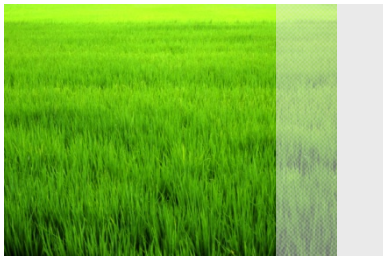

27th STAG

Advancing Taiwan's Technology Development System

Report 1: Observations on the Aims and Strategies of Taiwan's Technology Development Systems

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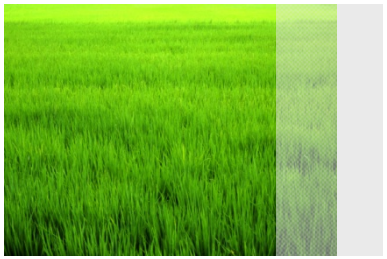
Executive Vice President
Industrial Technology Research Institute (ITRI)

2007.12.17

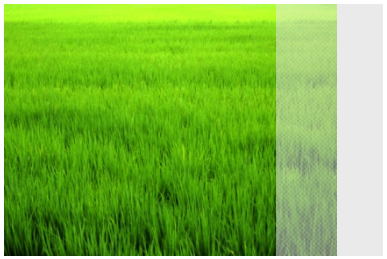


Presentation Outline

1. Introduction
2. Current Status of Taiwan's Technology Development System
3. Challenges Faced by the Technology Development System in Taiwan
4. Technology Development Models Followed in the U.K., Japan, South Korea and Finland
5. Current Direction of Taiwan's Technology Development System
6. Issues and Suggestions for the Future

Appendices

1. Taiwan industries / products recently ranked among the top 3 globally
2. The current strategic direction of technology development in Taiwan

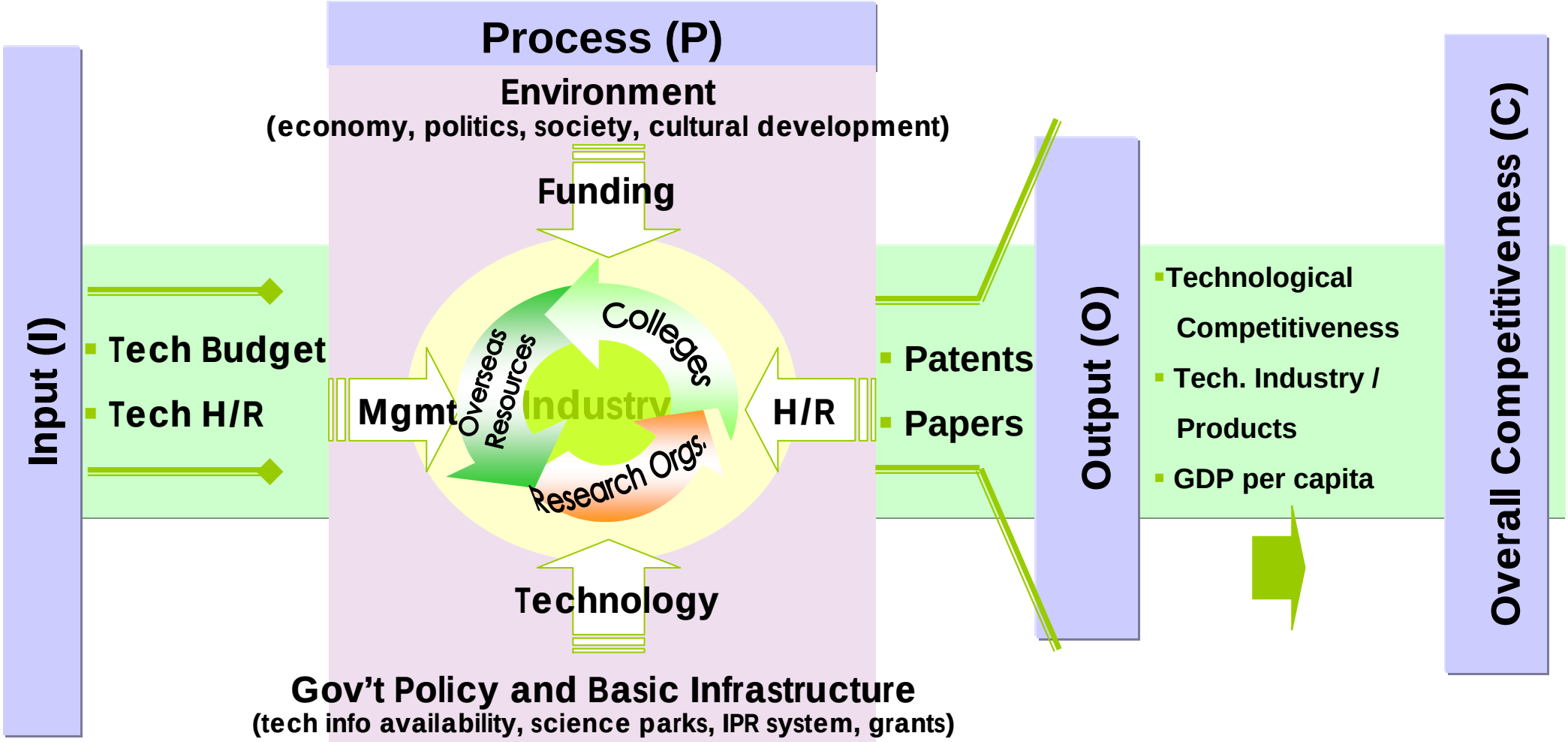


Introduction

- **The Executive Yuan's Science and Technology Advisory Board has raised numerous suggestions since 2005 in response to the competitive pressures faced by technology development systems in Taiwan. These are being consolidated into a report entitled "*Advancing Taiwan's Technology Development System*",which will be submitted for discussion at the forthcoming Advisory Board meeting.**
- **This Report will review what has been invested into and generated by Taiwan's technology systems. In addition to analyzing challenges to the system and benchmarking Taiwan's performance against that of other nations, the report will raise issues and suggestions that include :**
  - **Technology development vision and strategy should be based in "technology foresight" and**
  - **The integration and implementation of technology development should be based in "Fundamental Guidelines of Science and Technology Development."**

Current Status of Taiwan's Tech Dev. System (1/6)

Examining Taiwan's Current Technology Development System within a CIPO (Competitiveness, Input, Process & Output) Framework

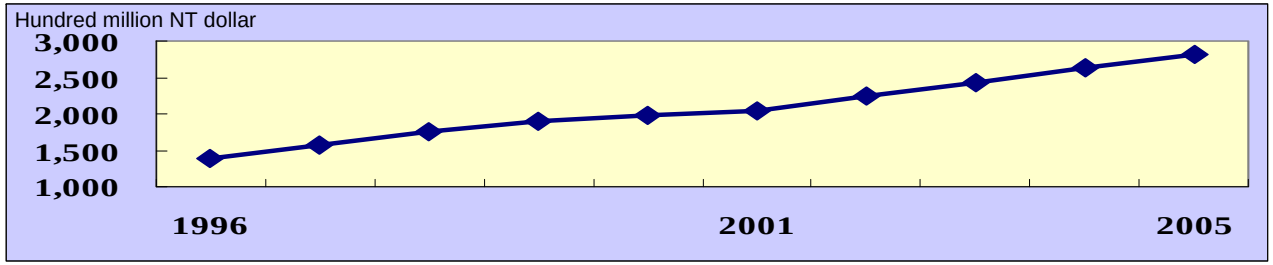


Technology Development System

Technology Innovation System

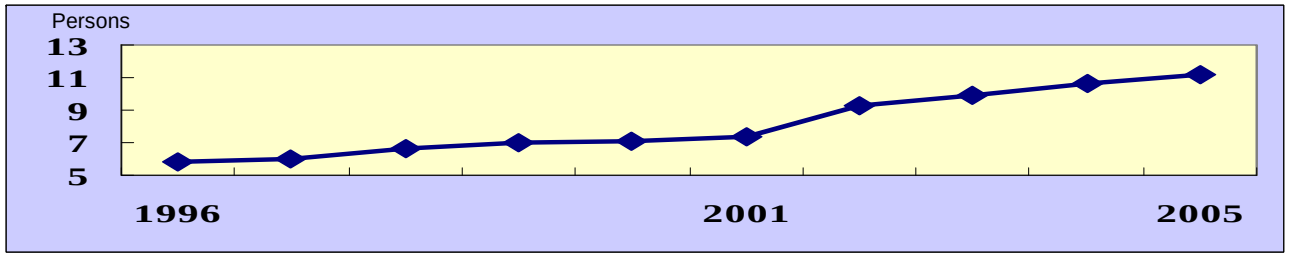
Current Status of Taiwan's Tech Dev. System (2/6)

Input: Recent years technology budgets and investments in technology-related human capital have grown in comparison to previous years



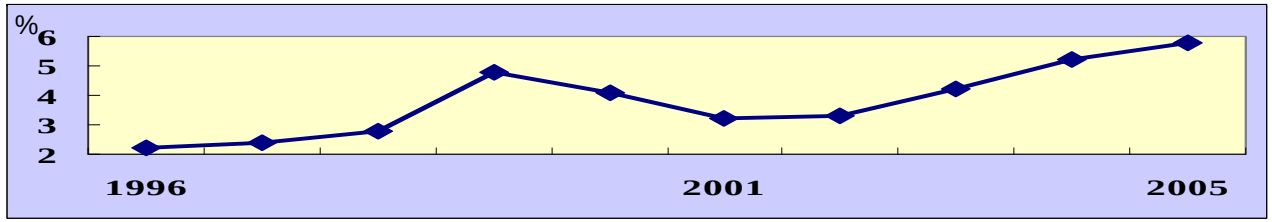
R&D Budget: NT$280.98 billion;

represents 2.46% of GDP



Researchers: For every 1,000 persons in the labor force, 11.2 are engaged in research work

Process: The higher education R&D expenditure by business enterprise is increasing, showing improved links between academia and industry



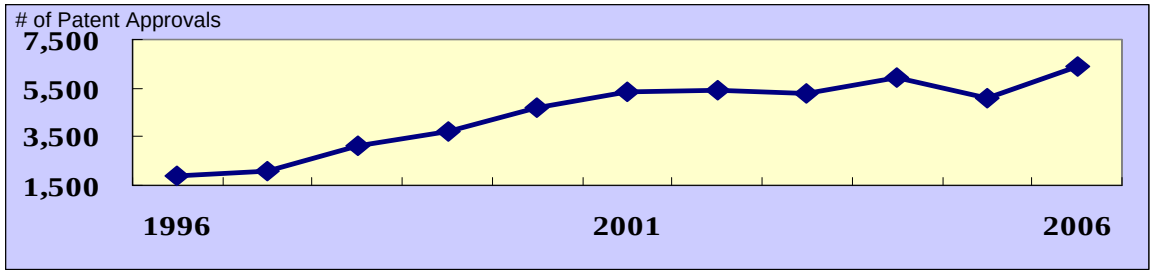
Ratio of higher education R&D expenditure by business enterprise:

2005 saw high water mark of 5.8% in business enterprise.

- *R&D budgets managed by sector of higher education average NT$25~32 billion per annum (roughly 12% of national R&D expenditures). More than 80% of these budgets are funded from government (including research institutions).*

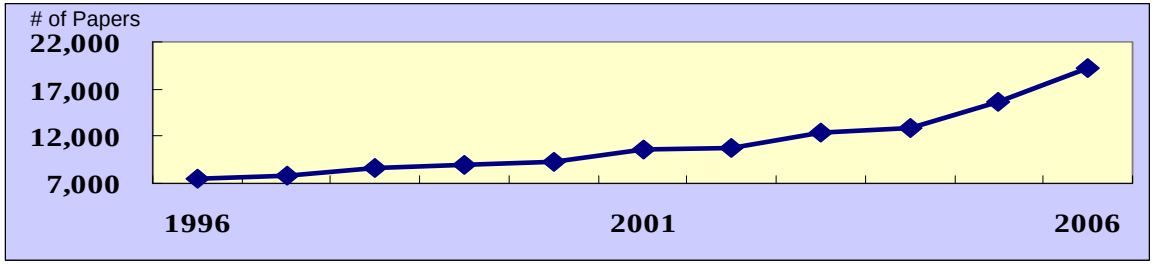
Current Status of Taiwan's Tech Dev. System (3/6)

Output: Technology patent numbers continue to support Taiwan's strong international position

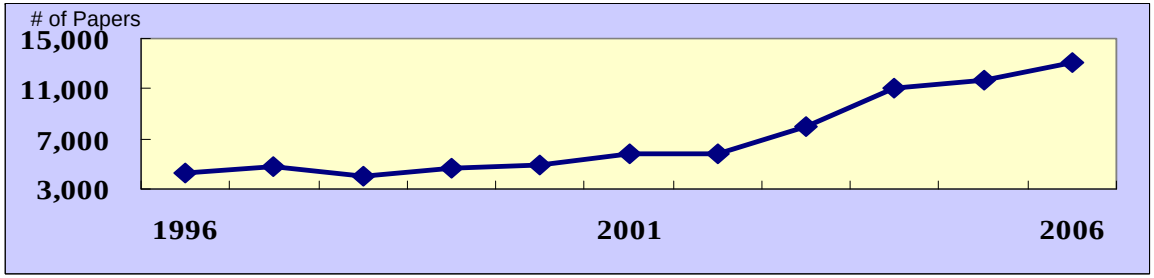


For the past 5 years (2002-2006), Taiwan has ranked the 4th most prodigious country in terms of U.S. patent approvals (ranking exclusive of filings made in new design). Taiwan accounts for 3.15~3.66% of total annual patent applications filed in the United States.

Output: The number of published technology papers has continued to rise



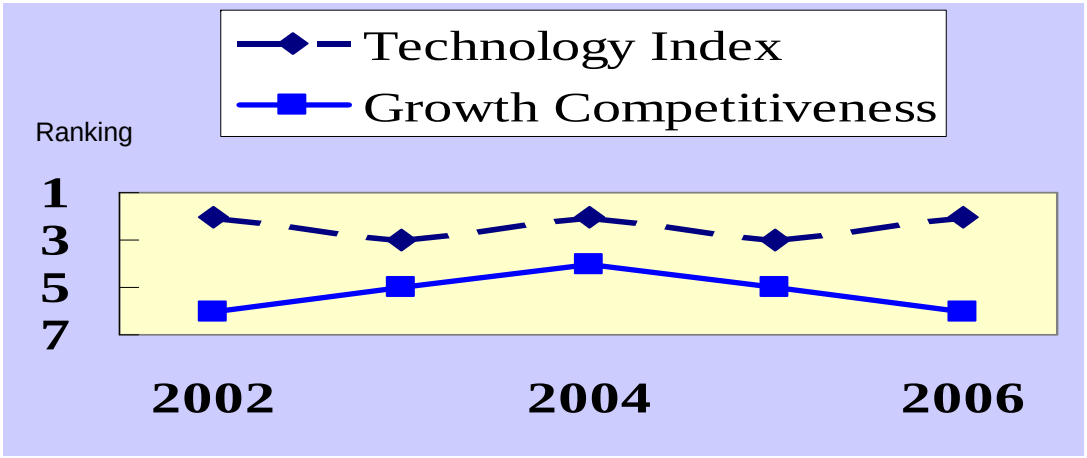
16,545 papers from Taiwan were cited in the index of basic scientific research, SCI, in 2006. This gives Taiwan an overall country rank of 17 on the SCI and 1.88% of global citations.

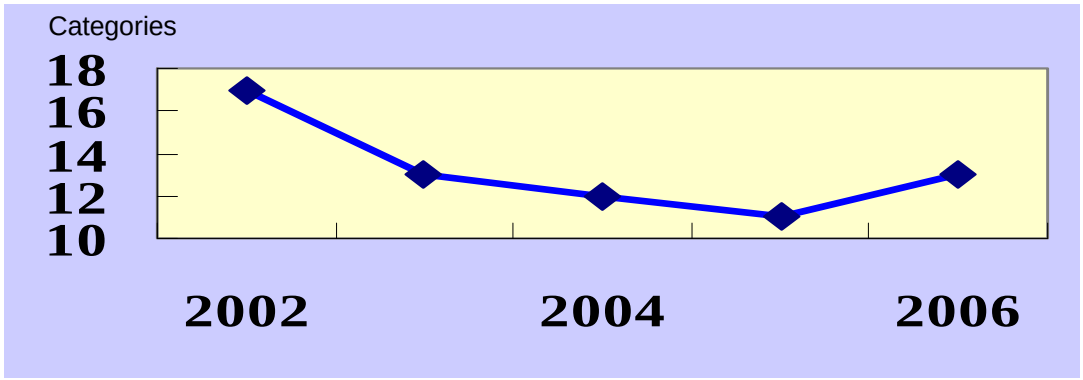


13,076 papers from Taiwan were cited in EI, the index of applied technologies and engineering development, in 2006. Taiwan has been the 11th largest country contributor to EI for the past three years.

Current Status of Taiwan's Tech Dev. System (4/6)

Overall Competitiveness: The International Technological Competitiveness of Taiwan has held steady in recent years



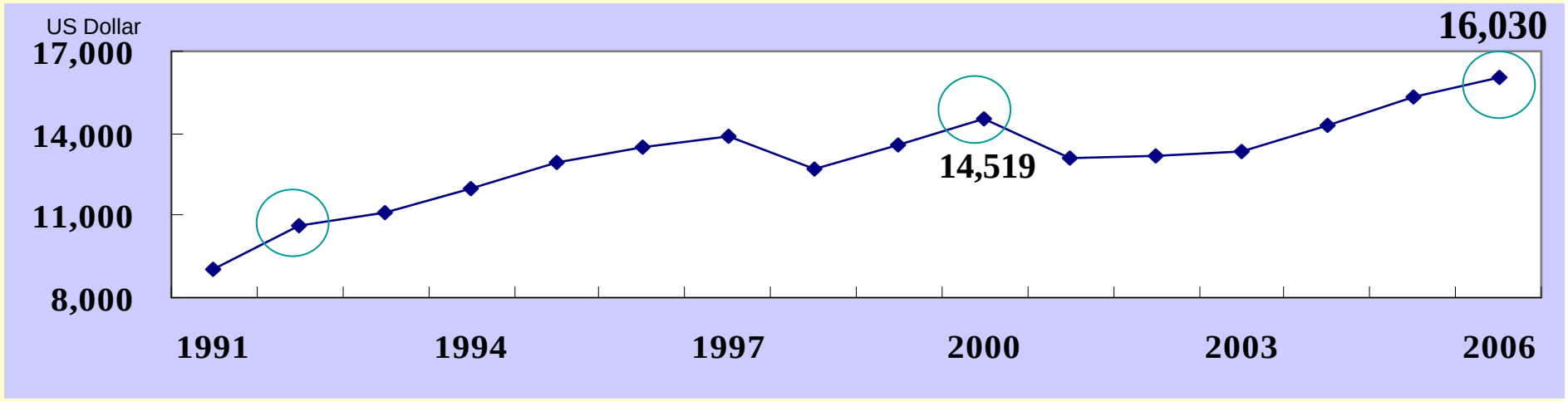


In 2002~2006 World Economic Forum (WEF) reports on global competitiveness, Taiwan has ranked 4th to 6th in "growth competitiveness" and 2nd to 3rd on technology indexes. These rankings further highlight Taiwan's competitive advantage in the technology field, with gaps highlighting the fact that there remains room for technology to deliver even greater economic benefits.

Industries & products in which Taiwan ranks no. 1 in the world (e.g., chip foundry, large dimension TFT-LCD screens) have declined in recent years. Declines have also occurred where Taiwan holds a lesser rank. In 2002, Taiwan ranked no. 3 in 40 industries & product categories. This number had shrunk to 30 by 2006.

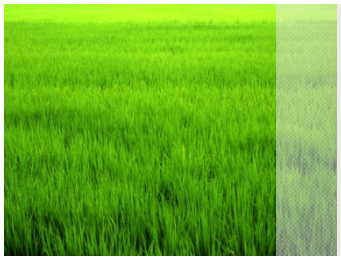
Current Status of Taiwan's Tech Dev. System (5/6)

Overall Competitiveness: Taiwan GDP per capita has continued to grow in recent years



GDP Per Capita

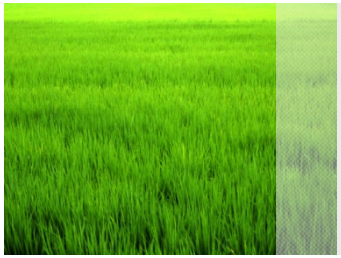
- GDP per capita in Taiwan was just over US$10K in 1992, reached US$14,519 in 2000 and achieved US$16,030 in 2006.
- In terms of national ranking, average earnings in Taiwan fell from the 25th highest in the world in 2002 to the 36th highest in 2005 – behind Japan, Hong Kong and Singapore and roughly equivalent to South Korea.



Current Status of Taiwan's Tech Dev. System (6/6)

Contributions of Technology to Taiwan Society

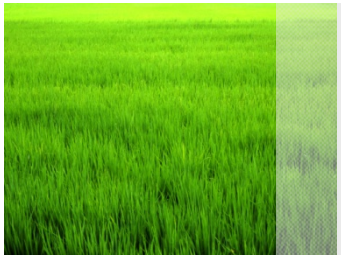
- Taiwanese have long acknowledged the positive role played by technology in helping Taiwan's core industries upgrade and evolve, as well as its specific role in facilitating the success of Taiwan's high technology sector (e.g., IT, semiconductor, TFT-LCD) – resulting in significant contributions to domestic social development.
- Taiwan has successfully employed technology to realize economic development, general prosperity, sustainable growth and national security. In facing strong global competition, greater effort and initiative will be necessary to retain the advantages essential to compete internationally.



Challenges Faced by the Technology Development System in Taiwan (1/13)

the International Environment

- **Challenge 1: Problems of carbon dioxide and energy are global in scale**
  - In 2005, Taiwan's carbon dioxide emissions accounted for 1% of total global emissions, the country ranked the 3rd highest in terms of emissions per capita. Increasing the ratio of indigenous energy within the national energy portfolio and developing new industries represent common goals pursued by nations throughout the world.
- **Challenge 2: Competition for technology talent is global in reach**
  - In pursuing technological advancement, countries around the world vie to hire and retain technology talents, resulting in "brain drain" in several countries. The former complementary "brain circulation" relationship that once existed between Taiwan and California's Silicon Valley has been severed.
- **Challenge 3: Aging populations and endemic "baby bust" are increasing pressures on Society**
  - A declining birth rate impacts directly and negatively upon the supply of productive labor, which in turn increases social loading. Such a situation demands the introduction of a new order focused on enhancing and sustaining the value of contributions to society made by its elderly members.
- **Challenge 4: Value your environment and take positive action to effect changes for the better**
  - Creativity infused into our daily lives, the environment and ecology, energy conservation, the creation of both urban and rural empowerment programs and the planning and use of public lands help achieve integration between people and nature, and can enhance quality of life throughout society by way of a superior



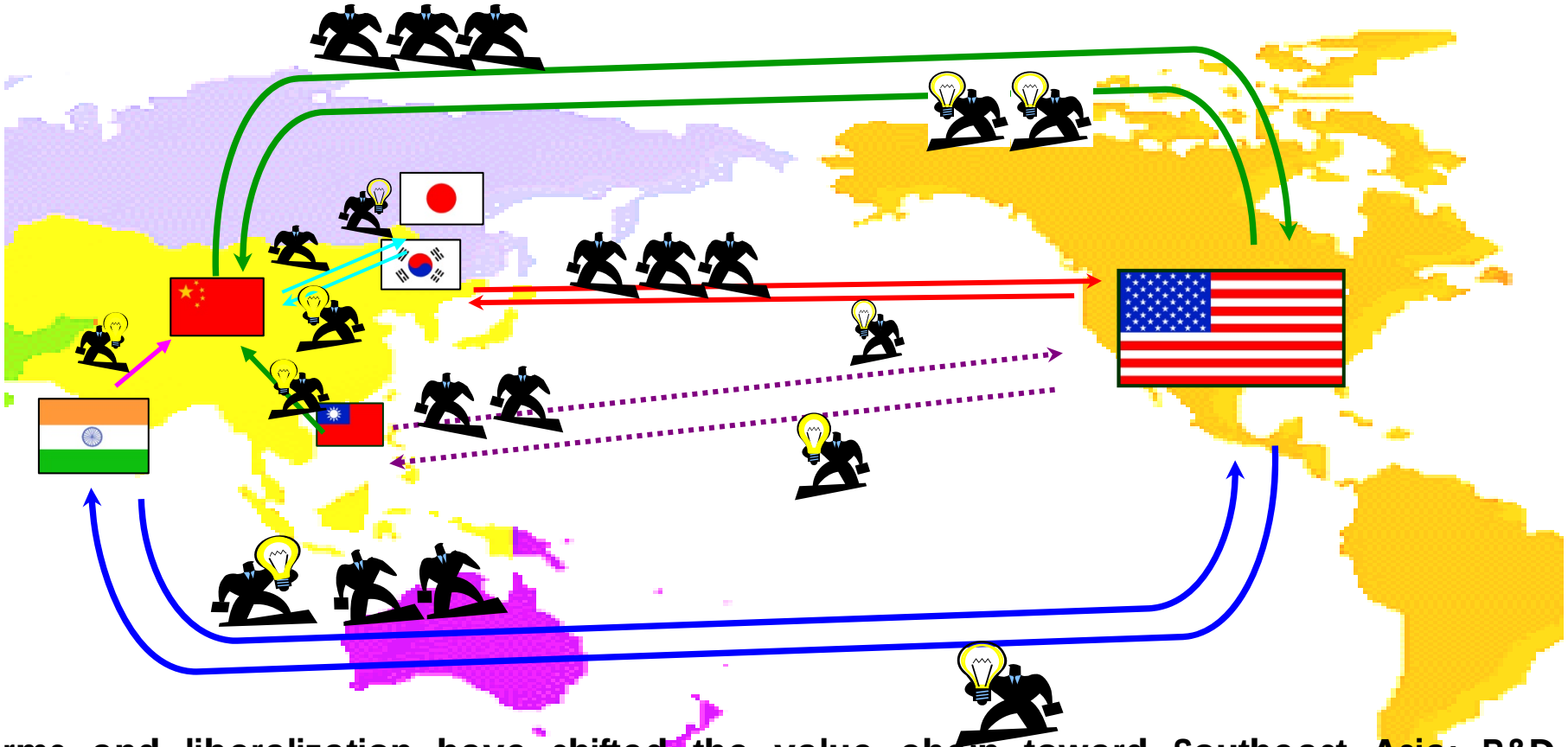
Challenges Faced by the Technology Development System in Taiwan (2/13)

1% of Global CO_2 Emissions & No. 3 in CO_2 Emissions per Capita

1. Taiwan was the 22nd largest CO_2 emitter in 2005, accounting for 1% of global CO_2 emissions. Taiwan had the third largest quantity of CO_2 emissions per capita, behind only the United States and Australia.
2. A recent International Energy Agency (IEA) report forecasts that world stocks of crude oil, natural gas, coal and uranium are sufficient only to last another 40.3, 67, 192 and 53 years, respectively. The pressure is on to identify and bring on line non-oil based sources of energy in order to limit the negative effects of increasing oil scarcity on economic growth and productivity. Supporting the development of green energy industries can help achieve goals related to energy diversification, increasing the ratio of indigenous energy in the national energy portfolio and new industry development, while also facilitating advances in energy safety, environmental protection and economic growth.

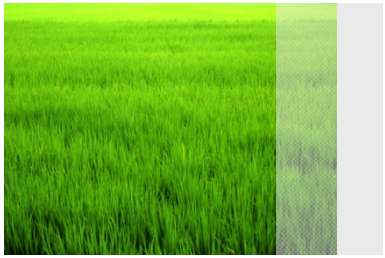
Challenges Faced by the Technology Development System in Taiwan (3/13)

Primary talent flows have shifted from Taiwan – Silicon Valley to China – Silicon Valley



Reforms and liberalization have shifted the value chain toward Southeast Asia; R&D is increasingly globalized; software development is heavily outsourced. Does this increasingly complex mobility network mean Taiwan is facing a "Brain Diversion"?

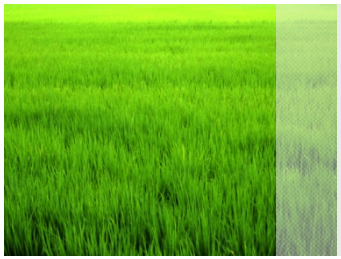
Source: Shin-Horng Chen & Xin-Wu Lin (2006)



Challenges Faced by the Technology Development System in Taiwan (4/13)

Aging populations and endemic "baby bust" increase social pressures

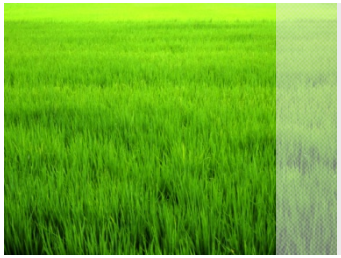
- Taiwan, already an aging society, will place greater importance on preventive medicine, with early diagnosis / early treatment made an imperative focus of medical technology development efforts.
- A declining birth rate reduces the supply of productive labor, which in turn increases social loading. Such a situation demands the introduction of a new order focused on enhancing and sustaining the value of contributions to society made by its elderly members.



Challenges Faced by the Technology Development System in Taiwan (5/13)

People and Nature Woven Together to Create an Environment that is Distinct and Individualized

- With the overuse and over-development of the environment and nature, we should infuse creativity into our daily lives as well as into the environment and ecology, energy conservation, the creation of both urban and rural empowerment programs and the planning and use of public lands in order to integrate people and nature and achieve harmony between man and his world. Such would help decrease incidences of natural disasters and support the creation of individualized styles and cultures to raise quality of life for those in Taiwan.
- Housing represents a basic human need. The rise in quality-related expectations toward housing and life has created a significantly larger home refurbishment market today.
- Development of the "ubiquitous" Internet and continuing trends toward on-demand anytime / anywhere e-services promise to an important engine of social and economic growth in the future.



Challenges Faced by the Technology Development System in Taiwan (6/13)

the Domestic Environment

Challenge 1: Social accountability

- Government budge allocated to technology continue to win steady support even while overall government revenues have declined.
- The General level of concern from various sectors of society regarding the effectiveness of technological development has gradually increased.

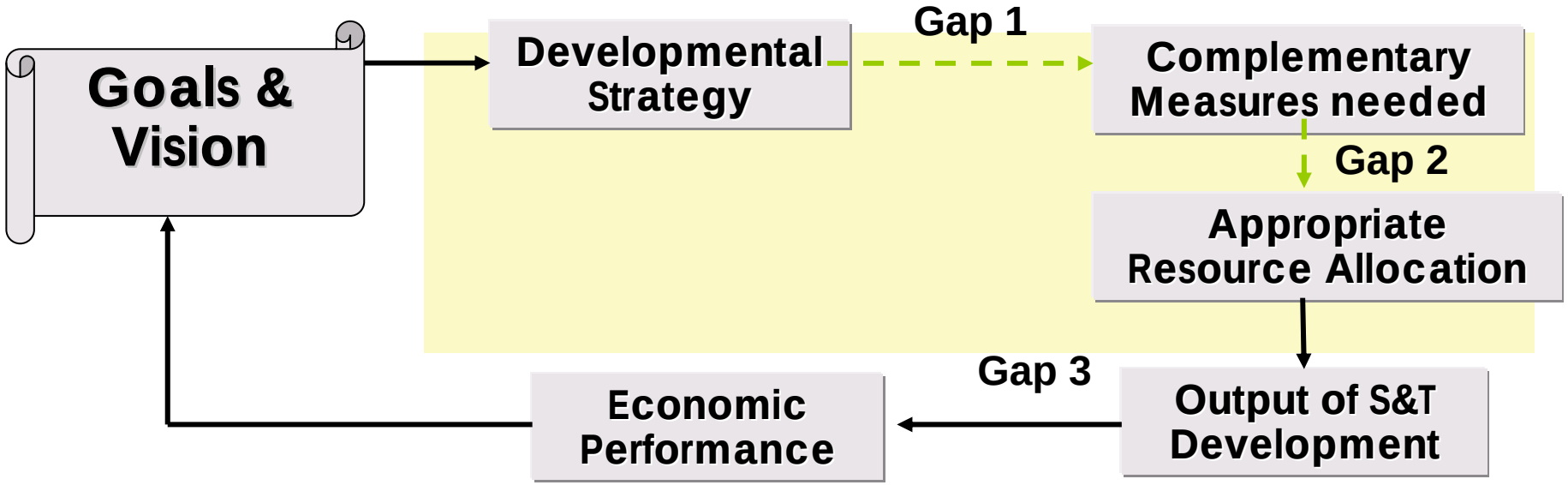
Challenge 2: Gaps have appeared in technology development systems.

Three gaps in technology development systems in Taiwan include those between:

- Development Strategy and Support Measures
- Support Measures and Resource Allocation
- Technology Development "Products" and Economic Benefits

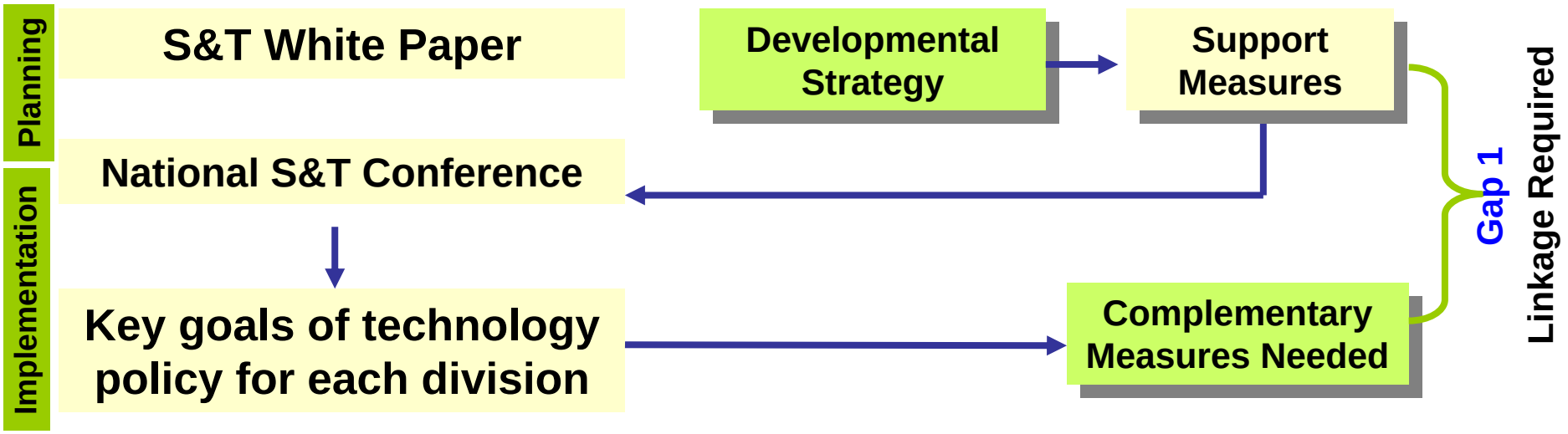
Challenges Faced by the Technology Development System in Taiwan (7/13)

3 Gaps in Taiwan's Technology Development System



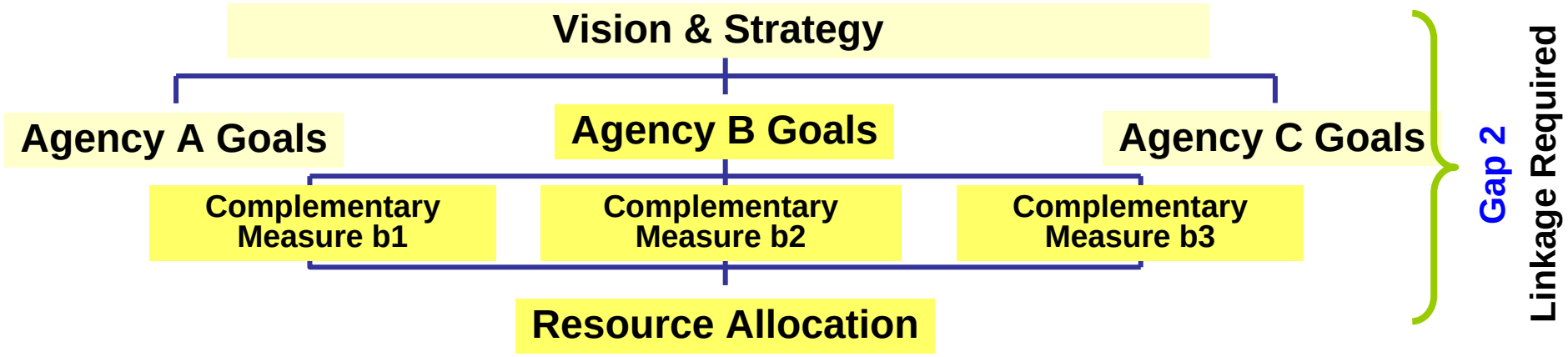
- **Technology developmental strategies have reached a "mature" stage, with critical elements targeted including human resources (talent), selected industries/sectors, regulations, industry-academia cooperation and national defense.** The current direction of Taiwan's technology development is illustrated in Appendix 2**.**
- **Results achieved by technology development programs are significantly affected by related complementary measures needed and appropriate resource allocations. Gaps in Taiwan's technology development system between Developmental Strategy and Complementary Measures Needed, Complementary Measures and Resource Allocation, and Output S&T Development and Economic Performance reflect areas requiring better linkages in order to help technology investments maximize national competitive advantage.**

Challenges Faced by the Technology Development System in Taiwan (8/13)



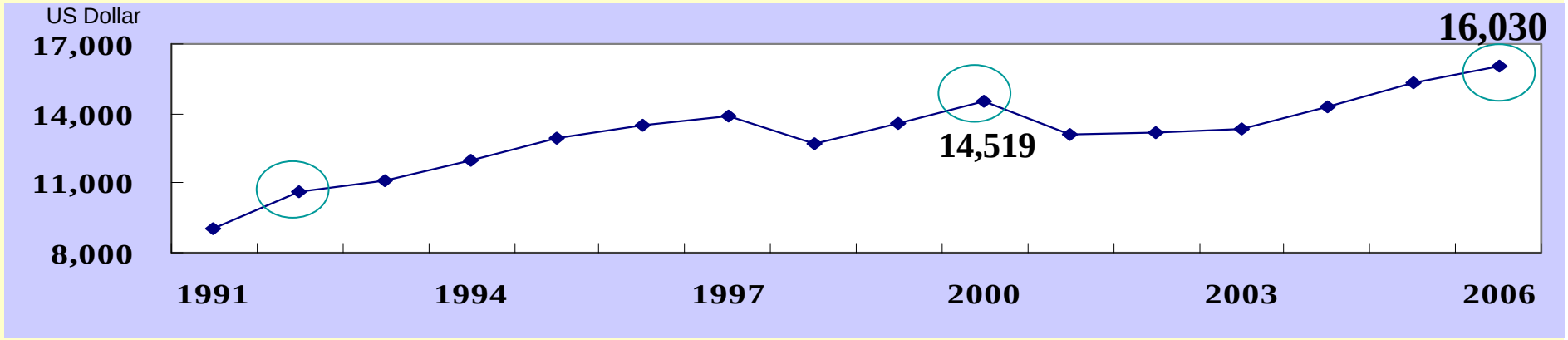
- **Gap 1: the origin of the gap between Developmental Strategy and Complementary Measures Needed**
  - Technology policy support measures are mostly implemented independently by various executive authorities, each of which tend to take a routine approach to such implementation.
  - Planning agencies establish only the principles underlying developmental strategy support measures. Implementation guidance is not provided.
    - Thus, the gap between planning and implementation agencies must be bridged.

Challenges Faced by the Technology Development System in Taiwan (9/13)



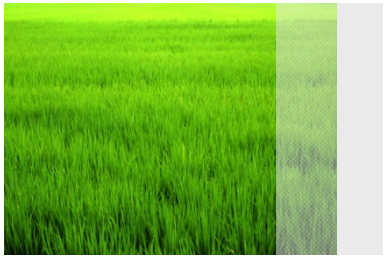
- **Gap 2: the origin of the gap between the Complementary Measures Needed and Appropriate Resource Allocation Needed**
  - **Executive authorities hold primary responsibility for allocating resources to support measures. The allocation of insufficient resources will affect the ultimate result and effectiveness of a given support measure.**
  - **The disbursement of resources among many goals or the existence of an excessive number of goals dilutes allocations to individual measures and undermines measure effectiveness.**
    - **Gap occurs when complementary measures are unable to secure needed resources or resources are diluted in trying to satisfy too many demands.**

Challenges Faced by the Technology Development System in Taiwan (10/13)



GDP per capita

- Gap 3: the origin of the gap between the output of S&T development, and Economic Performance
- The expansion of Taiwan's GDP from just over US$10K in 1992 to just US$16,030 in 2006 highlights the lack of an effective engine of growth and underscores the need to bridge the gap between the output of S&T development processes and economic benefit.
- Taiwan's "innovation paradox": While it has been 4th largest recipient of U.S. patents during each of the past 6 years, Taiwan's technology trade deficit continues to grow.
- High Tech Industries: Shrinking value added advantages; decreasing value added ratios; and declining productivity.



Challenges Faced by the Technology Development System in Taiwan (11/13)

Gap Example 1: **While measures and resources are executed by government agencies based on traditional "bottom-up" considerations, vision and strategies are planned and delivered in a "top-down" format.**

National S&T Development

Vision Become Pacific Asia's most capable center of development for innovative, new industries

Strategy Encourage innovative new enterprises, support the creation of new industries

Tech Dev't Programs at the Ministerial / Council / Administration Level

Gap 1

Goals

- Promote Taiwan as center for innovative research
- Create conditions favorable to growth of innovative SMEs

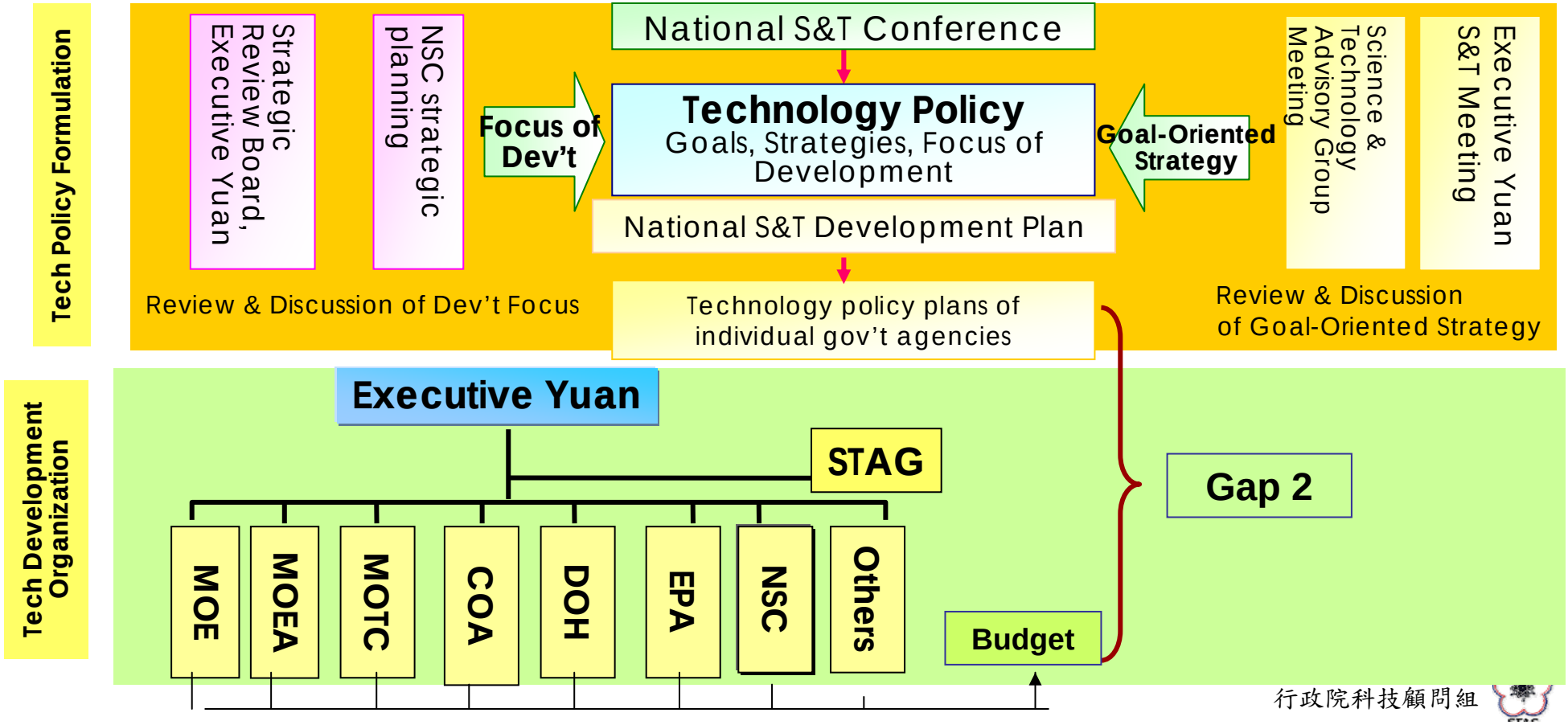
Measures

- Bolster innovative, advancing research
- Create facilities / environment favorable to tech R&D
- Develop critical technologies & international partnerships
- Increase industry participation in R&D and info application
- Facilitate university development of commercial technologies
- Help SMEs create value through information & communication technologies

Challenges Faced by the Technology Development System in Taiwan (12/13)

Gap Example 2: Inadequate Budget to Support Service Industry R&D Plans

- **Responsibility for service sector development is scattered amongst a number of disparate gov't agencies, the technology plans of which pursue agency (rather than service sector) priorities. Compounding problems is the tendency of executive authorities to assume the role of supervisor/monitor rather than facilitator. Thus, technology development in the service sector faces a perennial shortage of budget allocations available to implement extant policies.**



Challenges Faced by the Technology Development System in Taiwan (13/13)

Gap Example 3: Broad-Based Tech Growth Inadequate

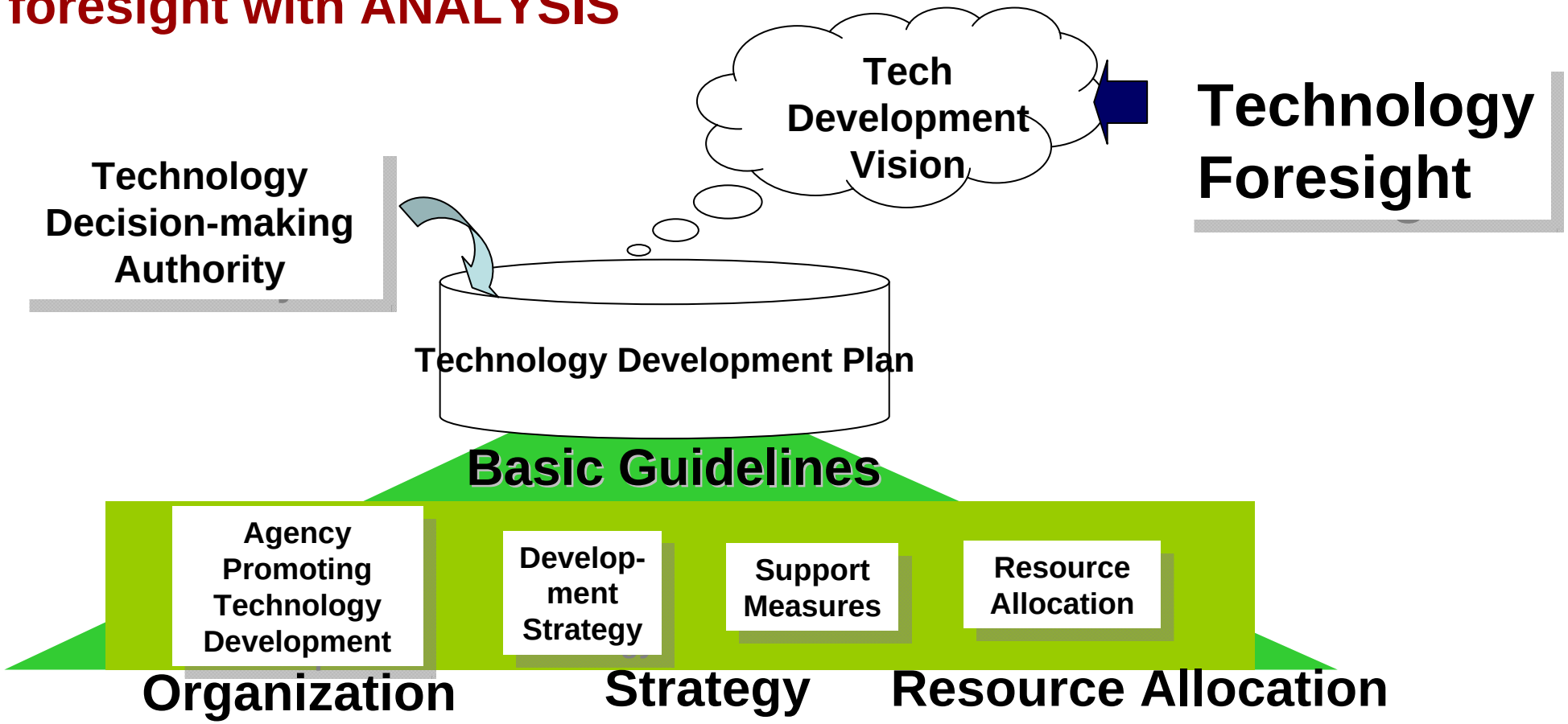
- The policy planning gap between Strategic Performance Goals and Relevant Indices is exacerbated by excessive emphasis on quantifiable result variables, which unnaturally limits certain special characteristics of technology (such as *Risk*, *Uncertainty* and *Schedules that do not neatly fit Fiscal Year Planning*). Such causes certain key technology development opportunities to be overlooked and certain plans not necessarily deserving of funding to receive budgetary allocations.
- There persists insufficient information inputs with regard to technology development as well as a difficulty to observe overall technology development work through the multitude of individual projects being run by various government agencies.

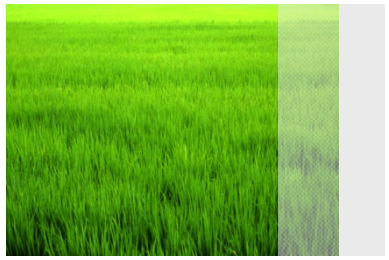
Strategic Performance Goals	Relevant Indices	Benchmarking Standards
Promote Taiwan as Center of Innovative Research & Development	• Patents (domestic & int'l); • Tech transfer cases; • R&D centers, strategic alliances, value of budgetary allocations to strategic-oriented services	• No. of patents (domestic & int'l) obtained; • No. of tech transfer cases; • Value of resulting additional private sector investment in R&D

Gap 3

Technology Development Models Followed in the U.K., Japan, South Korea and Finland (1/5)

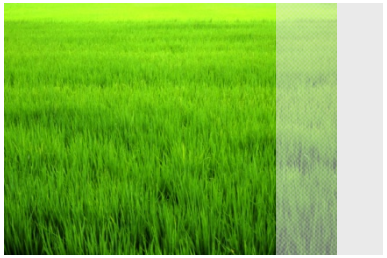
Technology Development Model: Augment tech development organization, strategy, resource allocations and technology foresight with ANALYSIS





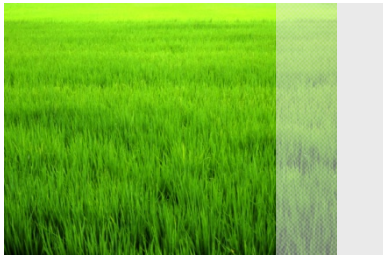
Technology Development Models Followed in the U.K., Japan, South Korea and Finland (2/5)

- **Commonalities (1/2)**
  - **Cross-agency organizations with Overall S&T decision-making authority with regard to**
    - **e.g., the UK's Council for Science & Technology (CST), Japan's Council for Science and Technology Policy (CSTP) and Korea's Vice Premier level Ministry of Science and Technology (MOST).**
  - **Government underwrites technology foresight initiative**
    - **as in the UK, Japan, Korea and Finland**
  - **Technology budget allocations use technology foresight results as primary base of reference**
    - **e.g., 60% of technology budget is allocated to sectors confirmed by foresight work. Technology forecast results frame all S&T basic plan in Japan and Korea.**



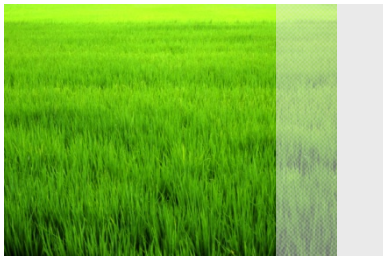
Technology Development Models Followed in the U.K., Japan, South Korea and Finland (3/5)

- **Commonalities (2/2)**
  - **Tech Foresight Results Frame National Technology Development Vision**
    - **e.g., the UK's Science and Innovation Investment Framework (SIIF) 2004-2014, Japan's 3rd Science and Technology Basic Plan (2006-2010), Korea's 2nd Basic Plan for Science and Technology (2007-2011) and Finland's innovation plan "Finland 2015".**
  - **Using the Technology Development Vision to guide practical Technology Development activities**
    - **e.g., UK uses its SIIF 2004-2014 and Japan & Korea use their respective S&T Basic Plans to guide domestic technology development programs. Finland 2015 serves as that country's blueprint for developments in the realms of science, technology and society.**



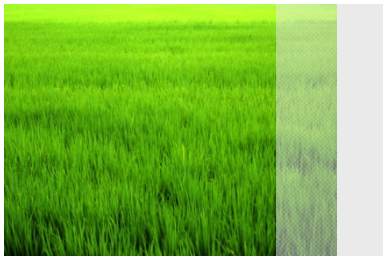
Technology Development Models Followed in the U.K., Japan, South Korea and Finland (4/5)

- **Differences**
  - **Technology Development Guidelines are arrived at via distinctly different processes**
    - **Japan systematically developed and regularly revises its Basic Plan – the highest guidance document for S&T development work in that country. Various agencies set their goals to target achievement of Basic Plan goals.**
    - **The UK developed and announced the SIIF 2004-2014 in response to a perceived need for a guidance document for technology development.**
    - **Korea also developed and announced, in 2000, its "Vision 2025" in response to a perceived need for a guidance document for technology development.**



Technology Development Models Followed in the U.K., Japan, South Korea and Finland (5/5)

- **Worth Adopting**
  - Create empowered cross-agency technology development decision making authority.
  - Deploy government resources to implement technology foresight work.
  - Ground Taiwan's Basic Technology Plan on the results of such technology foresight and use the Plan as the principal base of reference for making relevant budget allocations.
  - Follow Japan's model to use the Basic Technology Plan to guide Taiwan's technology development efforts and execute plans and promotion work in a systematic and organized manner.



Current Direction of Taiwan's Technology Development System (1/3)

Formation of Technology Development Vision & Strategy

Economy / Industry

Challenge 2008 Nat'l Development Plan → Major Investments, Big Support (2015 Econ Development Vision)

- Industry Development Package
- Human Resources Package

Mechanisms

Science & Technology Advisory Group (STAG)

25th plenary 2005.6.29 | 26th plenary | 27th plenary 2007.1.17

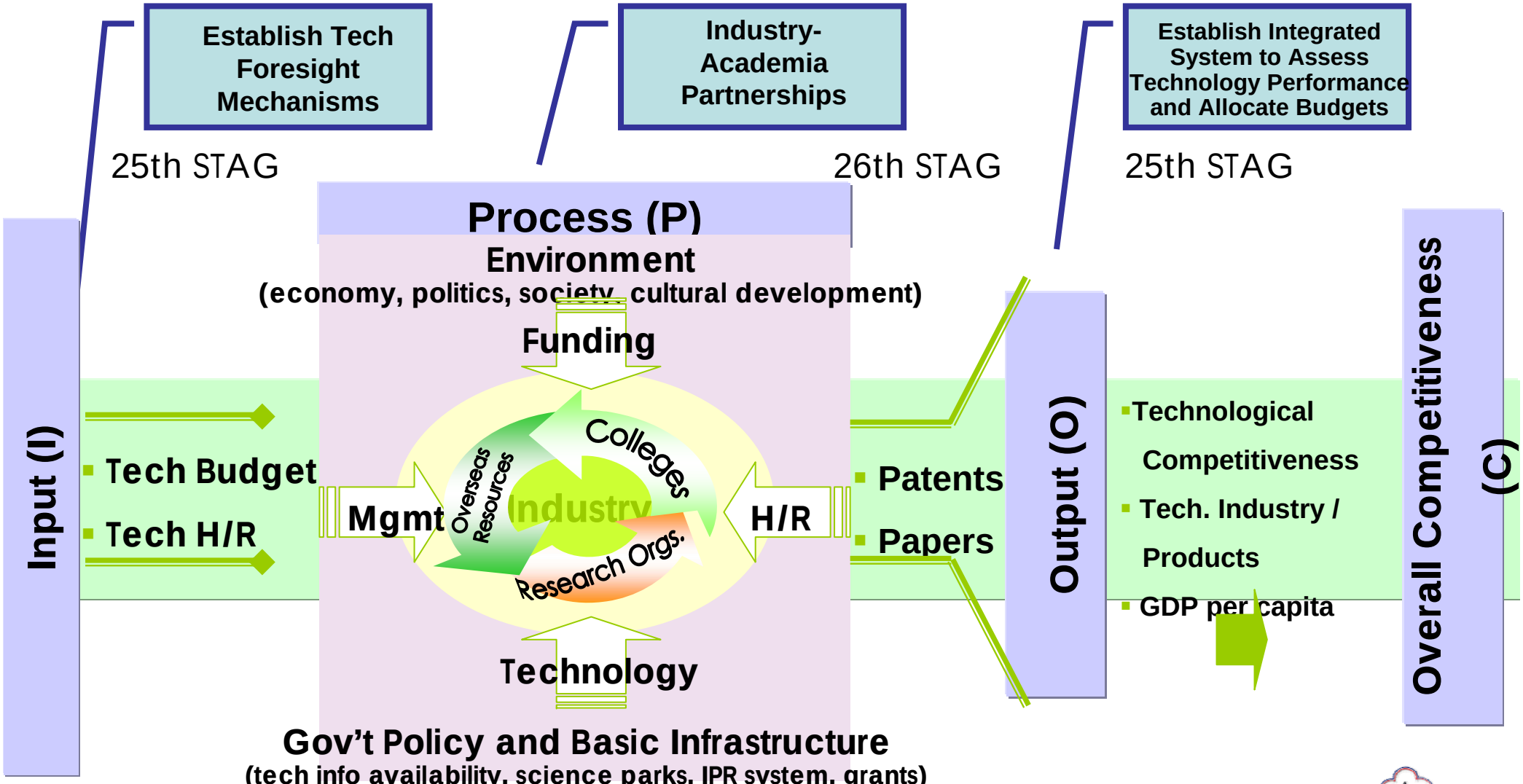
Technology

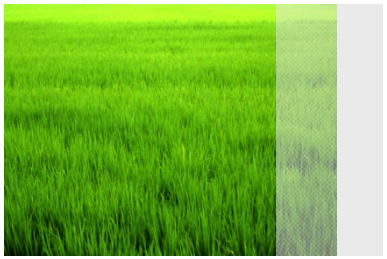
National S&T Development Plan (2005~2008) → S&T White Paper (2007~2010)

STB Law, Article 9: *The government shall address ever two years the vision, strategy and current situation with regard to science and technology development.*

Current Direction of Taiwan's Technology Development System (2/3)

Accomplishments Achieved by Taiwan's Technology Development System since the 25th STAG





Current Direction of Taiwan's Technology Development System (3/3)

Taiwan has begun implementation of a foresight system. System is not yet to the point of being able to formulate a practical vision for Taiwan's technology development.

- **STAG has directed TIER, ITRI's Industrial and Economic Knowledge Center (IEK), and STPI to create and organize an expert advisory body on technology foresight within the guidelines outlined in the document, "Pilot Program to Establish Taiwan Technology Foresight Mechanisms" (2005).**
- **In its "Initial Plan to Integrate Technology into Next Generation Industries", drafted between 09/2005 and 12/2005, the MOEA set in place the mechanisms and models that will shape industry foresight programs for the next decade.**
- **The MOEA's 3-year research project (start year: 2006), entitled "The Integration of Technology in Taiwan Industry in 2015", will define a vision and strategy for Taiwan industry looking nearly a decade into the future.**
- **In 2007, the NSC commissioned Dr. Eugene Wong to implement the "Foresight Taiwan" plan. The plan gives priority consideration to the economy in handling issues and looks to help identify a strategy, grounded in technology foresight, that will spur the next wave of economic growth in Taiwan.**

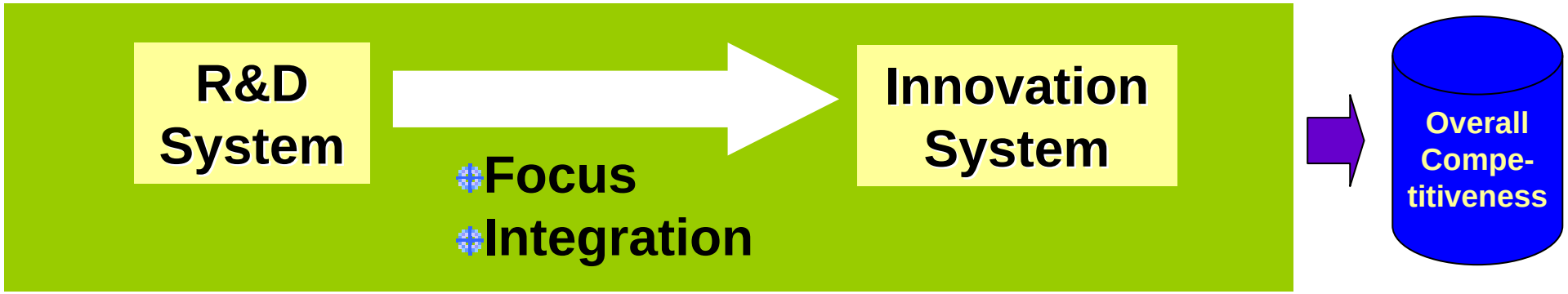
Issues and Suggestions for the Future (1/4)

Why Taiwan needs basic guidelines for technology development

- **Problems faced in advancing the nation's technology development system must be addressed seriously:**
  - **Gap between development strategy and support measures;**
  - **Gap between support measures and resource allocation;**
  - **Gap between technology development "products" and economic benefits**
- **The positive advance of Taiwan's technology development system must be sustained.**
  - **Strengthen system effectiveness and governance**
  - **Create a system that is both complete and integrated**

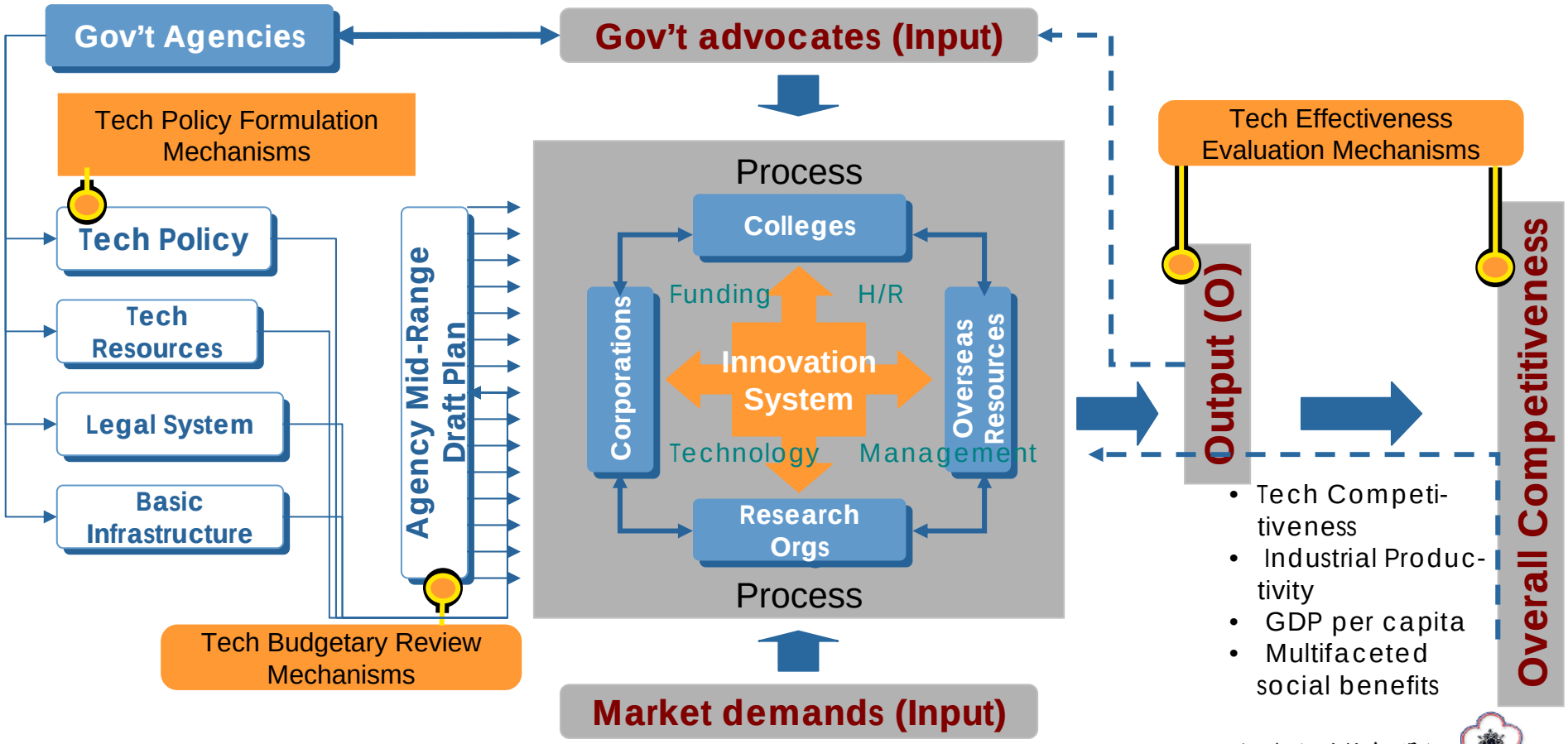
Issues and Suggestions for the Future (2/4)

- Technology foresight activities can confirm technology development vision and strategy to achieve focused results.
- Setting basic guidelines for technology development can coordinate technology development implementation and integrate resources.



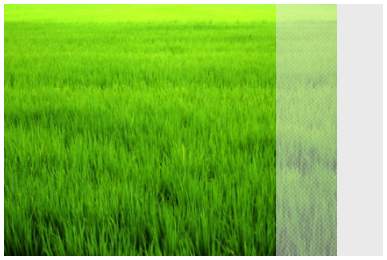
Issues and Suggestions for the Future (3/4)

Taiwan *needs* a set of Fundamental Guidelines of S&T Development to consolidate currently dispersed efforts and advance toward a common technology development vision and goals.



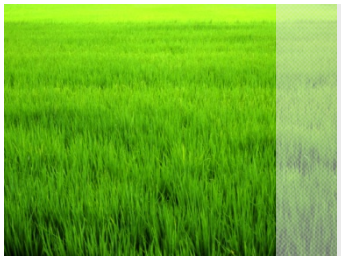
Issues and Suggestions for the Future (4/4)

- In observing Taiwan's technology development system inputs, outputs and challenges as well as the experiences of benchmark nations, this report offers the following suggestions:
  - Technology development vision and strategy should be based in technology foresight.
  - The integration and implementation of technology development should be based on a "Fundamental Guidelines of Science and Technology Development".
- In order to invigorate national technology development programs, raise national innovation effectiveness and spur industry growth, a "Fundamental Guidelines of Science and Technology Development" is needed that adopts the betterment of society at large, enhanced utilization of professional human resources, and broad-based cultivation of talent as its basic framework. Such should guide the development of practical strategies and measures in order to achieve the key policy goals of enhancing Taiwan's sustainable competitiveness and ensuring the nation's security and health.



Appendices

1. Taiwan industries / products recently ranked among the top 3 globally
2. The current strategic direction of technology development in Taiwan



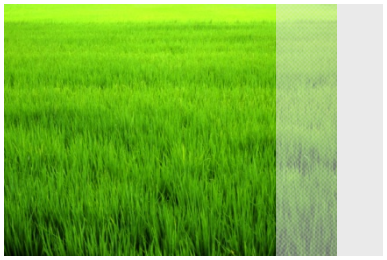
Taiwan industries / products recently ranked among the top 3 globally

Year	Industries / product categories in which Taiwan ranked NO. 1
2003 (13 items)	Wafer Foundry, Mask ROM, IC Packaging, ADSL Modem, Cable Modem, WLAN, SOHO Router, CD-R Discs, CD-RW Discs, DVD-R Discs, DVD RW Discs, Fiberglass Fabrics and ABS
2004 (12 items)	Wafer Foundry, Mask ROM, IC Packaging, WLAN, SOHO Router CD-R Discs, CD-RW Discs, DVD-R Discs, DVD RW Discs, Fiberglass Fabrics, electrolytic copper foil and ABS
2005 (11 items)	Wafer Foundry, IC Packaging, IC Testing, Mask ROM, CD-R Discs, CD-RW Discs, DVD-R Discs, DVD RW Discs, Fiberglass Fabrics, electrolytic copper foil and ABS
2006 (13 items)	Wafer Foundry, IC Packaging, IC Testing, Mask ROM, TN/STN LCD screens, large dimension TFT-LCD screens, data storage discs (CD-R, CD-RW, DVD-R, DVD RW), electrolytic copper foil, ABS, electric scooters and motorized wheelchairs (for handicapped users)

2006 categories in which Taiwan ranked NO. 2 (11 items)	2006 categories in which Taiwan ranked NO. 3 (6 items)
IC Design, RDAM, WLAN, SOHO Router, OLED screens, LEDs, Fiberglass Fabrics, IC Load Boards, Motherboards (including for systems), TPE and Polyester Filament	Small/Medium Dimension TFT-LCD screens, PCBs, Notebook Computers, PCs, PU Synthetic Leather, PTA, Nylon Fiber

Note: the list addresses only products manufactured in Taiwan and does not include products produced by Taiwanese companies overseas

Source: ITIS, Department of Industrial Technology, MOEA



The current strategic direction of technology development in Taiwan (1/8)

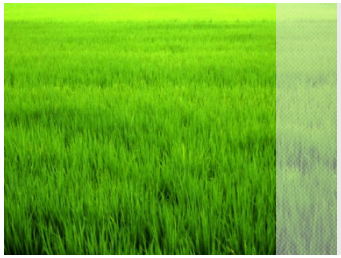
Vision for Technology Development

The globalization challenge and international technology trends

Taiwan's domestic social & economic issues

by 2015, Taiwan's levels of technological innovativeness and general quality of life will have reached that of developed nations.

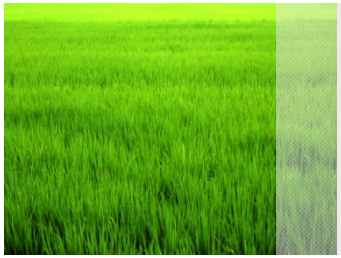
Leveraging technological innovation to create economic value and enhance national prosperity



The current strategic direction of technology development in Taiwan (2/8)

Vision – Exceptional Academic Research

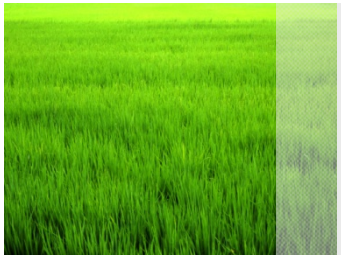
- Enhance the environment for academic research to attract world-class researchers.
- Develop fields of original academic research.
- In identified priority fields, cultivate internationally recognized and respected research experts as well as research teams at the forefront worldwide in their areas of expertise.
- Academic research and knowledge creation helps fuel industry growth, enhance general prosperity and make contributions that benefit all mankind.



The current strategic direction of technology development in Taiwan (3/8)

Vision – Reenergize Economic Growth

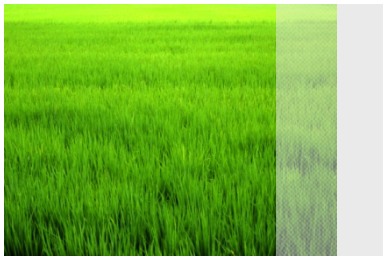
- Become Pacific Asia's most capable center of development for innovative, new industries.
- Technological innovation and knowledge services have already become the primary source of added value. Companies are marketing products worldwide under their own brands.
- Every area forms its own distinctive and innovative community based on the character of local industry, R&D resources and cultural environment.
- Talent from industry, academia and research interact closely, plug into the international community and participate in international industry standards-making activities.



The current strategic direction of technology development in Taiwan (4/8)

Vision – A Sustainable, High Quality of Life

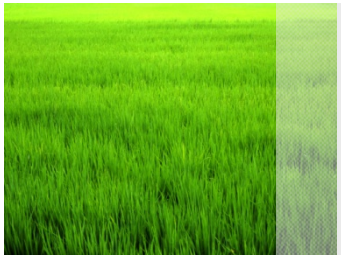
- Create a high quality national living environment that is participatory and safe, provides services quickly and conveniently, is capable of continued sustainable growth.
- Introduce R&D investment and new technology applications to meet society's development needs; Leverage technological innovation to help society enjoy a high quality of life.
- Ensure that science & technology develops sustainably and in harmony with ethics, society and culture, the environment, industry and the economy.
- Raise public competencies in the sciences to help science become more a part of life.
- Expand the scope of use for information and communication technologies to enhance the quality of work, study, recreation and life. Bring into being a highly refined networked/online society where services can be obtained "anytime/anywhere" and knowledge is readily accessed.



The current strategic direction of technology development in Taiwan (5/8)

Tech Development Goals (1/2) – Tech Investment Quantifiable Goals

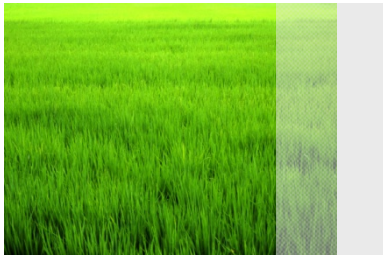
- **Tech Investment - Government**
  - Government investments in R&D have been growing steadily. When added to investments made by the private sector, it is hoped that overall R&D expenditures will continue growing to reach 3 percent of GDP (R&D expenditures accounted for 2.46% of GDP in 2005).
- **Tech Investment – Private Sector**
  - R&D investments by manufacturers should account for 1.7% of industry earnings in 2009 and 2.5% in 2015 (the ratio was 1.33% in 2005).
- **Industry-Academia Partnerships**
  - 9.1% and at least 10% of the R&D budgets of post-secondary academic institutions should be provided by industry in 2009 and 2015, respectively (the ratio was 5.8% in 2005).
- **R&D Talent**
  - In terms of the ratio of R&D professionals in the working population, a target of 9.7 per thousand and 10.9 per thousand has been set, respectively for 2009 and 2015 (ratio was 8.0 per 1,000 in 2005)



The current strategic direction of technology development in Taiwan (6/8)

Tech Development Goals (1/2) – Tech Output Quantifiable Goals

- **Academia**
  - **At least one university in Taiwan should be ranked among the 100 top universities worldwide (National Taiwan University ranked No. 114 in 2005). Also, at least 10 research centers in Taiwan should earn recognition as among the best in their fields in Asia.**
- **Industry**
  - **Taiwan maintains position as 4th largest annual recipient of U.S. patent approvals (exclusive of new format).**



The current strategic direction of technology development in Taiwan (7/8)

- **Critical areas of technology development tie into the 10 new industries to be promoted over the next 3 to 9 years. Targeted investments shall advance security in the home, security in action and a healthy lifestyle.**

General Industry Areas over next 3 years

- Digital life
- High Tech Services
- Intelligent Vehicles
- Health Care
- Green Industries

New Technologies

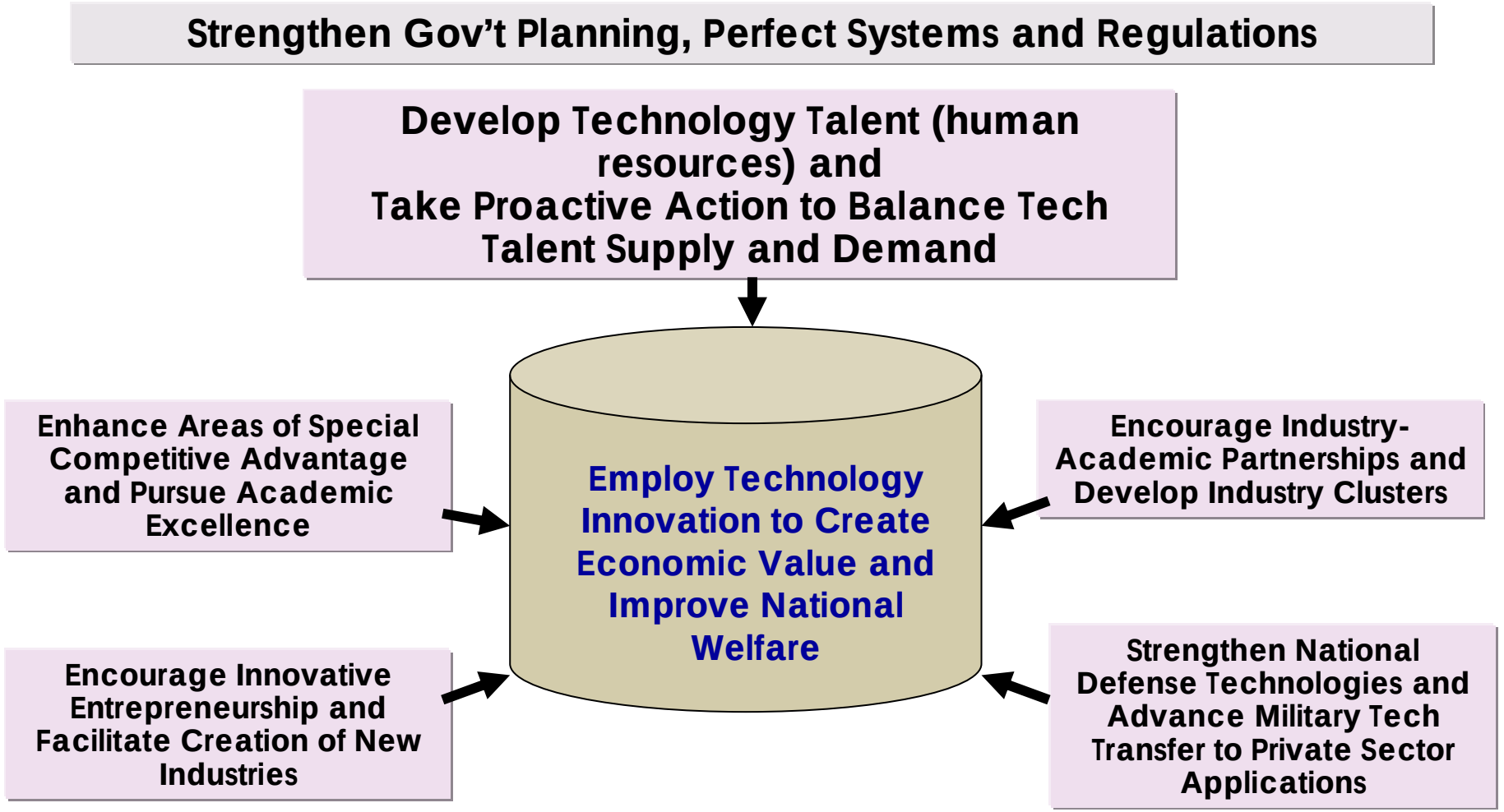
- Broadband Comm
- Internet Multimedia
- Digital Content
- System Chips
- RFID Tech
- Vehicular Energy Conservation
- Intelligent Transport Networks
- Med Facilities
- Distance Diagnosis
- Renewable Energy
- Green Energy
- Green Materials
- Environmental Protection
- Ubiquitous Network Society (UNS)
- Environmentally-Friendly Materials
- Low-Energy Building Materials
- Flexible Materials
- Image Display
- Precision Machinery
- New Biotech Medicines
- Medical Instruments
- Genomic Medicine
- Nanotech Materials

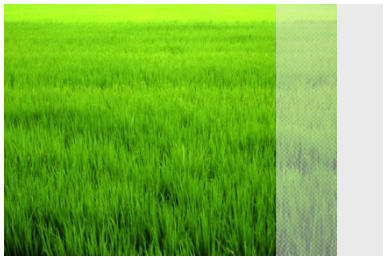
General Industry Areas over next 9 years

- Intelligent Living Space
- Flexible Electronics
- Intelligent Mechanoids
- Biotech Pharmaceuticals
- Nanotech Applications

The current strategic direction of technology development in Taiwan (8/8)

Development Strategy Structure





Thank you,
Comments are Welcomed!