The 30th STAG Board Meeting

Topic 1

Reform Strategies for Intellectual Property Management and Commercialization

Subtopic 2:

Intellectual Property Management and Commercialization Strategy Reform for Universities

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Report Outline

1. Introduction
2. Analysis of Current Status
   Overview the Status of University Intellectual Property Commercialization
3. Emerging Challenges
4. Strategies for Reforming Management and Commercialization of University IP
5. Conclusion and Discussion

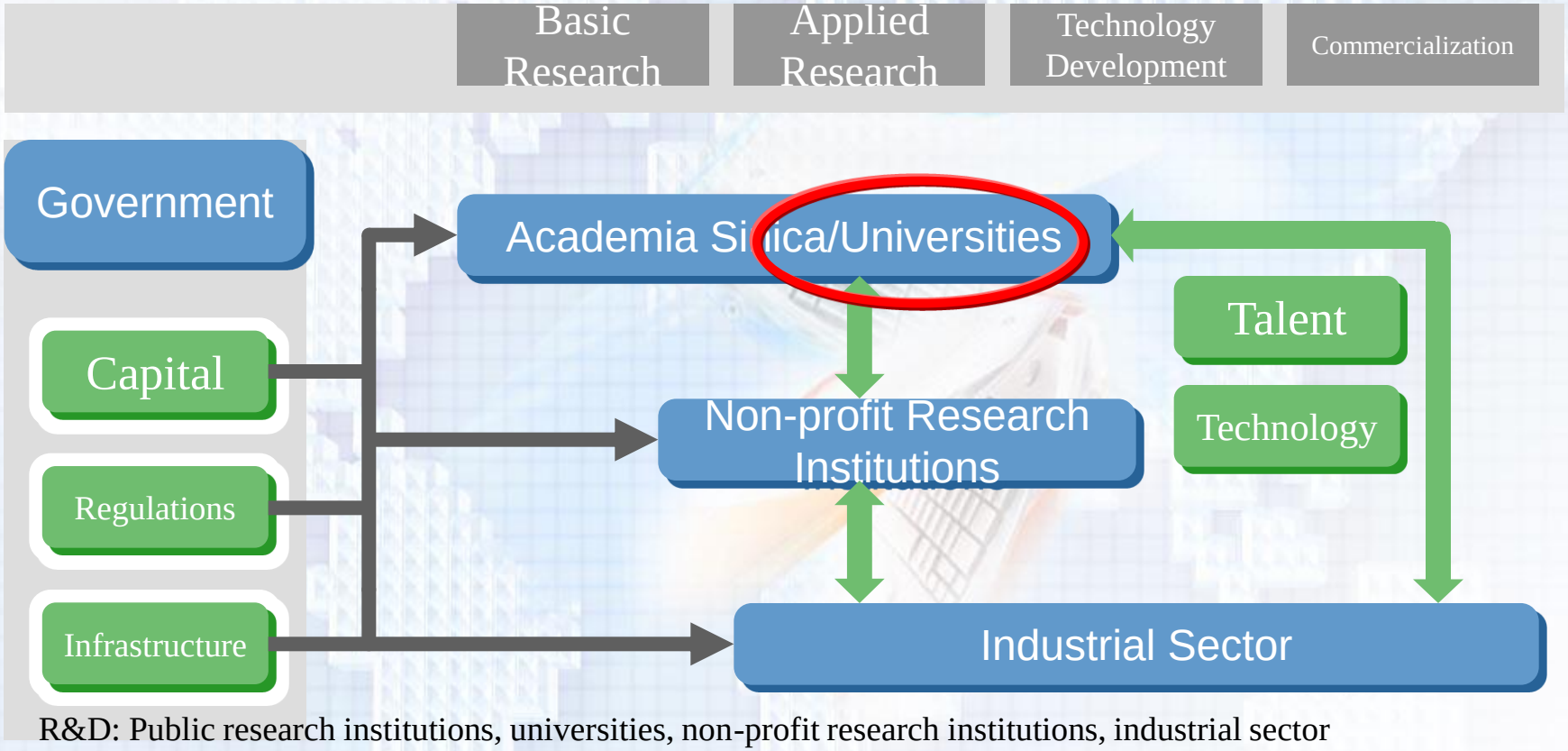
1. Introduction

- **The objective of this subtopic is to discuss "How to strengthen the mechanism to commercialize university intellectual property and value-added industrial innovation."**
- **The focus of this discussion includes:**

Converting university R&D capacity into a driving force of strengthening the nation

1. **Reviewing the current status of university R&D in industrial innovation and boosting the contribution of R&D at the higher education level to the industrial economy.**
2. **Developing a new IP operation mechanism available for university IP commercialization**

Roles of Universities in Industrial Innovation Tree Chart, R.O.C
—Science & Technology Innovation System



R&D: Public research institutions, universities, non-profit research institutions, industrial sector

Government Role: Utilizing capital and regulations as policy tools, establishing infrastructure, and guiding talent and flow of technology to achieve the goals of enhancing economic benefits and public well-being.

Source: STAG, Executive Yuan

2. Current Status: Existing Capacity

With the greatest share of highly-educated personnel, the higher education sector, as the main source of novel knowledge, is expected to be a leading driver in an era of reforming IP operation.

Basic Research 0.2%

Applied Research 25.5%

Technology Development 64.3%

2008 National R&D Spending
11,335,483,871USD

National PhD Research Manpower
30,920 Man-Years

Source: Based on Department of Industrial Technology (MOEA) 2006 "Briefing on Bridging Innovation Gaps between Industry and University R&D; data compiled and analyzed by NSC 2009 Indicators of Science and Technology"

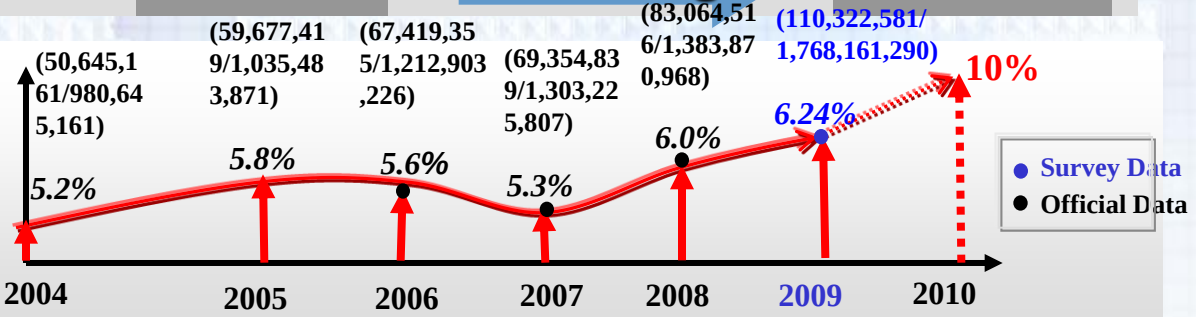
2. Current Status: Industry-Academia Collaboration Value-added Project / **2010 Policy Objectives**

Setting Goals to Double IP Commercialization based on 26th STAG Board Meeting

Unit: USD

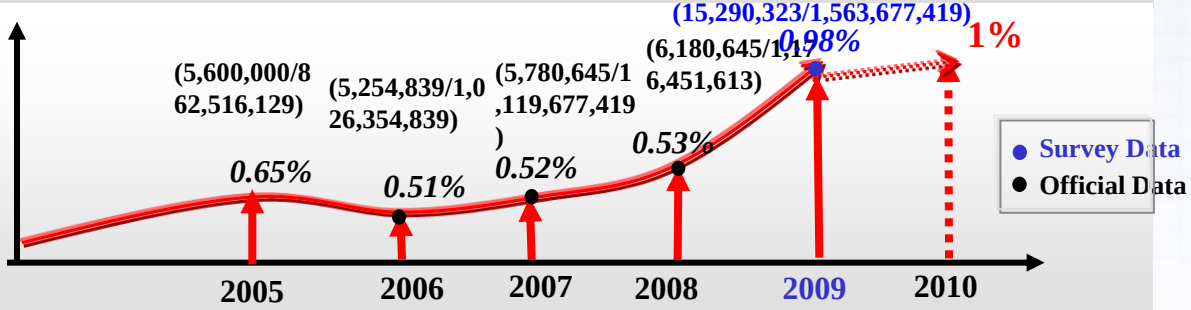
2005 → **Doubling** → **2010**

Ratio of university R&D expenditure derived from business enterprise sector doubles
Expenditure derived from business enterprise sector reaches 10%



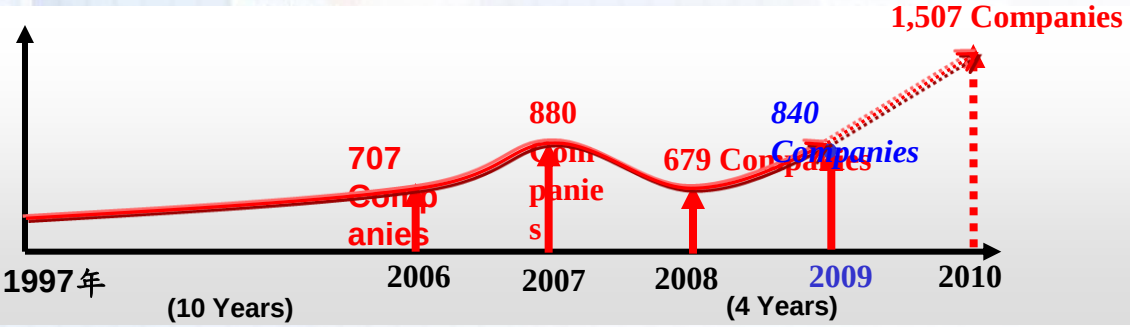
Source:：2009 Indicators of Science & Technology
Survey by MOE of university-industrial collaboration

Doubling of university-developed IP income
2010 income accounts for 1% of the Government's direct investment in R&D



Source:：2005-2008 STAG
Survey by MOE of university-industrial collaboration

Doubling of university-incubated start-ups
No. of start-ups in 2010 will reach 800



Source: MOEA's SMEA and industry-academia collaboration assessment data

2. Current Status

Comparison & Analysis of Industrial-Academic Collaboration Results for 2009 (1/4)

Category (No. of Schools)	Indicator 1: R&D Funds Derived from Business Enterprise Sector			Indicator 2: Intellectual Property Income				Indicator 3: Start-Ups (existing)			
	Total R&D Expenditure (USD)	R&D Expenditure Derived from Business Enterprise Sector (USD)	Ratio of R&D Expenditure Derived from Business Enterprise Sector	IP Income (USD)	Gov't Funds R&D Expenditure (USD)	Ratio of IP Income to Gov't Funds	Ratio of IP Income to Total R&D Expenditure	Start-ups from Incubation Centers with Technology Transfers (No.)	Start-ups from Incubation Centers but Without Technology Transfers (No.)	Start-ups via Technology Transfers not from incubation centers (No.)	Start-ups via Technology Transfers (%)
Public Universities (36)	9,481,936	437,419	4.61%	96,774	8,644,194	1.12%	1.02%	17	286	22	12.00%
Private Universities (36)	2,690,645	240,000	8.92%	22,903	2,017,419	1.14%	0.85%	25	174	11	17.14%
Public Vocational Institutes (20)	1,504,194	151,290	10.05%	21,613	1,302,258	1.67%	1.45%	5	95	3	7.77%
Private Vocational Institutes (73)	1,059,355	274,839	25.93%	11,613	727,742	1.58%	1.09%	15	157	30	22.28%
Total (165)	14,736,452	1,103,226	7.49%	152,903	12,691,613	1.20%	1.04%	62	712	66	15.24%
Total (including university endowment funds)	17,681,613		6.24%		15,636,774	0.98%	0.86%	Refers to start-ups under three years old established through university incubation centers			
Indicators for Comparison: USA 2008	R&D funds from business enterprise sector: 7% R&D funds from federal government: 63%			Ratio of IP income to total R&D funds: 6.7% Ratio of IP income to federal government funds: 10.4%				595 start-ups			

Source: MOE, AUTM 2008 Technology Transfer Survey Report

2. Current Status
Comparison & Analysis of Industrial-Academic Collaboration Results for 2009 (2/4)

Category (No. of Schools)	Government R&D Expenditure (USD)			
	NSC	MOEA	COA	Other
Public Universities (36)	5,354,516	745,807	374,194	1,147,419
Private Universities (36)	1,291,613	205,484	93,226	409,355
Public Vocational Institutes (20)	500,000	118,065	59,355	604,516
Private Vocational Institutes (73)	450,323	70,323	20,323	186,774
Total (165)	7,596,774	1,140,000	547,097	2,348,065
Proportion of Total Expenditures	65.31%	9.80%	4.70%	20.19%

Source: MOE

Public universities receive the largest amount of funding from government agencies, followed by private universities.

※ Two municipal universities and two open universities are included as public universities, but state-funded national universities still comprise the majority

2. Current Status

Comparison & Analysis of Industry-Academia Collaboration Results for 2009 (3/4)

Category (No. of Schools)	IP Income as a Percentage of R&D Expenditure from Government Sector			
	NSC	MOEA	COA	Other
Public Universities (36)	0.78%	2.74%	0.55%	0.13%
Private Universities (36)	0.98%	1.18%	0.00%	0.02%
Public Vocational Institutes (20)	3.38%	1.10%	0.33%	5.15%
Private Vocational Institutes (73)	0.90%	1.14%	0.00%	0.00%
Total (165)	0.99%	2.19%	0.41%	0.96%

Source: MOE

- **Public universities exhibit the greatest amount of IP income from MOEA- and COA-funded projects.**
- **Public vocational institutes exhibit the best ratio of IP income from NSC-funded R&D output. However, public universities show the greatest source of income as these universities receive the largest amount of NSC R&D funding. Taiwan's public universities still have further room for improvement, however, in comparison with other countries where top-notch research-oriented universities make the largest contribution to the economy.**

2. Current Status
Comparison & Analysis of Industry-Academia Collaboration Results for 2009 (4/4)

Category (No. of Schools)	IP Income to Total R&D Funding (2007-2009)					
	Government R&D Expenditure (USD)	Business Enterprise R&D in I-A Collaboration (USD)	R&D Funds by Other Units in I-A Collaboration (USD)	Total R&D Expenditure (USD)	IP Income (USD)	3-year IP Income/Total R&D Expenditure
Public Universities	24,088,065	1,221,613	1,270,323	26,580,000 (67.73%)	273,226 (70.12%)	1.03%
Private Universities	4,965,484	642,258	951,290	6,559,032 (16.71%)	45,161 (11.59%)	0.69%
Public Vocational Institutes	2,835,807	392,903	150,323	3,379,032 (8.61%)	47,097 (12.09%)	1.40%
Private Vocational Institutes	1,833,871	732,581	156,774	2,723,226 (6.94%)	24,194 (6.21%)	0.88%
Total	33,723,226	2,989,677	2,528,387	39,241,290 (100%)	389,677 (100%)	0.99%
Total (including normal funds)	42,329,032			47,847,097		0.81%

Source: MOE

- **Public vocational institutes obtain 8.61% of total R&D funding, while their IP income accounts for 12.09% of total IP income, translating to the highest investment efficiency of 1.40%.**
- **Overall, public universities obtain 67.73% of total R&D funding, while their IP income accounts for 70.12% of total IP income, pointing to a relatively more important social and economic responsibility.**

2. Current Status
Results of IP Commercialization in Universities (1/2)

Corporate-funded R&D

Continued increase over the past three years, and growth of 10% is expected for 2010. Vocational institutes have reached goals, private universities have hit 8.9%, and public universities have hit 4.6%. Government funding is mainly funneled to public universities.

Generating IP Income

Significant increases have been seen in the past three years, and the target of 1% for 2010 has been reached. This, however, still lags considerably behind countries that successfully commercialize IP, such as the US. Overseas, top-notch research-oriented universities commonly account for the largest economic contribution. Taiwan's public universities need to contribute more substantially to the industrial development.

2. Current Status
Results of IP Commercialization in Universities (2/2)

Nurturing Start-ups

The MOEA's SMEA provides funding to incubation centers at 50-60 schools to forge start-ups and corporate innovation. Over 800 companies have received assistance over the past three years. The MOEA in 2009 introduced the U-Start Program, aiming to expand the entrepreneurial atmosphere on campuses. A total of 641 teams of entrepreneurs, representing over 1,000 people, from 90 universities are involved in this program.

Success Stories:

1) HOY Technologies was created in 2009 by Ph.D. students from National Tsing Hua University using laboratory technology. Developing memory BIST, the company offers a solution in reducing costs in SoC testing. The company has won the National Invention Award and has been singled out as a model start-up. HOY is in collaboration with over 14 other companies. The company's value is poised to reach 22 million USD ahead of a projected listing on the stock market in 2015.

2. Chung Yuan Christian University provided assistance to graduating students in forming an LED lighting team, which led to the creation of An-Jeh Opto-electronics Co. in 2009. Team members have developed patented technology and the school has provided assistance in testing. Revenues of 0.32 million USD are expected in 2010.

2. Current Status
Issues Discussed and Policies Formulated (1/2)

Issues Discussed	Policies Formulated
1. Insufficient incentives for universities, instructors, and students to engage in R&D Enterprization	● Impose greater social responsibility on universities and design related evaluation systems ● Improve faculty promotion based on research findings, and technology reports ● Guide academic R&D capacity to the industrial sector, thus facilitating commercialization of technological knowledge
2. Onerous academic regulations restricts flexibility in industrial-academic cooperation	● Relax university personnel and accounting regulations, and boost personnel exchanges between academic and industrial sectors, thus increasing organic efficiency and efficacy ● Promote corporatization of public universities
3. Wide array of industrial-academic cooperation policies lack specific focus	● Policy adjustments and integrating function of university R&D, technology transfers, and incubation organizations ● Integrating use of cross-agency resources with which establishing a platform for industry-academia collaboration ● Doubling R&D funding for the higher education sector derived from corporate R&D income, producing IP income, and fostering incubation of start-ups

2. Current Status
Issues Discussed and Policies Formulated (2/2)

Issues Discussed	Policies Formulated
4. Laws restrict use of R&D results among public universities and research units	● Clarify the appropriate relation between the Science and Technology Basic Law and the National Property Act, through a clear regulation that the National Property Act does not limit the transfer of research results from public universities/institutions ● Relax regulations on licensing and offshore implementation
5. An environment is needed on campuses to foster start-ups and support industry-academia collaboration	● Formulate operational guidelines for university spin-offs, covering the use of stock and participation in corporate operations, preventing conflicts of interest , and providing a reward and pay-back mechanism ● Encourage a culture of managing a commercial undertaking on campuses and discover benchmark success stories

2. Current Status –Existing Measures and Results

Deregulation

Examples include amendments to the Act Governing the Appointment of Educators, the Civil Servants Work Act, rules to expand the opportunities for university instructors and research personnel, and a more flexible salary structure for university faculty

Industry-Academia Collaboration Assessment and Faculty Promotion

Holding of annual events and reports on their outcome, and rewards for schools displaying excellence; improved instructor promotion system and encouraging strengthened technical reports

Adjustment of Academic-Industrial Organization

Implementation of mechanism to commercialize R&D successes on the campus, such as programs to encourage academic-industrial collaboration, the promotion of bridge projects, and strengthening of professional intellect

Campus Start-ups

will instill the idea of start-ups and promote the creation of such companies throughout school campuses

Cross-agency Cooperation

Establishment of an integrated academic-industrial collaboration cross-departmental working group and creating a cross-departmental cooperative mechanism

Transferring R&D Success

R&D successes achieved by public universities via NSC funding, will with cross-departmental coordination, now be transferred to third parties

In terms of regulations and infrastructure, efforts will continue to create an atmosphere for universities to take greater responsibility for social service.

3. Emerging Challenges

Subtopic 1: Introduction to Key Challenges in the Commercialization of IP

Challenge 1: Limited efficiency and efficacy in know-how claim and management

Challenge2: Insufficient synergy in academia-industry-research linkage to value-added commercialization

Major Challenges in Commercialization of University IP

Challenge 1：A single collaboration project or case has limited impact on industry

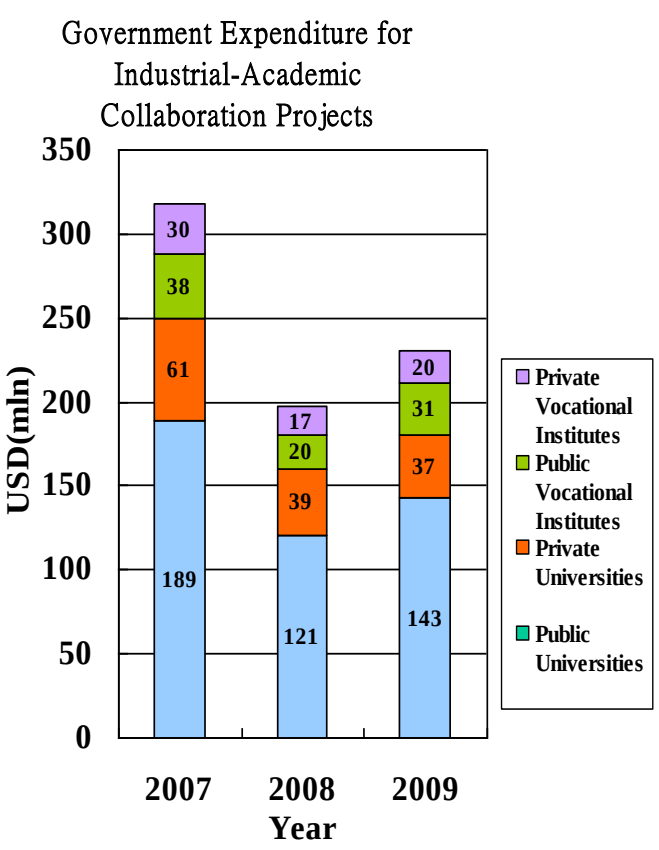
Challenge 2：Awareness is generally short on IP commercialization, IP strategies and innovative invention requires upgrading

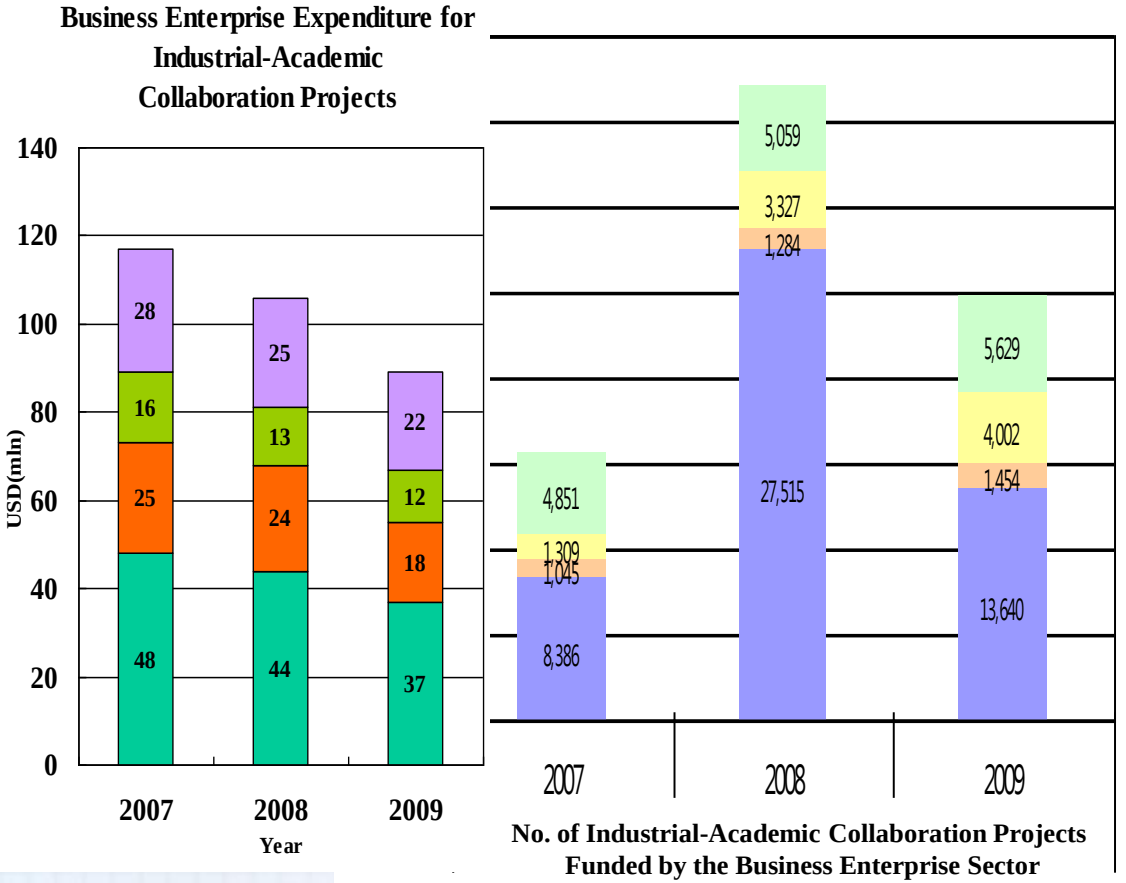
Challenge 3：University-incubated start-ups receiving technology transfer need to be strengthened

Challenge 4：How to enable IP operation organizations and specialized manpower resources to take root on campuses

3. Emerging Challenges

While university R&D funding derived from the corporate sector has increased in the past three years, the amount for each case remains low. Consequently, the impact of academia-industry-research collaboration for a single project or case is limited.

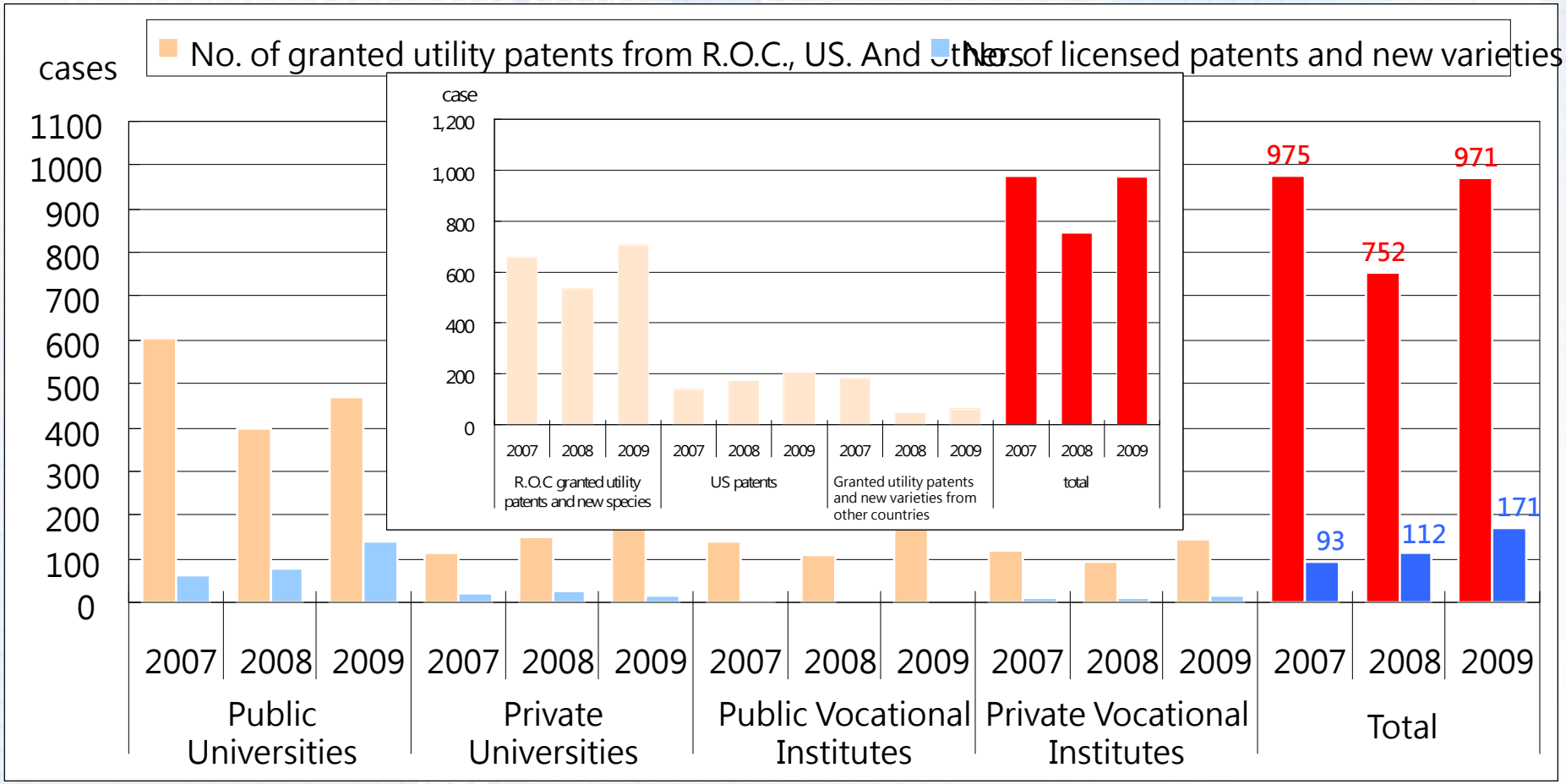




Source: MOE

3. Emerging Challenges

Most patents held by universities for local ones, with their ratio of international patents quite low. The number of licensed patents has increased in the past three years, but still remains low, pointing to insufficient commercialization of IP and innovation.



Source: MOE

3. Emerging Challenges

University incubators mostly provide space, and consultation, guidance, and promotion services. More work is needed to integrate R&D and technology carried out together by teachers and students, helping to generate spin-offs

University-incubated Start-ups

Year	2007	2008	2009
Start-ups	880	679	840

In 2009

Start-ups receiving technology transfers made up 15.24%

Start-ups entering university incubators and receiving technology transfers: 62 companies

Start-ups entering university incubators but not receiving technology transfers: 712 companies

Start-ups not entering university incubators but receiving technology transfers: 66 companies

Source: MOEA's SMEA and the MOE

※ Reference Indicator: The US definition for start-ups is a new company that is established with new technology or new business models. The number of new companies incubated by American universities in 2008 and receiving technology transfers was 595. Source: AUTM 2008 Report

3. Important Challenges

Generally, IP operation scale and specialized personnel universities hold are insufficient. Efficacy in converting knowledge into IP, and then commercialization need to be built up. The resources available to each school vary greatly, causing the commitment of each school in promoting the initiative to differ.

Management chiefs in universities need further training so as to emphasize and integrate efficacy of knowledge industrialization.

Scale of IP Commercialization Organization in 31 Universities

Specialized Manpower	No. of Schools
＞20 People	0
11-20 People	2
6-10 People	5
Under 5 People	24

Notes:
1. All 31 schools are participating in the collaboration incentive program
2. IP commercialization organizations include agencies in charge of academia-industrial collaboration, technology transfers, and successful incubation

	Stanford University (2008)	University of Washington/UW R&D Foundation (2008)	University of Tokyo (2008)	NTU (2009)	National Chiao Tung University (2009)
IP Office Staff	42 People (17.5 people involved full-time in technology transfer)	52 People (18.22 people involved full-time in technology transfer)	21 People	16 People (10 professional managers)	17 People (6 professional managers)
Total R&D Expenditure (US$1 mln)	694	1027	711(2005)	221	84
License Income (US$1 mln)	62.5	80.3	3.0	2.1	2.3

Source of Overseas Data: AUTM 2008 Report, Stanford University, University of Washington, University of Tokyo website, University of Tokyo CASTI Briefing; License income includes that from the government and industrial sector. However, income at University of Tokyo comes from project subsidies of the Ministry of Education, Culture, Sports, Science and Technology

4. Establishing Management and Commercialization Strategies for University Intellectual Property

- **Vision and Objective: The R&D capacity of universities is converted into promoting Taiwan as a leader in innovation**
- **Reform Strategies: Establish a new collaboration relationship for the academic and industrial sectors, thereby creating a golden decade for Taiwan**

University R&D efforts must move from reacting to corporate needs to creating industrial value.

- **Promotion Measures: University IP commercialization mechanism**

1. Industry-academia partnerships & alliances and R&D platform
2. Inter-university joint IP management platform
3. University start-ups and spin-offs platform

4. Establishing Management and Commercialization Strategies f or University Intellectual Property

The R&D capacity of universities is converted into promoting Taiwan as a leader in innovation.

- **Becoming a partner in innovation with industry**

  Move university IP management to the front-end of innovative R&D, engage in R&D with the long term in mind, respond to the needs of companies, and serve as a supplier of IP. Universities should become leaders in technical innovation and be able to strengthen the impact on industry of their R&D, helping to foster sustainable development and coordination between academia and the industrial sector.

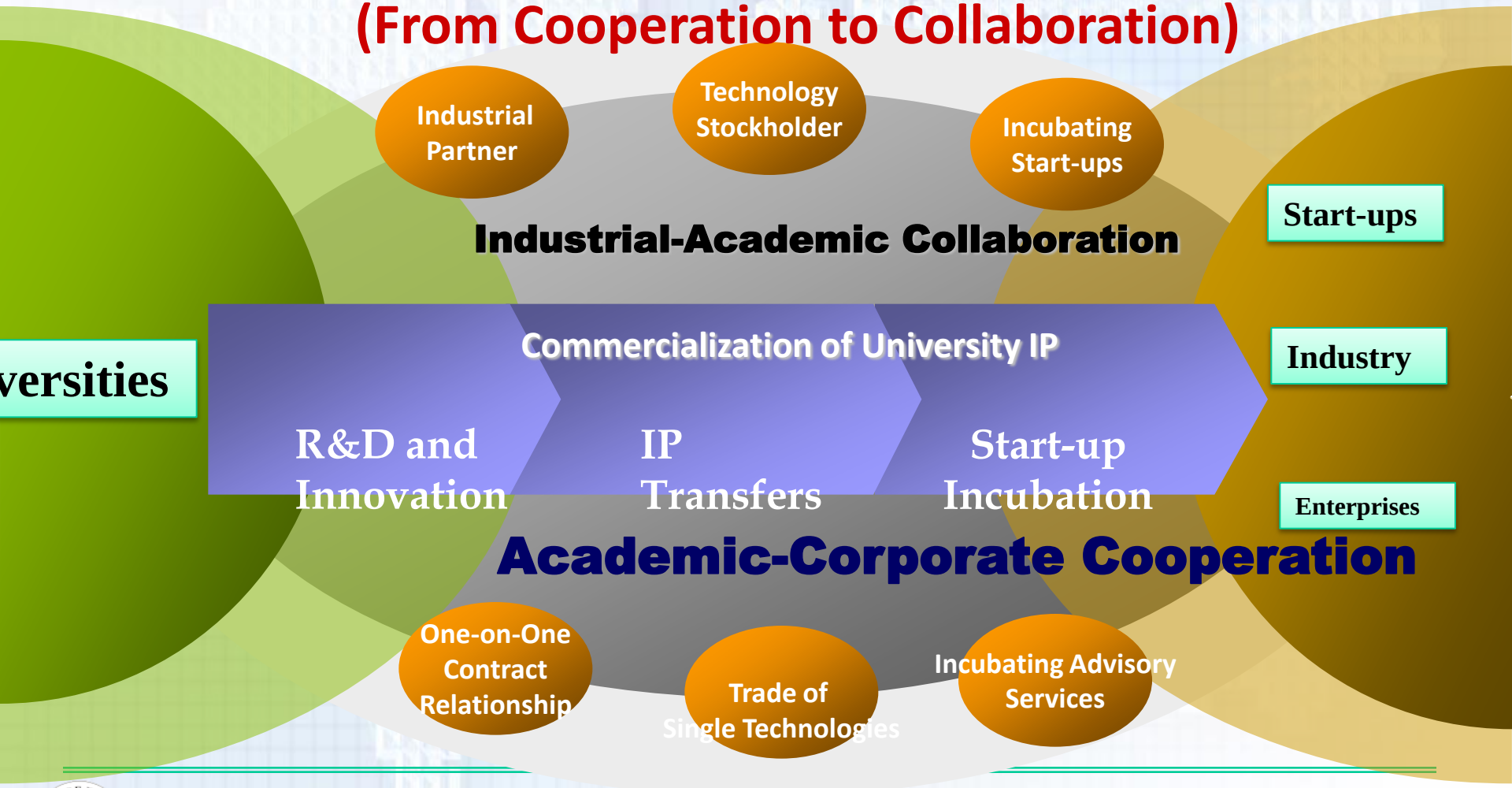
- **Making knowledge into IP and commercializing it**

  Helping universities generate and manage IP, cultivate innovation, and enliven the IP value cycle

- **Strengthening IP commercialization system**

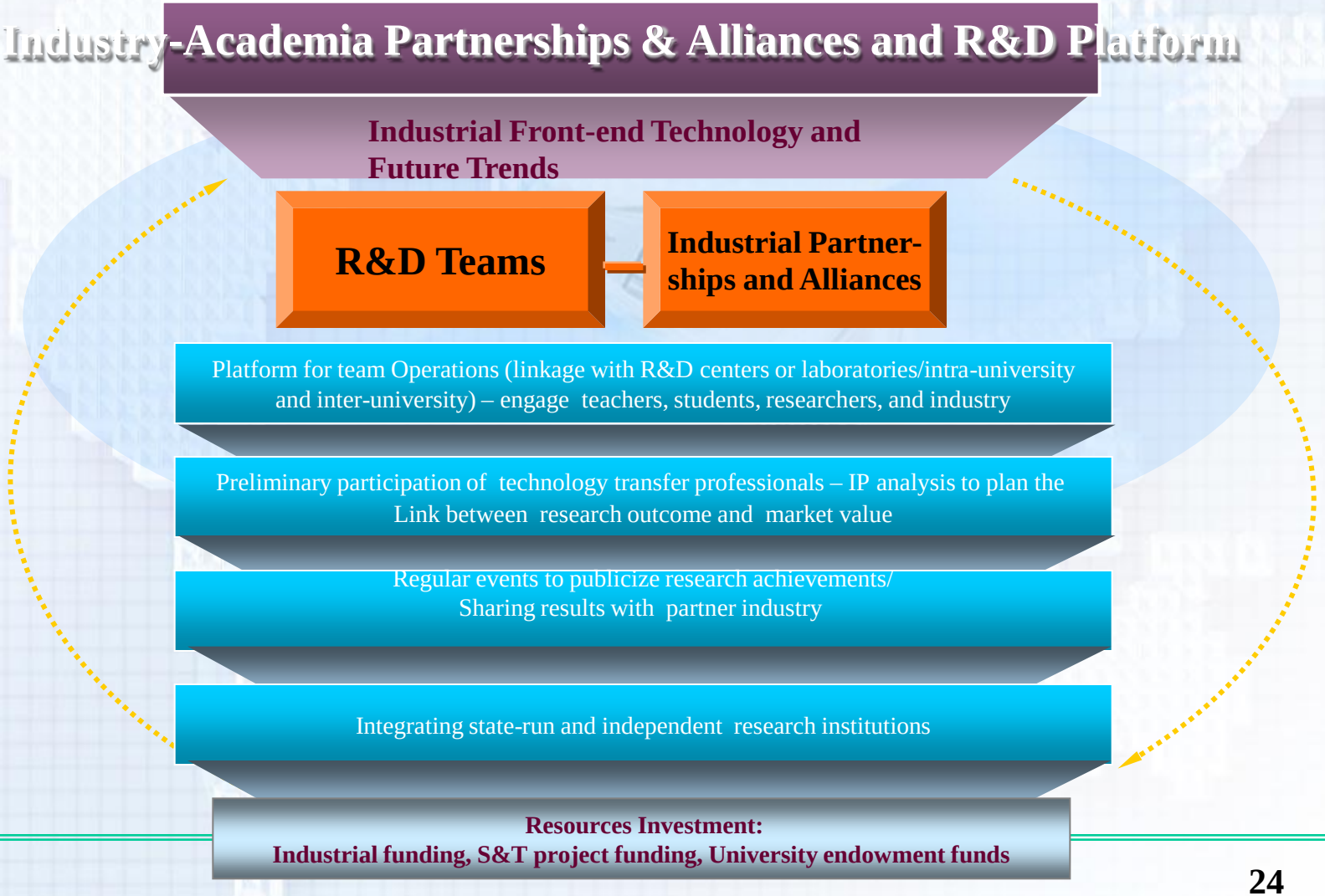
  Strengthening the IP value chain's upstream, midstream, and downstream innovation mechanism and professional support system

New Collaboration Relationship between Industry and Academia (From Cooperation to Collaboration)



4. Establishing Management and Commercialization Strategies for University Intellectual Property

Mechanism to Commercialize University IP -- FROM REACTION TO CREATION



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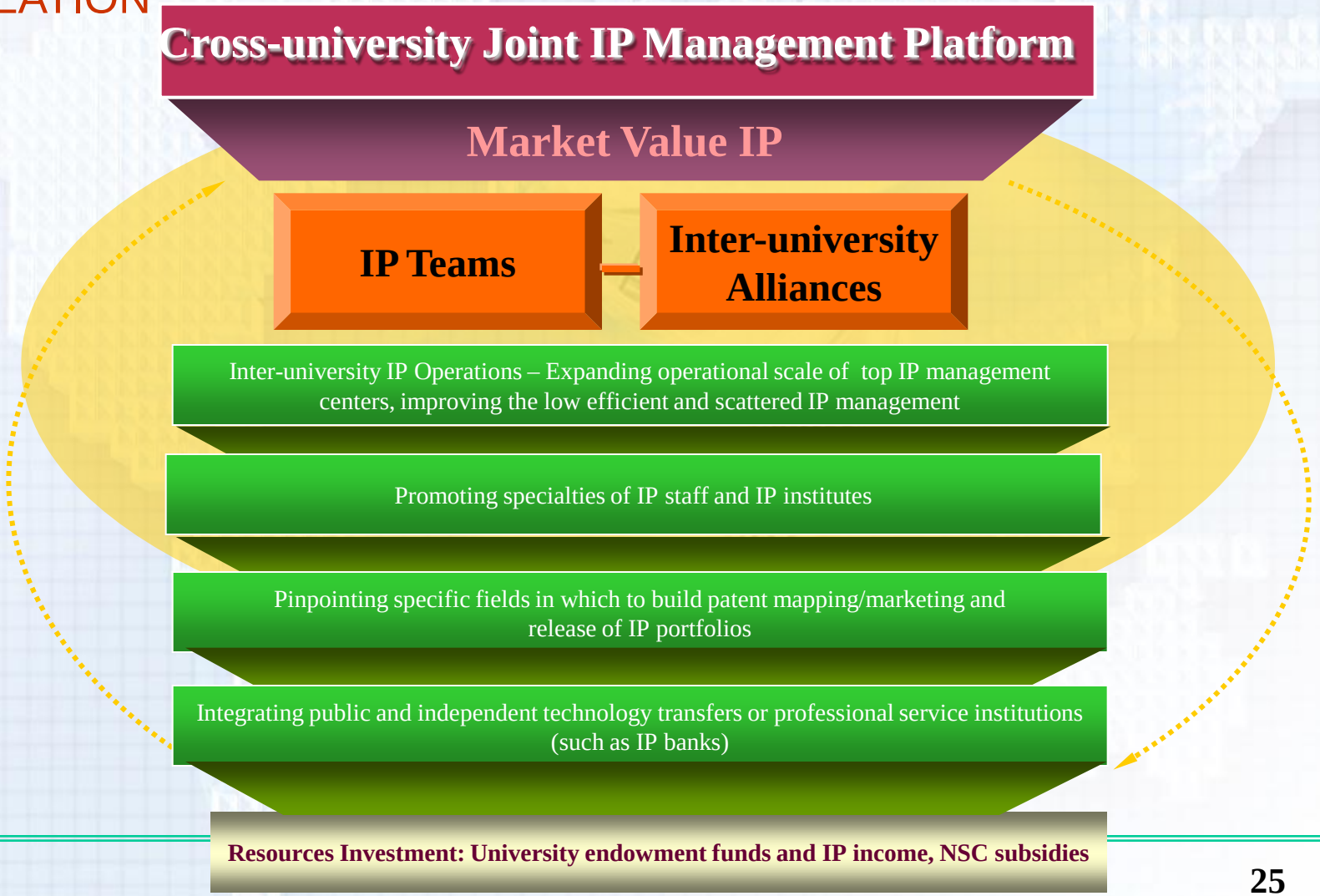

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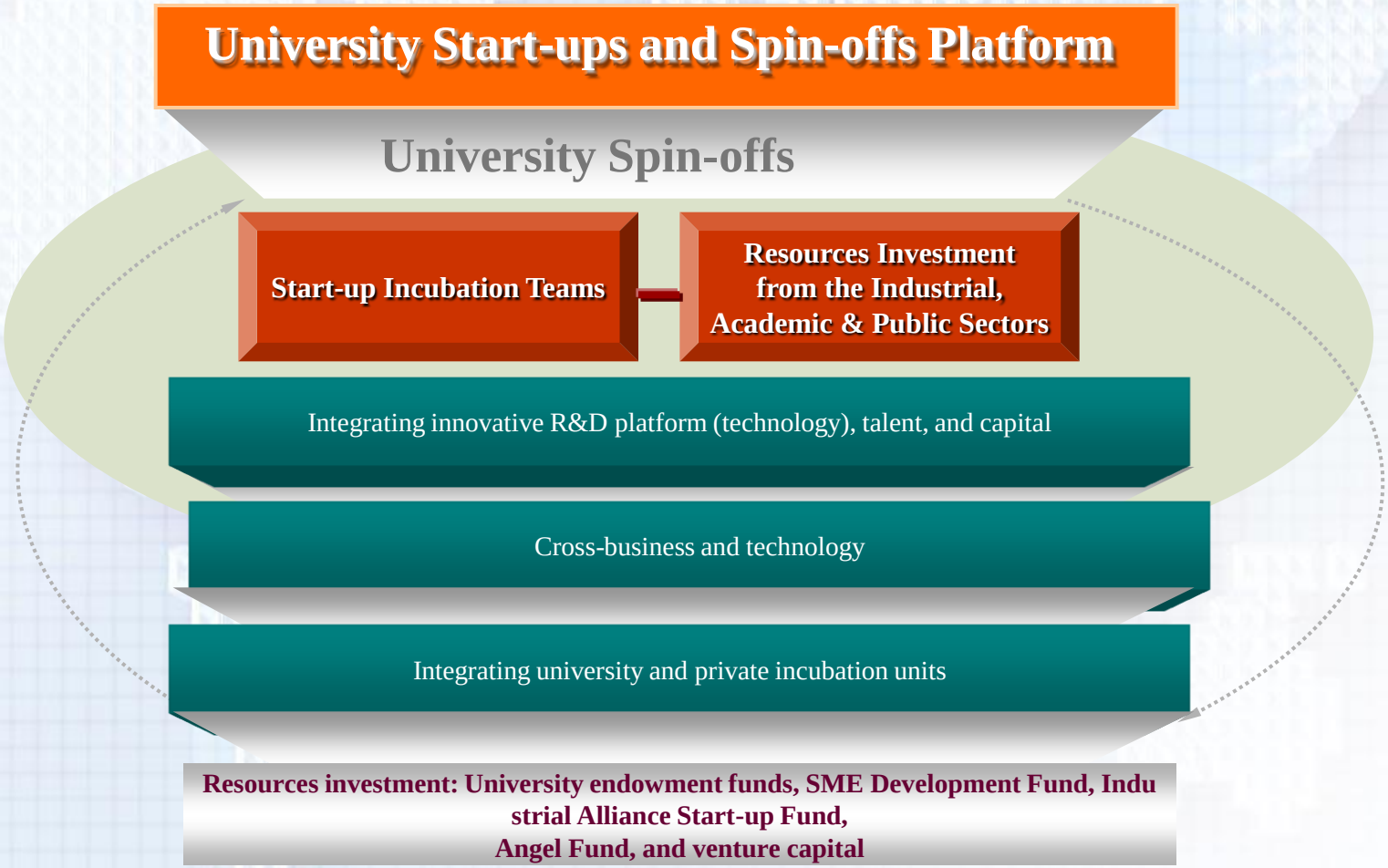
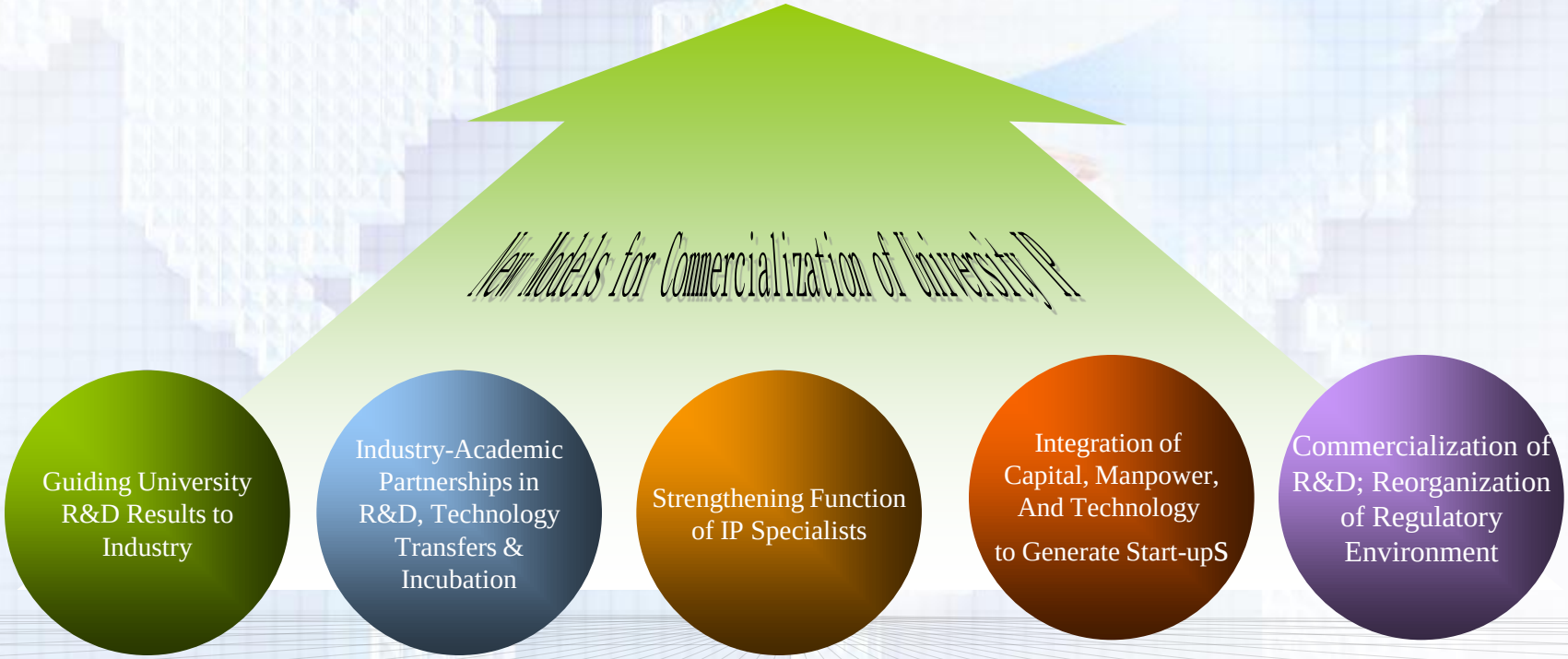


5. Conclusion

Realizing an Innovation- and Knowledge-based Nation



5. Conclusion – Topics for Discussion (1/2)

1

How to create a new collaborative I-A relationship, which can effectively integrate resources within and among universities, to operate an I-A R&D platform to boost the front-end technology and to drive Taiwan towards becoming an innovation-oriented nation?

2

The related agencies must adjust the resources allocation and cooperate to strengthen the mechanism for commercializing university IP (through R&D alliances, management of IP, and spin-offs).

How to make a good use of the governmental Science and Technology R&D Fund and Development Capital Fund to induce industrial investment in commercializing IP?

5. Conclusion - Topics for Discussion (2/2)

3

Regarding the mechanism for commercialization of university IP, there are problems for every single institute to efficiently formulate, map and pack the IP in terms of industrial application and value creation. How to establish a workable cross-institute platform that could integrate the scattered IP, and then materialize the commercialization of University IP?

4

The university start-ups should feature as the ultimate outcome of effective R&D and technology transfer; hence the function of university incubators to create start-ups should be the focus of reform. How to reinforce the professionalism of the presently numerous multi-purposed university incubators, and then make them become the real start-up nurture centers?

Briefing Concluded.

Suggestions welcomed .

Attachment 1: Related Regulatory Data (1/3)

Item	Regulations or Methods
Procedures for public universities to transfer patents/IP produced with funding or commis-sions by the NSC to third parties	October 7, 2010 NSC's No. 0990072673 letter Re: Resolutions made at the July 15, 2010 STAG inter-ministerial meeting to discuss the transfer of patents held by public universities Explanation: 1. R&D results of public universities that have been funded or commissioned by the NSC can be transferred to third parties with the assent of the NSC according to Article 6 of the Government Scientific and Technology R&D Results Ownership and Utilization Regulations. Such moves must also be carried out in accordance with Article 15 of the National Property Act and the procedures set forth in Article 60 of the Enforcement Rules of the National Property Act. The Ministry of Education, the supervising agency, must also ultimately approve such transactions. 2. Transfer of R&D results of public universities funded or commissioned by the NSC should be in accordance with the stated objectives of the Science and Technology Basic Law principles of fairness. Note shall be made of the agency that provided funding for the research, the necessity of the transfer, the process of the transfer, and the negotiated conditions and means of determining the price of such research results. This data shall be submitted to the MOE. The MOE will then contact the NSC as to whether it approves of the stated transfer, after which the MOE will decide whether to grant or deny the application.

Attachment 1: Related Regulatory Data (2/3)

Item	Regulations or Methods
Part-time work by university teachers and research personnel and fees for such work	1. In accordance with the Enforcement Principles for Part-time Work by Full-time Faculty at Public Schools **（1）Relaxing Rules on Part-time Work by Faculty: Teachers at colleges or above that do not concurrently serve in an administrative position at the school may engage in part-time work for state-run enterprises or at listed companies or unlisted public companies whose shareholders have resolved to list in the future, or in the position of independent directors or supervisors at such firms. Each school can decide on its own the number of teachers it allows to pursue such part-time work.** **(2) Relaxing Restrictions on Highest Level of Remuneration for Teachers Engaged in Part-time Work: Teachers at public schools not concurrently serving in an administrative position and engaging in part-time work will not be subject to rules limiting monthly payment for such work to NT$8,000 and not more than NT$15,000, nor the limit on the combination based on the pay scale for professors and academic research fees(NT$104,820 per month).** (3) Teachers concurrently holding positions as administrators may, with permission, engage in other work in accordance with the Civil Servants Work Act 2. In accordance with Principles for Full-time Faculty Temporary Transfer The period of transfer has been relaxed to eight years from an original four. Rules requiring faculty members to return to their original school for at least two years before another transfer have been abolished. 3. With effect from January 1, 2010, limits on the number of part-time professional technicians and research personnel and payment will be based on rules governing faculty. Salary (based on rank) for research personnel will be made from endowment funds raised by the individual schools, along with any supplements.

Attachment 1: Related Regulatory Data (3/3)

Item	Regulations or Methods
Flexible utilization of manpower at univer-sities	**1. In accordance with the Enforcement Principles of the Use of Public University Endowment Funds for Teachers, Researchers, and Workers….** Measures have been relaxed to enable endowment funds raised by technical colleges or above on their own to be used for the hiring of teachers, researchers, and workers. Relaxed personnel management and remuneration standards have also been adopted to boost flexibility of schools in the use of such manpower. **2. In accordance with the Enforcement Principles for Employment of Public University Administrators….** Schools are allowed to contract personnel to fill openings for Level 2 supervisors or below in order to boost flexibility in the utilization of manpower.

Attachment 2：List of 31 Universities in Industry-Academia Collaboration Incentive Program

National Chiao Tung University ＊	Feng Chia University＊	National Taiwan University of Science and Technology＊	Cheng Shiu University
National Cheng Kung University ＊	Chung Yuan Christian University ＊	National Yunlin University of Science and Technology＊	Southern Taiwan University
National Tsing Hua University ＊	Taipei Medical University＊	National Taipei University of Technology	Nan Kai University of Technology
National Chung Hsing University＊	China Medical University	National Formosa University	Ming Chi University of Technology
National Taiwan University ＊	Kaohsiung Medical University	National Pingtung University of Science and Technology	Kun Shan University
National Sun Yat-sen University＊	Chang Gung University	National Kaohsiung First University of Science and Technology	Far East University
National Taiwan Ocean University	Chung Hua University	National Kaohsiung University of Applied Sciences	Chienkuo Technology University
National Ilan University	I-Shou University		Shu-Te University

Note: The above schools receive funding under the Industry-Academia Collaboration Incentive Program. Schools must reach certain stated thresholds in terms of collaboration results, research income, and IP income to apply to enter the project. Consequently, these 31 schools represent the strongest in Taiwan in terms of industry-academia collaboration.

＊ Denotes first group of schools approved to enter the program, and each of these schools is receiving larger amounts of subsidies and funding.