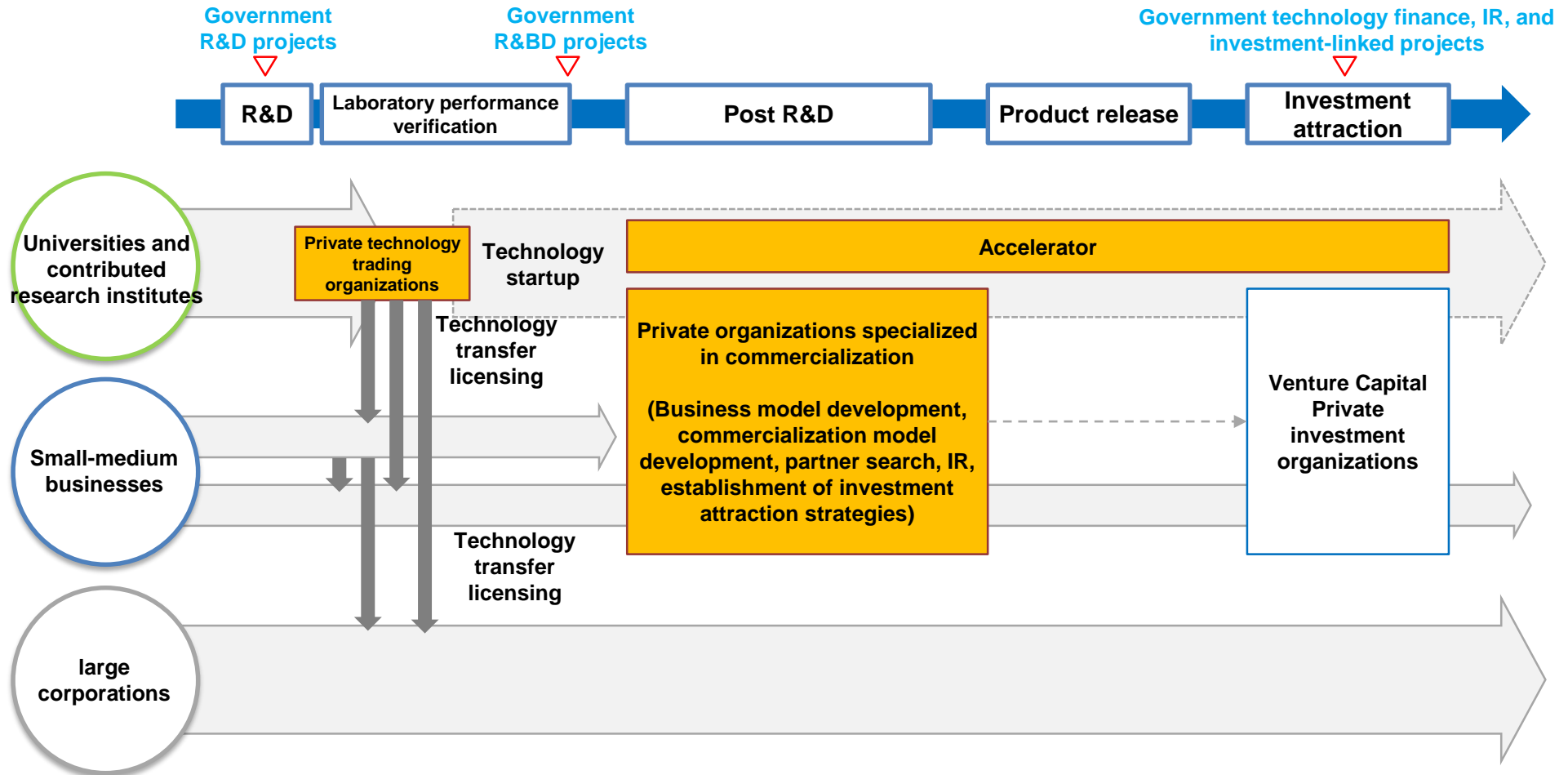


✓ MIRAE TOWN



5. Support structure for commercialization of domestic technology

➤ Enhancement of the technology and the performance of manpower of technology supply organizations by utilizing private commercialization consulting agencies, and support of strategies to advance technology and business plans for commercialization

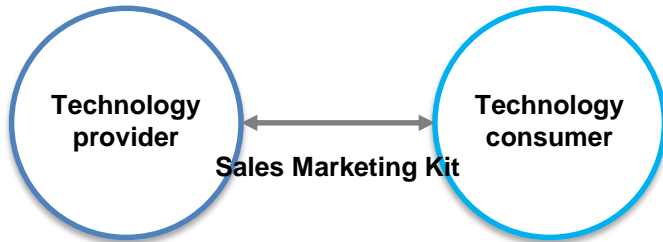


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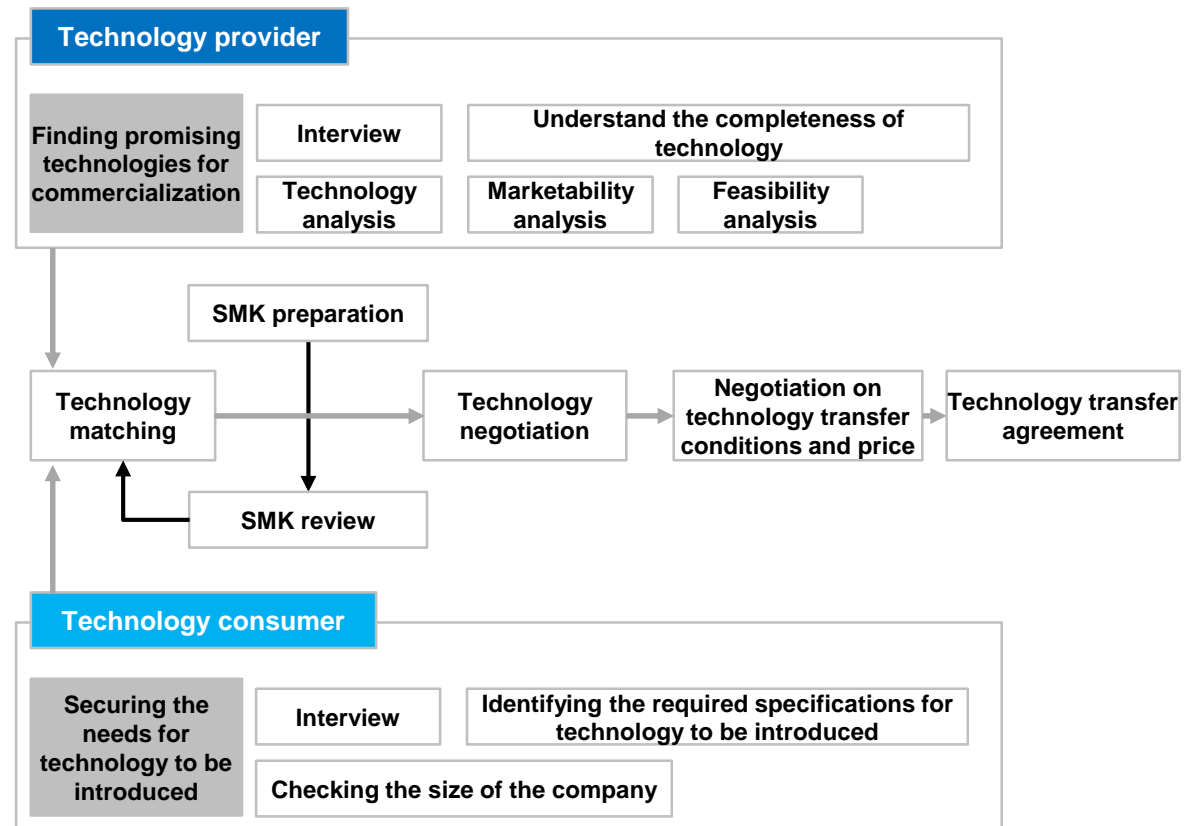
6. Practice areas of private technology trading organizations

Technology transfer, Licensing



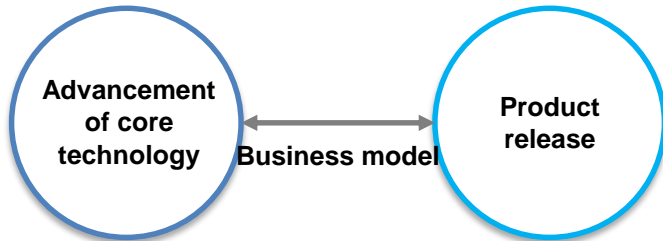
- ❖ Finding technology to be supplied
 - ✓ Analysis of technology through interviews with inventors of universities, research institutes, and small-medium businesses and identification of the types of the technology to be supplied (patent, know-how, product, etc.)
- ❖ Finding demand enterprises
 - ✓ Securing the needs for introduction of technology of demand enterprises
- ❖ SMK (sales marketing kit) preparation and sharing
 - ✓ Preparation of technology introduction materials which explain the technology to be supplied so that it can be easily understood and sharing the materials with demand enterprises
- ❖ Technology transfer negotiation
 - ✓ Proceeding with negotiations for technology trade and discussion on technology transfer conditions, price, etc.
- ❖ Support for preparation and legal review of technology transfer agreements

Technology transfer PROCESS



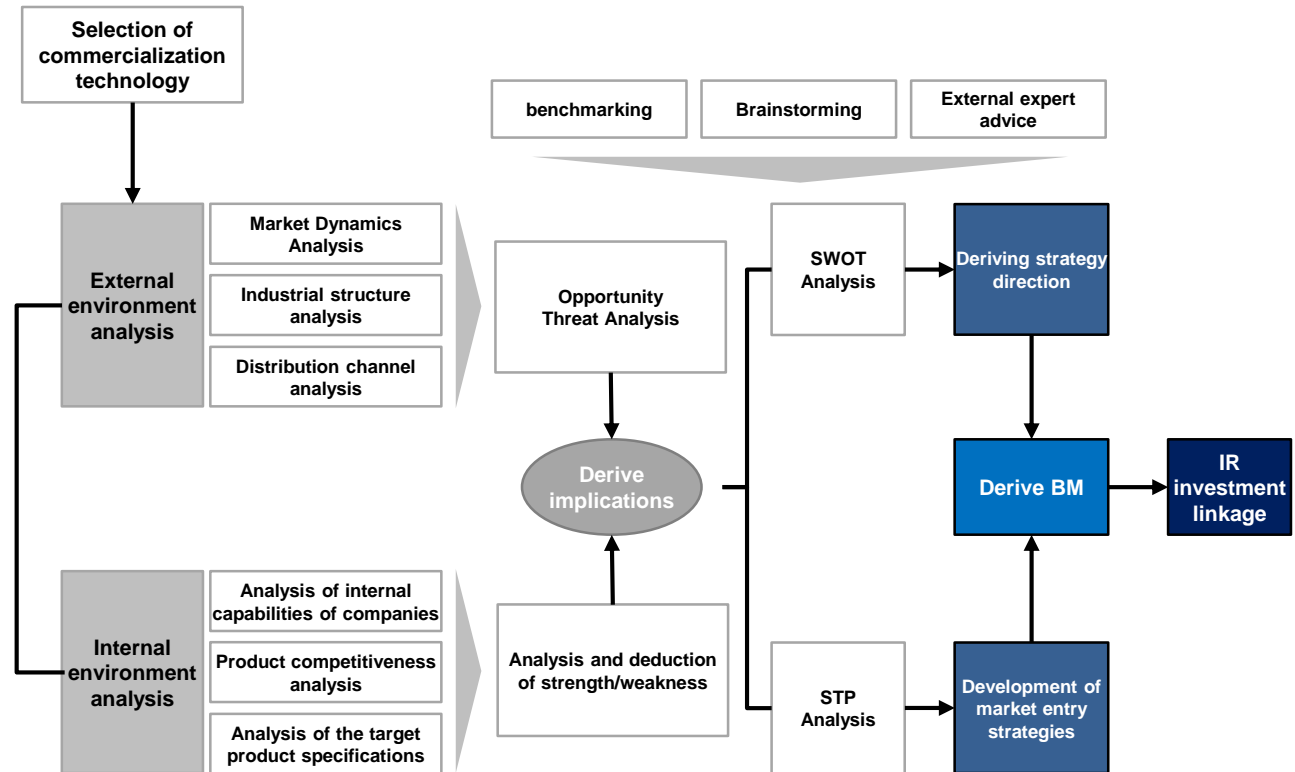
6. Practice areas of private technology trading organizations

Business Model, Commercialization strategy, Investment linkage



- ❖ Establish and verify business models
 - ✓ Design business models through the analysis of the external market of products and competitors, internal capability analysis, etc.
 - ✓ Verify feasibility by using field experts
- ❖ Establish commercialization strategies
 - ✓ Actualization based on the advancement of business models, such as market entry, marketing strategy, and product release strategy
- ❖ Preparation of IR data for investment linkage and IR
 - ✓ Prepare IR data for attracting and linking investors and hold IR events
- ❖ Finding partners
 - ✓ Find partners for various business cooperation
- ❖ Linkage with government R&BD businesses and investment support businesses

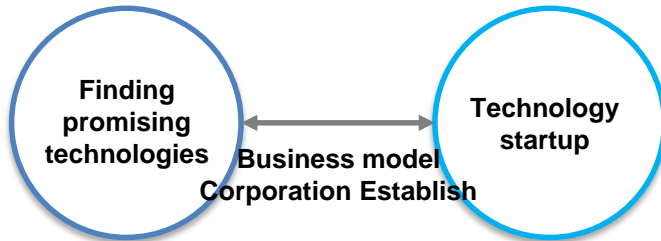
❖ BM PROCESS



※ STP Analysis : Segmentation, Targeting, Positioning Analysis

6. Private Accelerator Business Area

Business Model, Commercialization strategy, Investment linkage



Accelerator PROCESS



❖ Finding technology founders

- ✓ Finding technology founders with a technology for which there is a demand

❖ Finding promising technologies

- ✓ Analysis of feasibility through technology search, selection of promising technology

❖ Support for commercialization

- ✓ Establishment of corporations, entrepreneurship education, mentoring, support for space for startup

❖ Support for corporate growth

- ✓ Preparation of a plan for securing business expenses through prototyping, linkage with a commercialization R&D project, etc.
- ✓ Establishment of investment attraction strategies such as IP-based guarantee, IP investment, and cash investment

Company Search	Property Discovery	business Model	Commercialization	Follow UP
<ul style="list-style-type: none"> ✓ Finding technology consumers (enterprises) ✓ Finding the needs of family companies of universities and research institutes ✓ Finding the needs for startup of researchers such as researchers' startup 	<ul style="list-style-type: none"> ✓ Searching for promising technologies ✓ Evaluation of patents ✓ Evaluation of technology and the degree of the right ✓ Evaluation of marketability and feasibility ✓ Analysis of suitability for the target market 	<ul style="list-style-type: none"> ✓ Matching of technology and product based on the needs of businesses ✓ Finding the field to be applied and analyzing the external environment ✓ Establishment of product-based business models and commercialization strategies ✓ Operation of educational programs 	<ul style="list-style-type: none"> ✓ Startup education and seminars ✓ One-to-one mentoring consultation for startup ✓ Operation of administrative and legal education programs related to corporation establishment, etc. 	<ul style="list-style-type: none"> ✓ Establishment of a plan to secure funds by linking commercialization R&D projects, etc. ✓ Establishment of investment attraction strategies such as R&D-based guarantee, IP-based guarantee, IP investment, and cash investment by linking market-makers

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6. Best commercialization example 1 in Korea

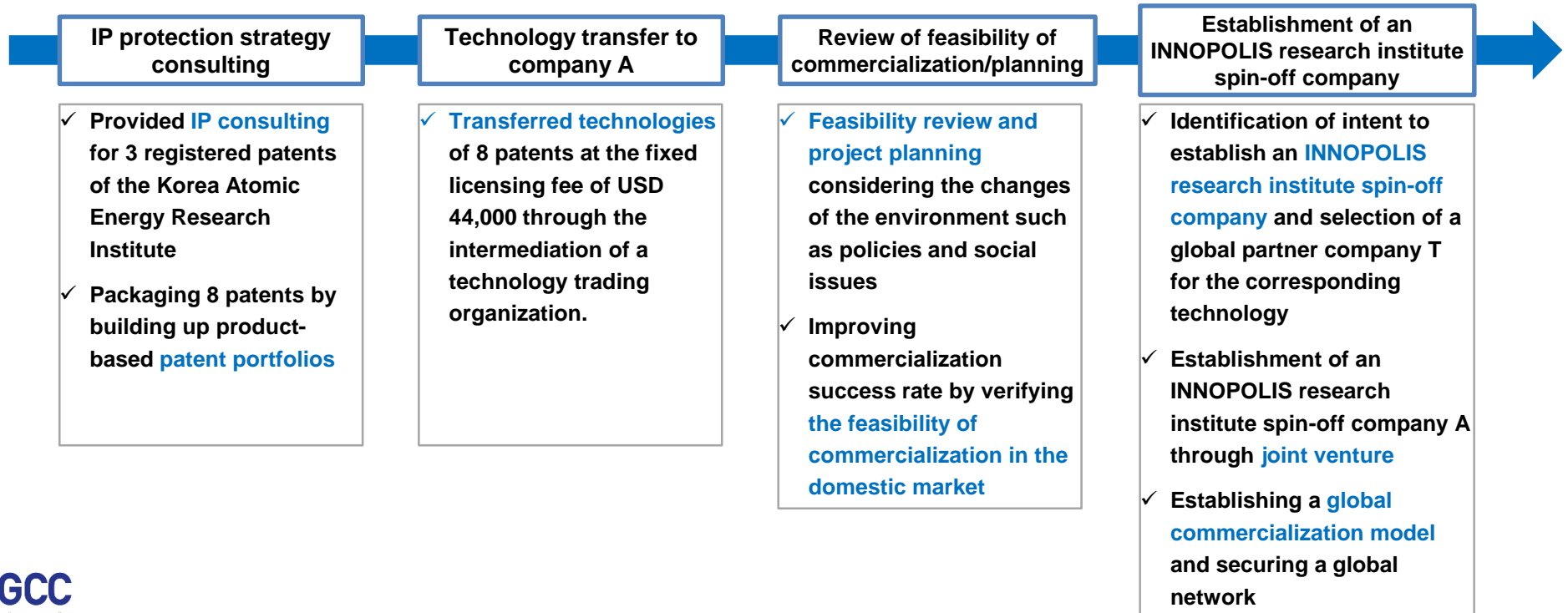
Support for the establishment of a J/V company A through the technology transfer and investment of the Korea Atomic Energy Research Institute (technology for inspection of containers using radiation)

- ✓ Building up product-based patent portfolios and patent packaging
- ✓ Technology transfer through the intermediation of technology trading organizations and verification of domestic market performance
- ✓ Establishment of technology commercialization strategies considering legal and market environment changes
 - Article 1701 of the Act on the Implementation of the Measures against the Terrorism of 9/11 (100% freight scanning legislation)
 - Upward adjustment of global security level (needs to cope with international terrorism and technology acquisition)

원자력연구원, 1조 규모 컨테이너 검색기 국산화 한다



원자력연구원 연구진, '컨테이너 검색기' 국산화 성공
원자력연구원 연구진이 2011.11.22. 오전 11시 30분 원자력연구원 대회의실에서 '컨테이너 검색기' 국산화 성공을 기념하며 기념 촬영을 하고 있다. 원자력연구원 연구진은 '컨테이너 검색기' 국산화 성공을 기념하며 기념 촬영을 하고 있다. 원자력연구원 연구진은 '컨테이너 검색기' 국산화 성공을 기념하며 기념 촬영을 하고 있다. 원자력연구원 연구진은 '컨테이너 검색기' 국산화 성공을 기념하며 기념 촬영을 하고 있다.

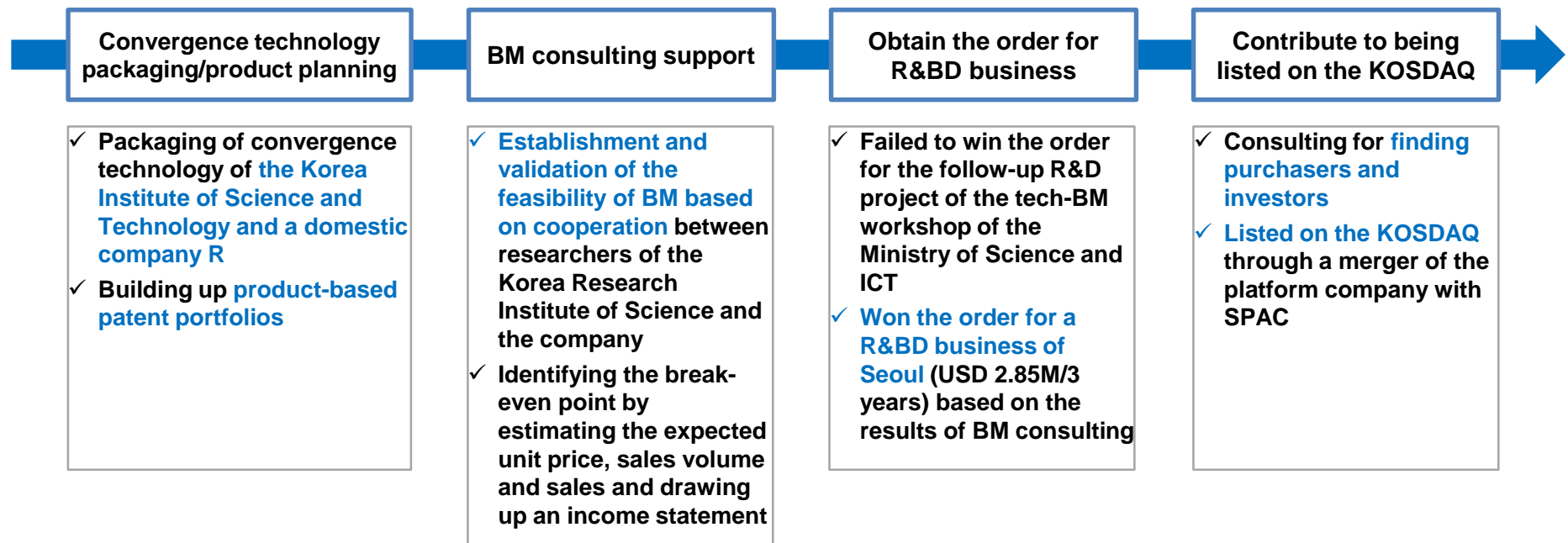


6. Best commercialization example 2 in Korea

➤ Obtained the order for a large R&BD project through BM consulting, listed on the KOSDAQ (technology of educational robot system and contents)

- ✓ Consulting and support for Post R&D project (**Tech-BM workshop**) of the Ministry of Science and ICT as a consortium of the Korea Institute of Science Technology and a domestic company R → failure to win the order
- ✓ **Won the order for a R&BD business of Seoul (USD 2.85M/3 years) based on the results of BM consulting**
- ✓ Contribute to being listed on the KOSDAQ through a merger of the platform company with SPAC

※ SPAC (Special Purpose Acquisition Company)

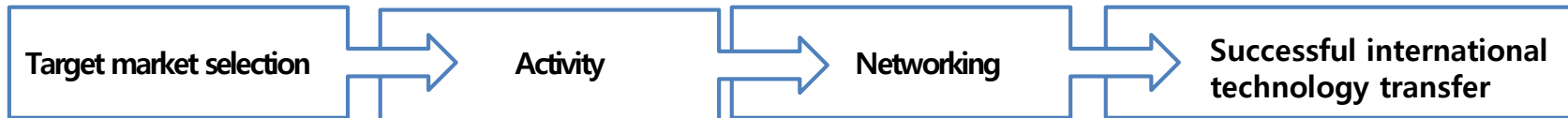


6. Examples of international technology transfer

› Technology

- ✓ “Carbon Capture, Utilization & Storage technology” (TRL 7) of government funded research institute
- ✓ Technology of atmospheric environment protection

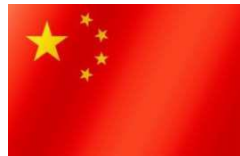
❖ PROCESS



› Consideration for target market selection

- ✓ Potential demand
 - Where there are a lot of atmospheric environment issues
 - Where there are many government-regulations on enterprises in environmental pollution
- ✓ Accessibility
 - Physical distance
 - Political distance (If there are any political problem between Korea vs. country of potential target-market)
 - Favorability to Korea

 Chinese Market



6. Examples of international technology transfer

› Activity

✓ Attending local conferences for technology transfer

- Attending China ITTC(International Technology Transfer Convention)

➤ *Event Overview*

- The China ITTC is a state-level exchanging platform in China hosted by China Ministry of Science and Technology, and Municipal People's Government.
- Over 4000 participants attended China ITTC, which included 1000 international guests from about 60 countries and regions all over the world.

➤ *Activities*

Seminar, Roadshow, Matchmaking, Exhibition

- Marketing the technology

- Networking with local experts

› Networking in China



国际技术转移协作网络
International Technology Transfer Network



Northern Territory™

中关村东升科技园



6. Examples of international technology transfer

› Networking in China

❖ ITTN(International Technology Transfer Network)

- A professional service organization committed to promoting International Technology Transfer and International Innovation Cooperation
- Has contracted MOU
- Inviting to a number of conferences
- Consulting on Chinese policy and market information



国际技术转移协作网络
International Technology Transfer Network



❖ Local law firm specializing in technology transfer

- Has contracted Broker Agreement
- Providing an information on demand technology
- Contacting potential demand enterprise
- Attending conferences for marketing on behalf of our firm or our client

❖ HOPE (Haier Open Partnership Ecosystem)

- Open innovation platform of HAIER
- Partnership with HAIER
- Providing Technology needs
- Collecting innovation resource



Photovoltaic direct-drive and inverter heat pump control solution

Haier seeks photovoltaic direct-drive and inverter heat pump control solution for solar water heater products.

Key Success Criteria:

Successful responses will meet the following criteria:

- The electricity generated from the photovoltaic power generation process will first go through the MPPT circuit and the regulated voltage booster, and then it will connect with the DC module of the compressor and drive the operation of the inverter compressor together with the grid supply;
- Be able to provide optimum design for the PV/T collector, the way of connection between the heat exchange module and the photovoltaic module, and the design for heat exchange module;
- Be able to develop the control logic for the inverter compressor and the electronic expansion valve, the complete photovoltaic thermal control solution, optimum design for the system configuration and optimum COP for the heat pump;
- Provide design for the whole structure and circuit board;
- The hot water volume for the whole unit is 20L/h;
- Cost less than RMB2600.

Approaches tried before:

- Photovoltaic low voltage drive DC compressor;
- Inverting the photovoltaic generated power into alternating current for usage. However, the inverting efficiency is low and battery is required for the off-grid system. So only low electricity volume is achieved and the cost is high.

Problems:

- The heat exchange efficiency of the PV/T collector is poor, and the design related with the refrigerant system is not that perfect;
- No mature inverter compressor and electronic expansion valve control based on irradiation intensity and ambient temperature changes.

Preferred Collaboration Type:

- Joint development
- Technology resource provides a technology solution, and Haier will pay for the solution.

6. Examples of international technology transfer

❖ Start-up incubators & Accelerators in China (中关村东升科技园 or Techcode)

- Help Fundraising & government support for enterprises or entrepreneurs
- It is possible to link Korea's licensee or joint venture planning to commercialize in China.
- Marketing to enterprises linked with the incubators & Accelerators



❖ China branch of Korea Environment Corporation

- Korean government agencies that have entered China
- Promote environment-related projects with government agencies and companies of China
- Advising to enter the China market as Korean
- Providing know-how on approaching the Chinese market



❖ CTEX(China Technology Exchange)

- Providing demand technology of companies located in each region
- Having platforms in each region of China.



❖ China Division of IVL Swedish Environmental Research Institute

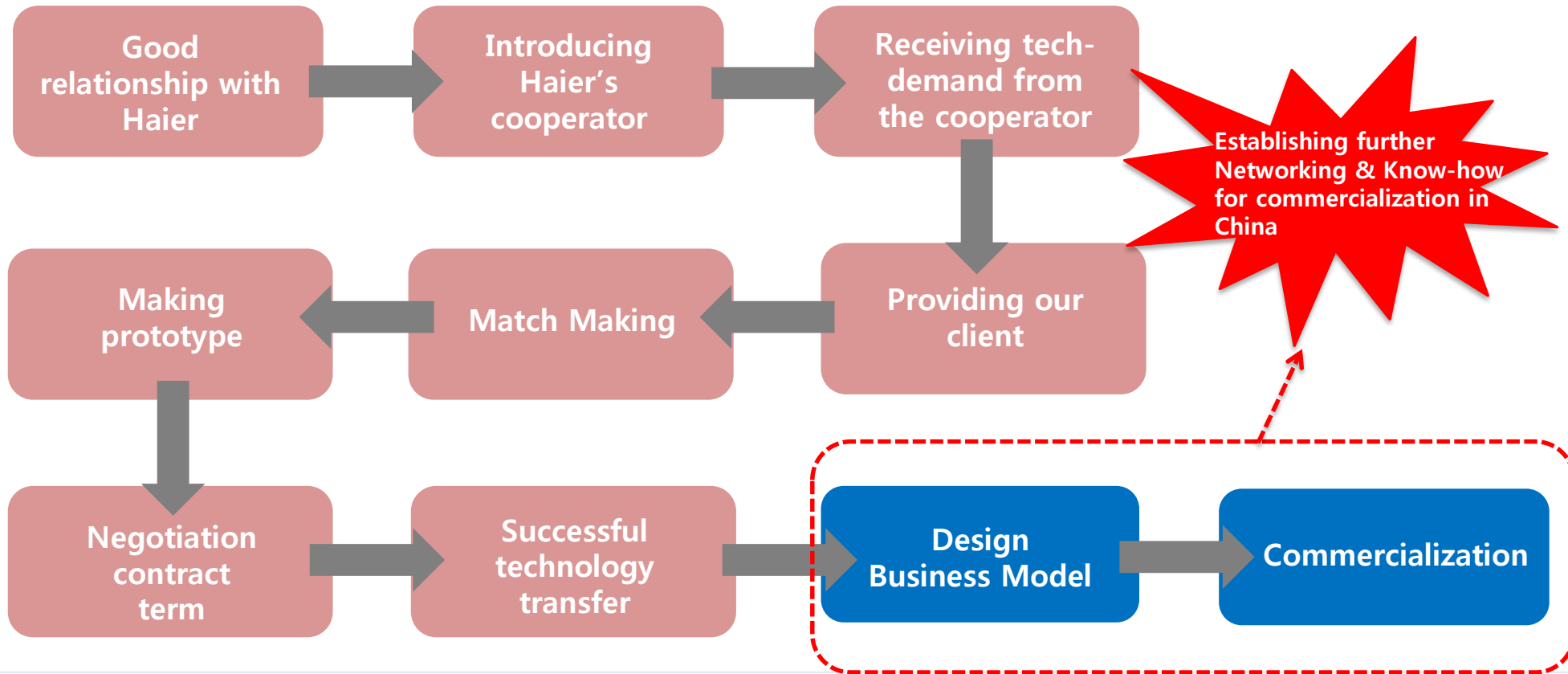
- Supporting Swedish environmental research institutes and companies coming into Chinese market for a long time
- Has experience, resources and knowledge on China's environment and energy policy, technology, economy and market development
- Providing services for comprehensive market and policy analysis



6. Examples of international technology transfer

➤ Achievement

- ✓ Technology transfer for “Carbon Capture, Utilization & Storage” technology is ongoing
- ✓ Continuous networking in China has given another opportunity, and technology transfer of other technologies has been achieved.



Thank you