The 31st STAG Board Meeting

Theme II: From S&T Research to Industrial Applications

2.2 Policy Packages for Commercialization of S&T Research and Innovations

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Outline

1. Introduction
2. Positioning and Evolution of S&T Innovation Measures in the MOEA
3. Models of Innovation Commercialization within the Technology Development Programs (TDP)
4. Problems with Existing Measures and Models
5. Policy Recommendations for the Promotion of S&T Innovation and Commercialization

1. Introduction: External and Internal Challenges for S&T Development in Taiwan

- Major competitors all increase R&D investments
  - R&D intensity of South Korea: **3.37% in 2008** and targeting **5% in 2012**; Taiwan: **2.94% in 2009**
  - R&D intensity of China: **1.75% in 2010**, accounting for 9.1% of global R&D investments
    - The 12th Five-Year Plan: Targeting **2.20% by 2015**
  - If unable to compete with these competitors in terms of R&D intensity, Taiwan needs to enhance the **impact of its R&D investments.**
- Mounting "Social Accountability" pressure for public R&D expenditures
  - Pressure on S&T development imposed by **joblessness and imbalanced growth**
  - More finely tuned innovation governance, strengthened strategic planning, deployment of IPR, integration of R&D and innovation programs are aimed at enhancing the economic, industrial and social impact of S&T development.

2. Positioning and Evolution of S&T Innovation Measures in the MOEA

1.Major MOEA S&T Programs

- **Technology Development Program (TDP)**: This was initially carried out via the establishment of R&D institutes such as ITRI and III to conduct R&D (R&D Institute TDP) and then to lead to technology transfer to the industrial sector.
- **Various Means** of TDP: Industrial TDP to promote technological innovation & advanced R&D in the industrial sector; University TDP to establish linkages between science and industrial innovation.

R&D Institute TDP

– 4 Technology Fields
– 3 Types
- Advanced R&D
- R&D Infrastructure
- Key Technologies

(Since 1979)

Industrial TDP

– Key Technologies
– SMEs (SBIR)
– Technology Applications & Service Innovations
– Enterprise's & MNCs' R&D Centers
(Thematic)

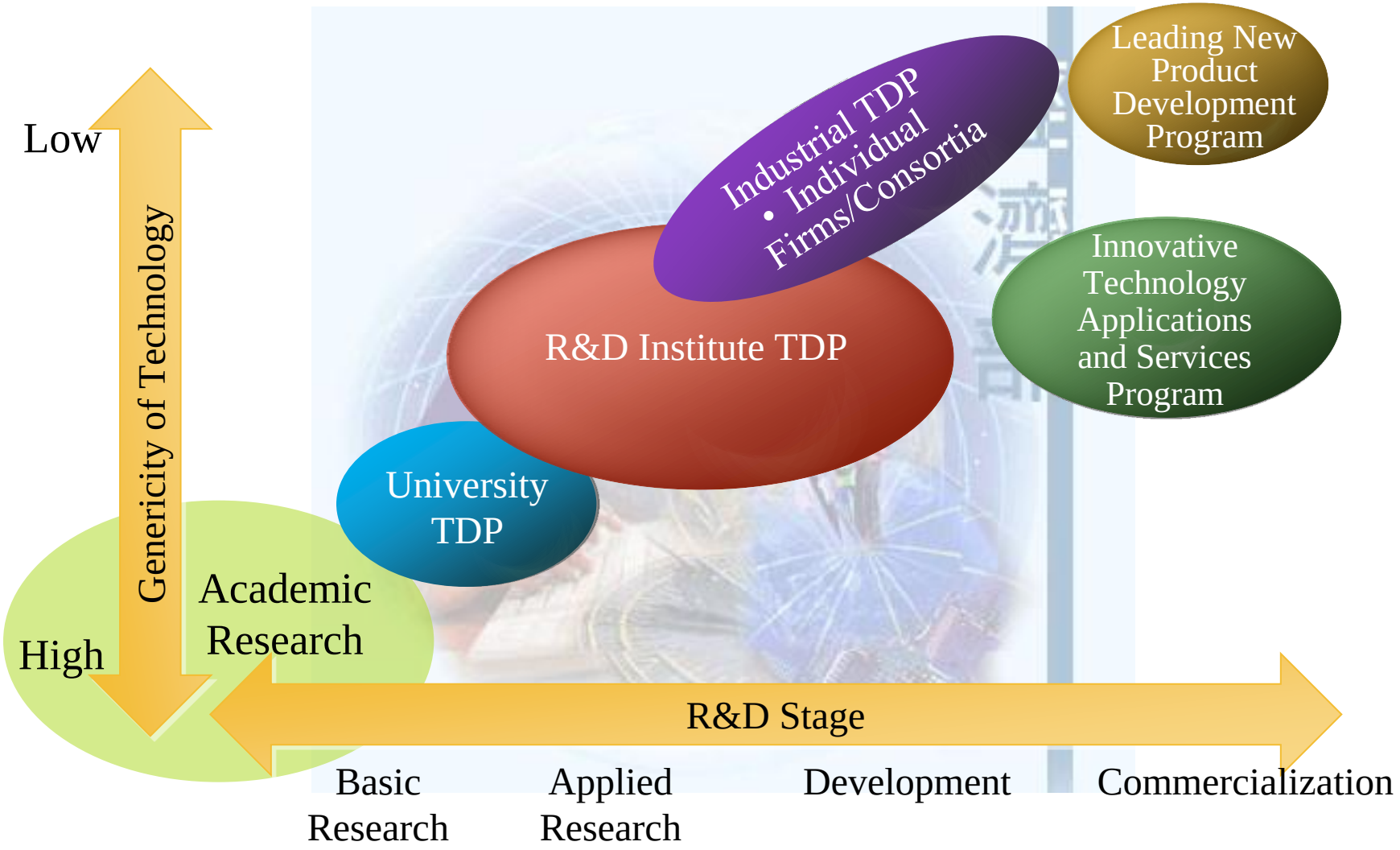
(Since 1997)

University TDP

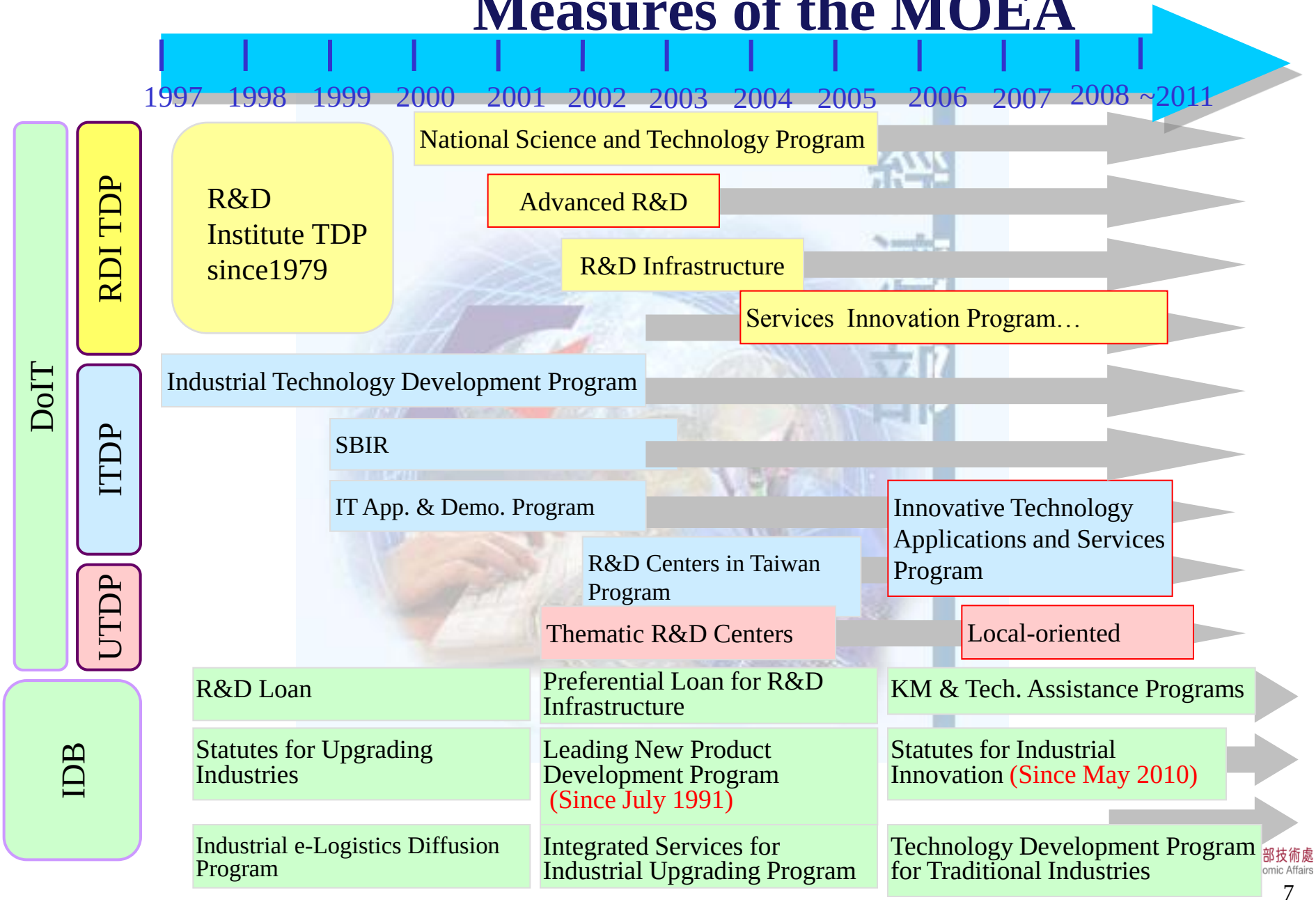
– Thematic R&D Centers
– Local-oriented

(Since 2001)

2. Positioning of Major R&D Programs

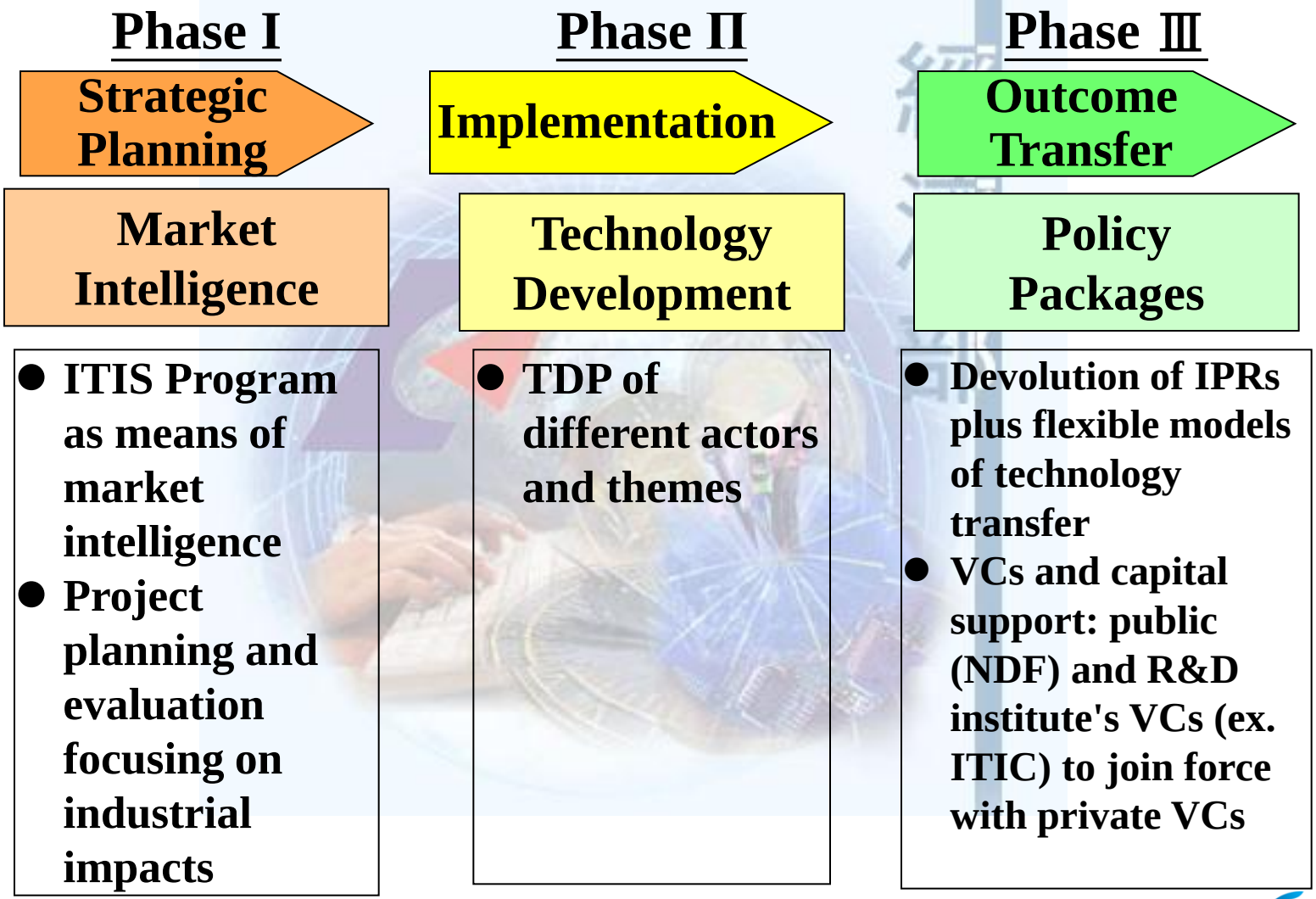


3. Evolution of Industrial Innovation Measures of the MOEA



3. Models of Innovation Commercialization within the Technology Development Programs (TDP)

1. Traditional Start-up Model under TDP



2.Main Models of Strengthening Cross-over Linkages in TDP

- To leverage the S&T resources of **other ministries**
  - University TDP: Mobilize R&D resources of universities
  - Military Supply Procurement Program: Access the resources of CSIST/MOD
  - University Coach Program: Vulnerable firms to be coached by professors in universities
- To adjust R&D portfolios of R&D institutes and the private sector
  - Advanced R&D by R&D Institutes: Encouraging cooperation between R&D institutes and universities
  - Advanced R&D by industrial sectors
- To extend the value chain and promote value creation
  - New themes driving value creation, such as manufacturing services, device-based services, healthcare services…; R&D institutes as facilitators
  - To promote vertical R&D linkages in areas such as steel-making and the automotive sectors

3. Scope of Linkage for Commercialization of S&T Innovations

- Innovation process, especially between the industrial, academic, and research sectors
  - –Previous policy focus focuses mainly on **supply-end**
- **Vertical innovation linkage** for commercialization
  - –Encouraging outcomes in the steel-making and automotive sectors
  - –Coordination and integration within the MOEA
- Linkages among innovation, **field trials and demonstrations** (in line with the **Living Lab approach**)
  - –To facilitate linkage with market demands (**creation of initial markets**) and the integration between product and service systems
  - –Mostly involving **inter-ministerial cooperation and coordination**
  - –To promote technology-based service innovation, MOEA is just a **cultivator**, but other ministries are often the **"owner";** there is involvement required in order to generate significant innovation benefits

4. Problems with Existing Measures and Models

1. Bottlenecks and Proposed Remedies within Existing Linkage Modes

- To leverage the S&T resources of other ministries: **Institutional changes are required** on the part of other ministries involved
  - Military Supply Procurement Program: Supply contracts released by the Ministry of National Defense
- To adjust R&D portfolios of R&D institutes and universities: Changes required in **Internal atmosphere and institutional structure**
  - Heads of R&D institutes need to fine-tune the internal mechanism for conducting advanced R&D, with an ultimate goal to generate results that have major impacts on industry.
- To extend the value chain and promote value creation: **Mindset changes and the upgrading of capabilities on the part of firms**
  - The firms involved often are prone to current R&D and innovation trajectories.

2.Extension of Policy for Cross-over Innovation Linkages

- **The "Valley of Death"** must be overcome to realize the full impact of R&D and innovation, with a wide variety of **considerations required**
  - Initially referring to the chasm between basic research and the industrial and academic sectors (the R&D process)
  - The "Valley of Death" also appears **in the process of industrial development**, preventing innovation germination from generating substantial industrial development.
- Innovation policies in Taiwan focus mainly on addressing hurdles in the R&D process, and put less emphasis on addressing the needs in **the process of industrial development**
  - The design of innovation policies in Taiwan needs to be extended to cover everything from the supply chain to the value chain, and from industrial germination to industrial fertilization
  - Calls for an **appropriate S&T innovation and policy package** often involve inter-ministerial cooperation and demand-driven policies
- Besides carrying out integration in the upstream S&T research system, Taiwan also needs to focus attention on bottlenecks in downstream commercialization

3. Case Study of Intra-MOEA Coordination: LED Industrial Standards and Demonstration Applications

- In 2007, an LED standardization consortium formed by ITRI, with support from the MOEA, began developing the technologies and corresponding industrial standards.
- Six national standards were formed via the consortium, with CNS15233 becoming the first global standard for LED street lighting.
- The Bureau of Energy and the Industrial Development Bureau adopted the standards for public procurements, facilitating the deployment and application of LED public lighting.

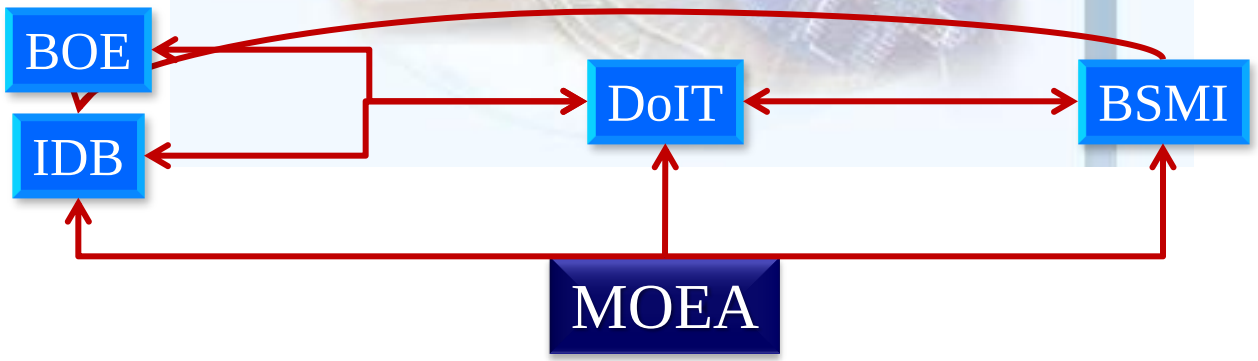
Industrial, governmental, and academic collaboration in drafting LED standards

LED路燈產業聯盟 Taiwan LED Street Light Industry Alliance

-Demonstration-
Deployment in public lighting and facilities

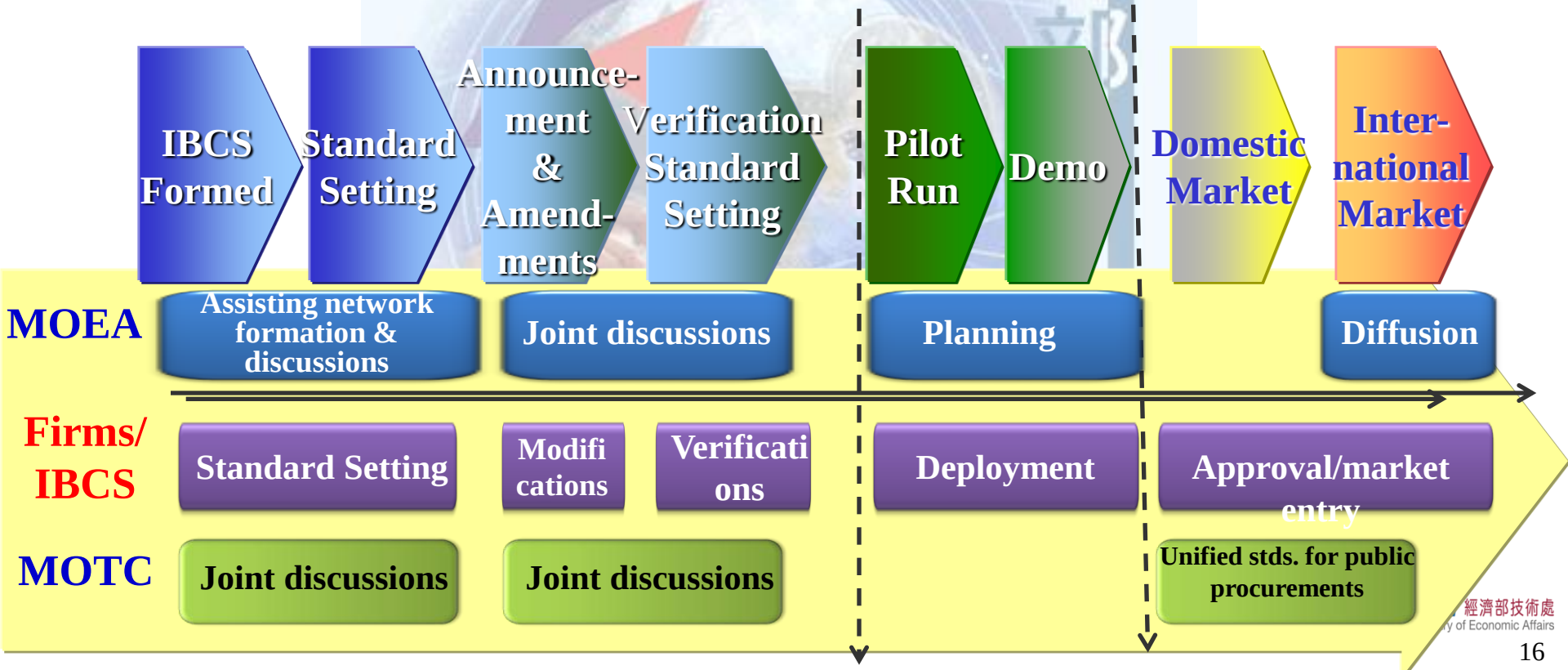
-TDP-
Technology standardization

-National Standards-
Verification & announcement of the LED standards



4. Case Study of Inter-Ministerial Coordination: Intelligent Bus Industrial Standards & Demonstration Applications

- The MOEA took the initiative to form a joint working panel, IBCS, to develop industrial standards for intelligent buses.
- **The MOEA and MOTC worked together to assist** IBCS to complete five industrial standards for corresponding equipment.
- By the end of 2012, 17,029 buses are expected to incorporate the standards and solutions, equivalent to an 80% penetration rate.



5.Case Required Further Progress: WiMAX

- Regarding WiMAX development, the process from R&D to service deployment essentially involved **integration of an innovation system**
  - **Technology development & value chain**: Well-established in Taiwan, except for the backbone network
  - Deployment of services: Six licenses issued for WiMAX services, but **the operators currently face bottlenecks**
    - Smart devices for WiMAX services not available for commercial scale
    - Difficult to acquire IP addresses for base stations, undermining the deployment of the networks
    - High transmission costs of backhaul networks
    - Problems associated with **interoperability with other tier-one telecom operator services**, holding back VoIP services
- Inter-ministerial negotiations on solutions for WiMAX services in progress
- Existing capabilities of WiMAX helping the migration to 4G (LTE)
  - **Cross-strait collaboration in TD-LTE**: Call for inter-ministerial consensus on relevant issues in the cross-strait context

5. Policy Recommendations for the Promotion of S&T Innovation and Commercialization

Mindset Changes Required in the Design of Innovation Policy (1/2)

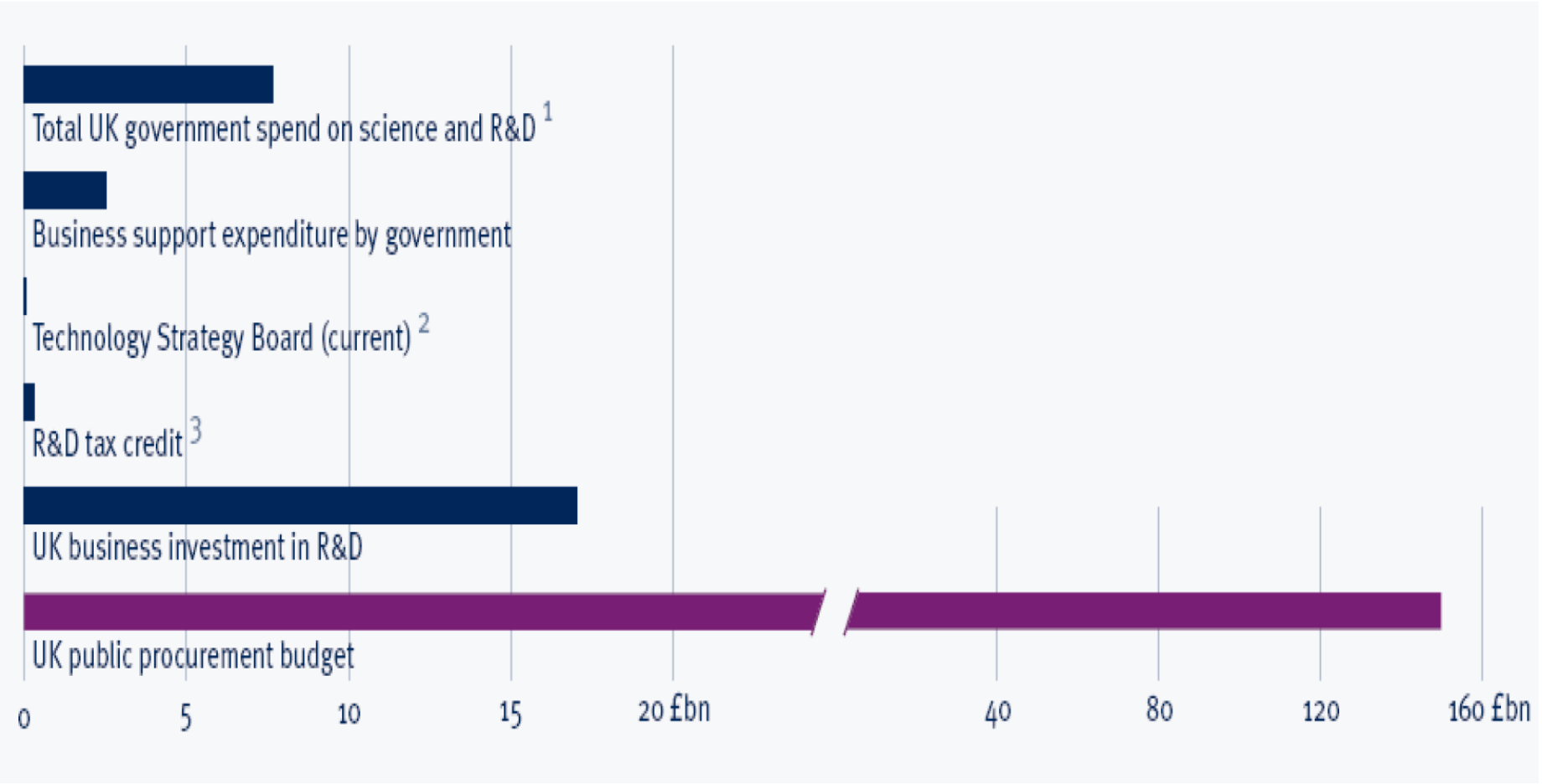
- **The innovation process requires linkage starting from R&D all the way to commercialization. Each step is integral, often requiring system integration and inter-ministerial coordination.**
- Policy packages for **inter-ministerial cooperation are** needed, especially to link efforts in innovation, field trials and demonstrations: Evaluation of policy impacts **in an inter-ministerial context**
  - Services and green innovations often entail inter-ministerial cooperation in order to achieve innovation goals.
  - The MOEA has cultivated technology-based healthcare innovations, but it is the Department of Health and the Ministry of the Interior which are the **"owners,"** facilitating scaling up of the proven innovations and bringing this experience to the masses.

Mindset Changes Required in the Design of Innovation Policy (2/2)

- Industrial commercialization of innovation entail **a wider variety of policy measures** than just technology transfers and start-ups. For instance, public procurements can serve as an important tool in commercialization.
  - A UK perspective: Public procurement as a **driver for innovation**, presenting an initial market for innovations
  - Recent focus on public procurement as a demand-driven measure of innovation: **Pre-commercial procurements plus quality/standard requirements**
  - **Article 27 of the Statute for Industrial Innovation**: Green products should be given priority in public procurements
    - **Green procurements** can boost industrial commercialization in a variety of fields here, including electric vehicles and green buildings.

The End
Thank You for Your Attention

UK Perspective: Public Procurement as a Driver for Innovation (Policy-wise)



Source: Innovation and Public Procurement, p. 5, adapted from Stephen Roper, "Enabling non-technical innovation – enabling the demand side"。