

ECLAC/-INNOVA Chile CORFO Conference:

**INNOVATION AND EXPORT DEVELOPMENT
IN THE FRAMEWORK OF PUBLIC-PRIVATE
ALLIANCES**

SANTIAGO

April 3-4, 2008

**Establishment of National Innovation
System**

The Finnish Case

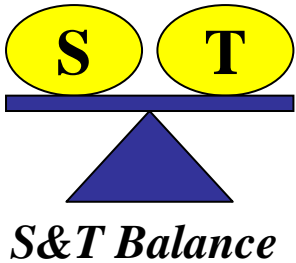
Case Study*

Dr. Heikki Kotilainen

S&T Balance

Deputy Director General, Tekes (ret.)

*Background for ECLAC's project "Private-Public Alliances for Export Development" (2008) in collaboration with the Iberoamerican General Secretariat and Corfo, Chile

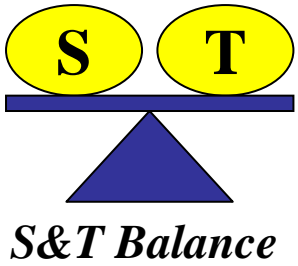


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1. INTRODUCTION
2. THE FINNISH INNOVATION SYSTEM
3. THE SCIENCE AND TECHNOLOGY POLICY COUNCIL
4. THE TECHNOLOGY AGENCY
5. ANNUAL STRATEGY PLANNING AND EXECUTION
6. THE NATIONAL TECHNOLOGY PROGRAMS
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1. INTRODUCTION

Finland in Figures *

Total Area: 338,000 sq km, this makes Finland the seventh largest country in Europe

Neighbouring Countries: Sweden, Norway, Russia, Estonia

Capital: Helsinki

Main Cities & Population: Helsinki (555,000), Espoo (213,000), Tampere (195,000), Vantaa (178,000), Turku (172,000) and Oulu (120,800). Approximately one million people live in the Helsinki Metropolitan Area.

Population: approx. 5,3 million

Population Density: **17 inhabitants** per square kilometre, 62 % of the population lives in towns and cities.

Currency: Euro. Until 2002 markka, also known as the Finnish mark (FIM).

Languages: Finnish (93 %) and Swedish (6 %) are official languages. Sami (Lappish) is the mother tongue of about 1,700 people.

Climate: The climate of Finland is marked by distinctive seasonal variations. Winters are cold and summers relatively warm.

National Legislature: Finland has a unicameral parliament with 200 members.

Finland in the International Community:

Member of EU, UN, OECD and WTO, among others.

Major Exports: Electronic and electrical products, pulp and paper, machinery and equipment, metal products, transport vehicles, timber and wood, chemicals

GDP: \$176.4 billion (2006)

GDP per capita (PPP): **\$33,700 (2006)**

GDP real growth rate: 5.5% (2006)

GDP composition by sector (2006)

Agriculture: 2.7%

Industry: 30.3%

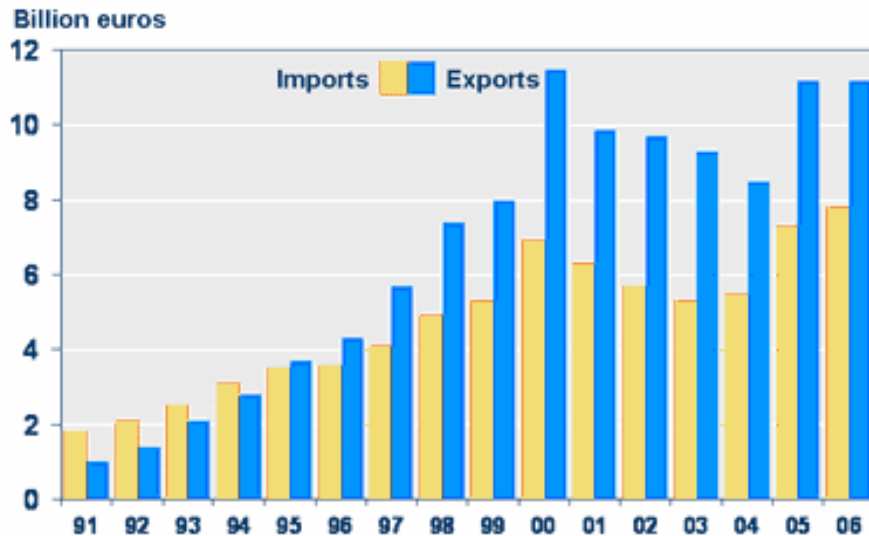
Services: 67%

Unemployment rate: 7% (2006)

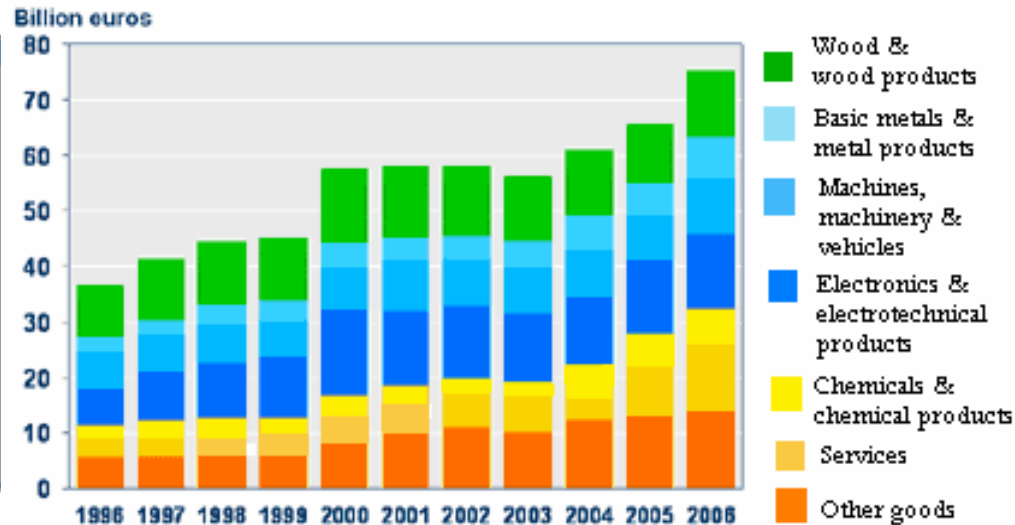


Finnish Trade

Trade in High-Tech products, 1991-2006*



Export by Industry, 1996-2006*



The biggest surpluses in Finland's foreign trade in high technology were recorded in trade with:

- Russia (+ EUR 1.2 billion)
- United Kingdom (+ EUR 600 million)
- Saudi Arabia & United Arab Emirates (both+ EUR 615 million)
- Italy (+ 520 EUR million).

The balance was the most negative for Finland in trade with China (- EUR 1.5 billion).

High technology products accounted for 21.3 per cent of all Finnish exports in 2006

* Source: Tekes, 2006

Competitiveness comparison

Ranking by the science and technology factor

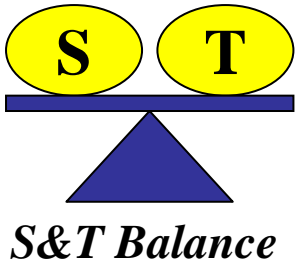
	WEF Technology				UNDP 2001	IMD Technology Science			
	2003	2002	2001	2000		Population over 20 mill. 2003	Population less than 20 mill. 2003	Population over 20 mill. 2003	Population less than 20 mill. 2003
USA	1	1	1	1	2	1	-	1	-
Finland	2	3	3	2	1	-	3	-	6
Taiwan	3	2	4	24	-	6	-	5	-
Sweden	4	4	6	9	3	-	4	-	2
Japan	5	5	23	7	4	9	-	2	-
Switzerland	7	6	24	6	-	-	6	-	3
Denmark	8	11	12	13	-	-	5	-	8
Israel	9	7	26	8	18	-	8	-	11
Estonia	10	14	8	-	-	-	19	-	25
Canada	11	8	2	14	8	2	-	6	-
Norway	13	10	7	29	12	-	10	-	14
Germany	14	12	15	5	11	4	-	3	-
UK	16	15	10	17	7	8	-	7	-
Australia	19	9	5	23	9	3	-	9	-

Sources: The World Competitiveness Yearbook (IMD), The Global Competitiveness Report (WEF)

And Human Development report (UNDP)

DM 36054

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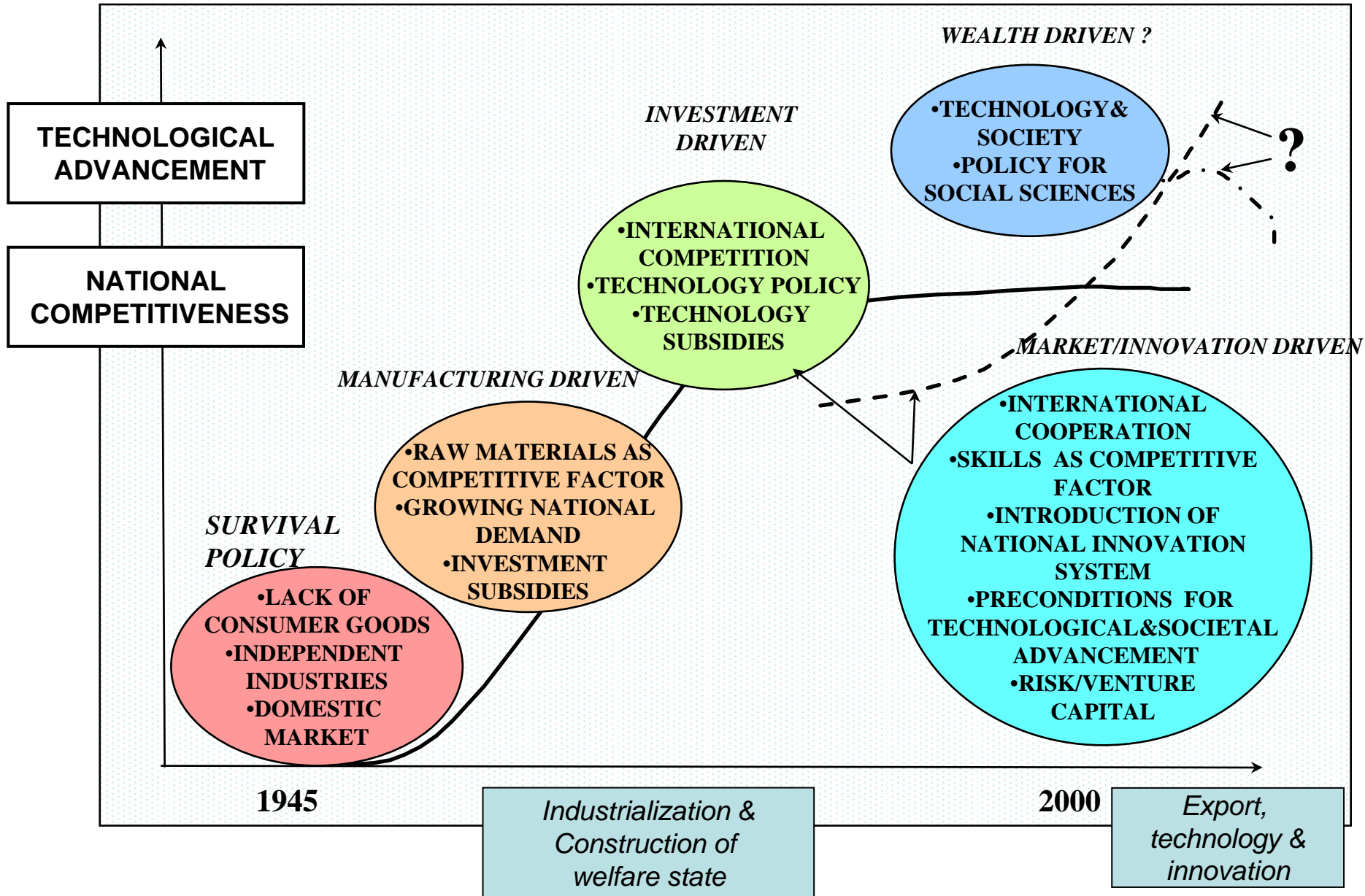
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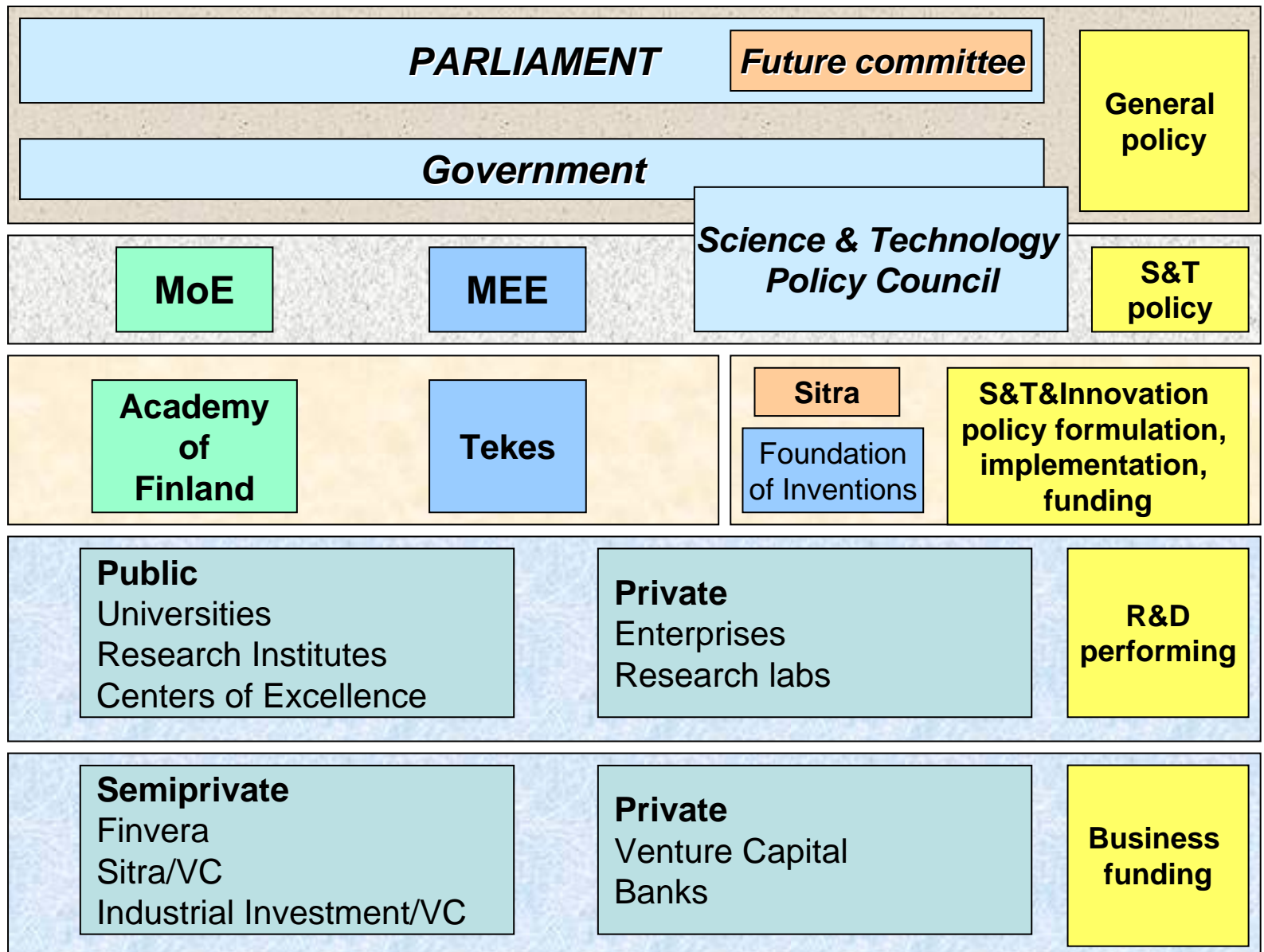
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2. THE FINNISH INNOVATION SYSTEM

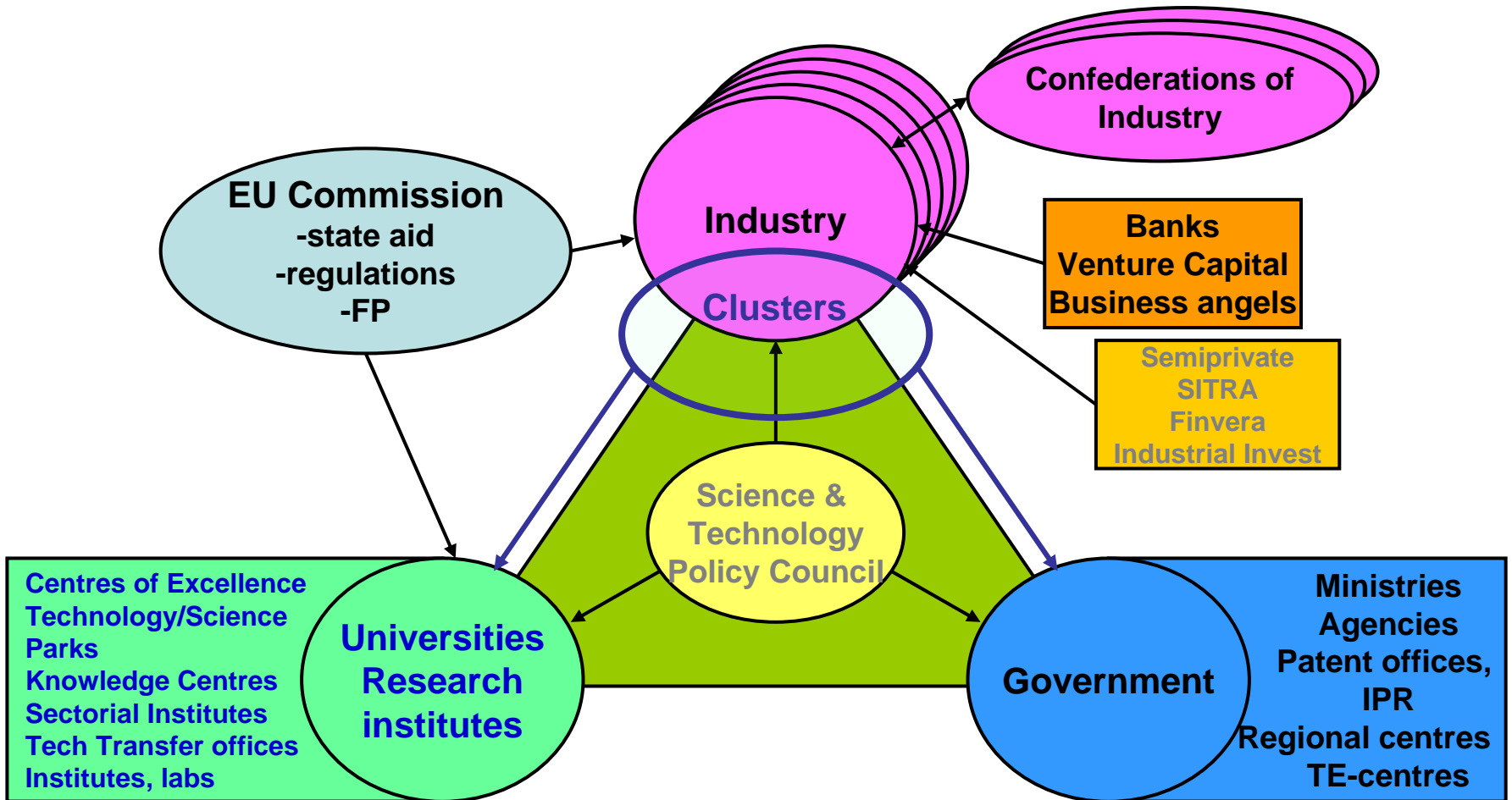
THE POLICY DEVELOPMENTS IN FINLAND



Tasks in the Finnish Innovation System



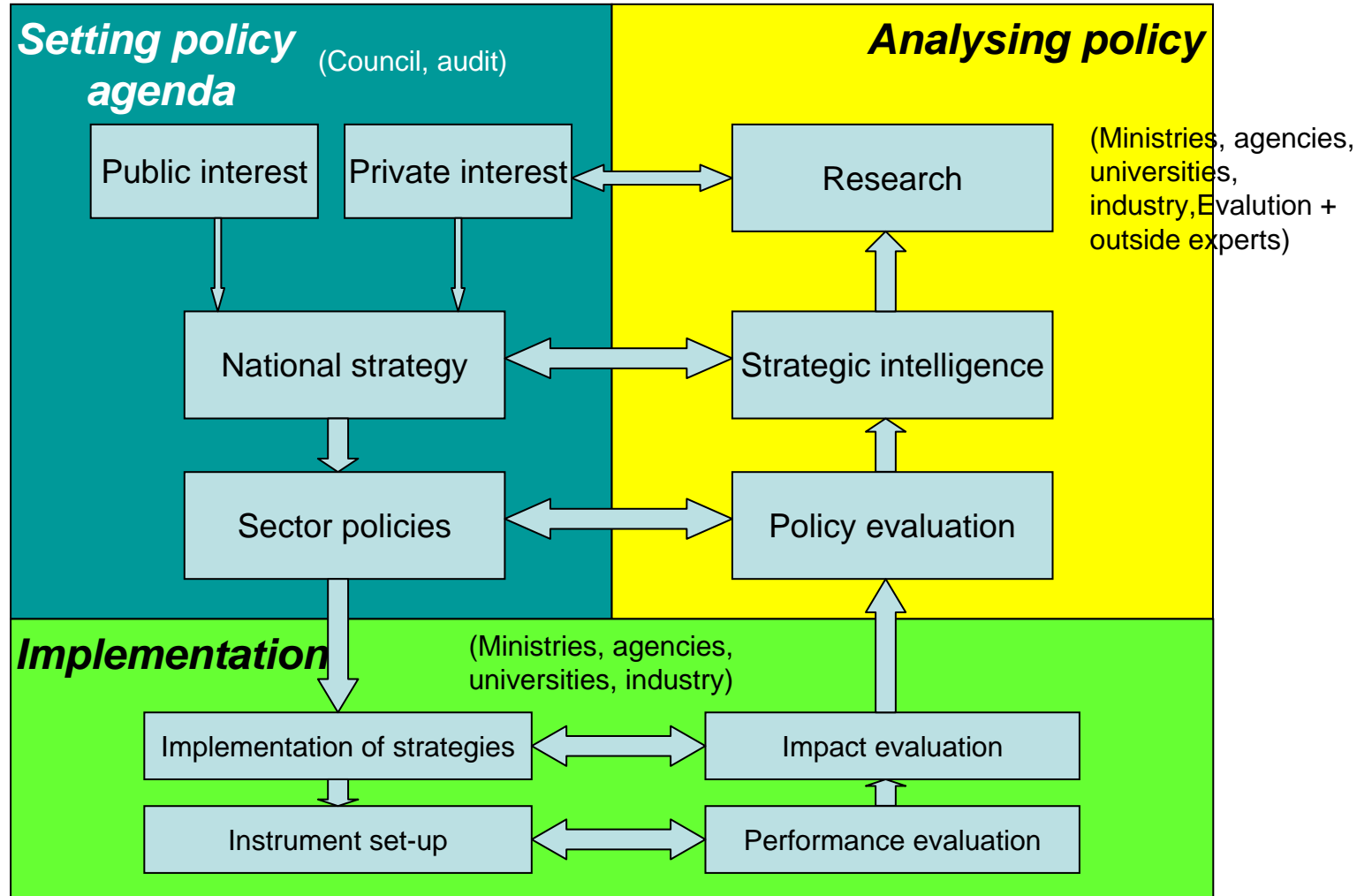
The Triple Helix



Guidelines and Prerequisites for Establishing Innovation Policy

- **Main target: High return of R&D investment**
 - **Do not copy – no directly adaptable features**
- **Environment is dynamic – create a continuous process**
- **Consider methodology – not single tasks. Single tasks can serve as concrete examples for the creation of process/methodology**
- **Iterative process- questions & answers – solutions**
 - **Statistical data**
 - **Auditing the innovation infrastructure**

Circulation of innovation policy



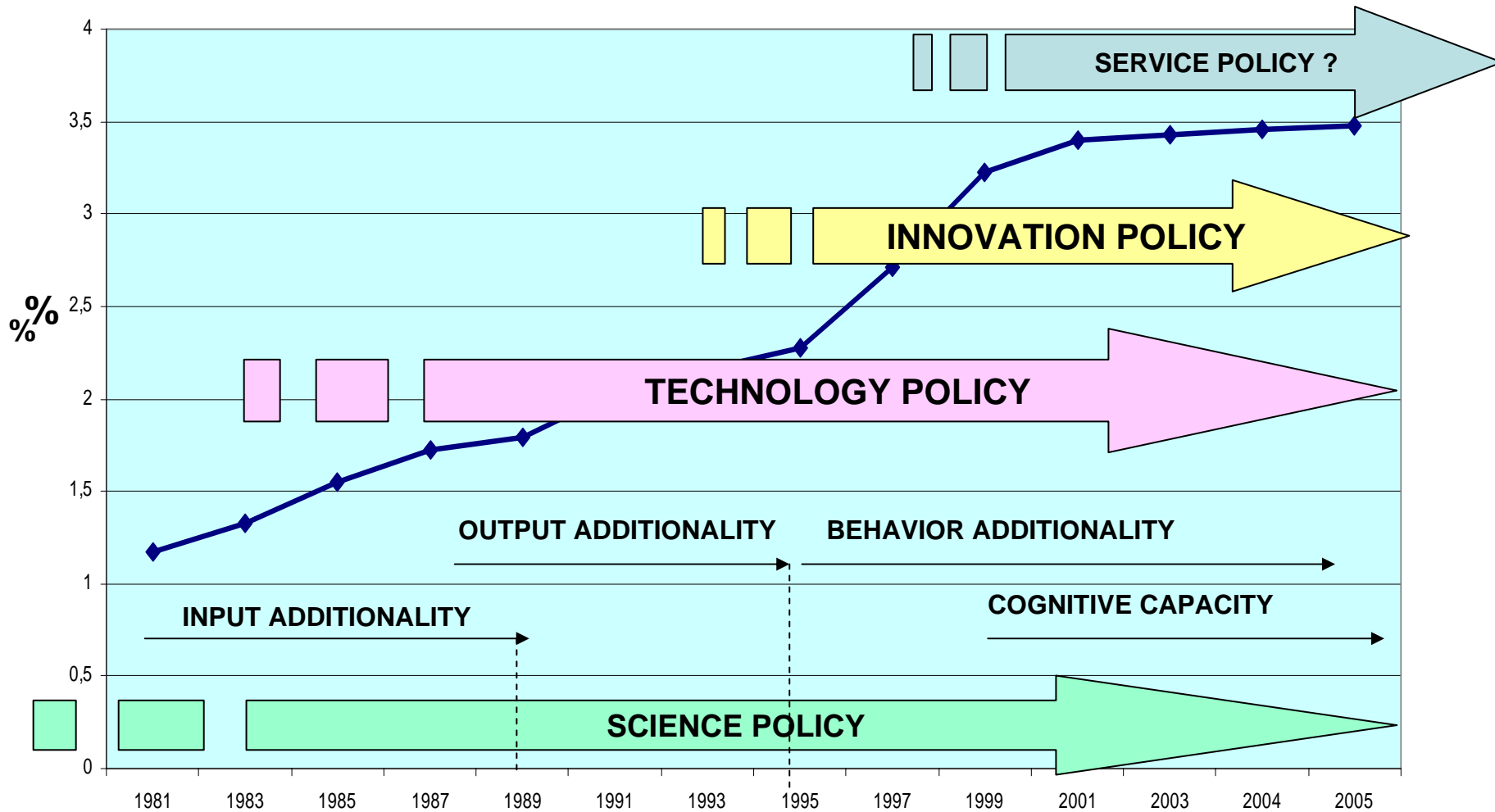
Source: Tekes

Public funding of R&D and additionality

DEFINITION OF ADDITIONALITY	BASIS FOR PUBLIC ACTIONS	MEASURE TARGET	MEASURE
INPUT ADDITIONALITY	<ul style="list-style-type: none"> • MARKET FAILURE 	What is the influence of public funding on R&D input of companies?	The amount of R&D input of a company
OUTPUT ADDITIONALITY	<ul style="list-style-type: none"> • MARKET FAILURE 	What is the influence of public funding on the results and output of companies?	Increase of output on project level Increase of revenues on company level
BEHAVIORAL ADDITIONALITY	<ul style="list-style-type: none"> • FAILURES AT SYSTEM LEVEL AND LEARNING 	What is the influence of public funding on the behavior and actions of companies?	Soft measures like changes of networking and strategies
COGNITIVE CAPACITY	<ul style="list-style-type: none"> • FAILURES AT SYSTEM LEVEL AND LEARNING 	What is the influence of public funding on the growth of skills and understanding of companies?	Soft measures like improvement of skills as a consequence of public funding

R&D/GDP in Finland

R&D/GDP



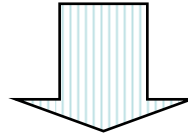
Prerequisites for administration involvement in R&D

- **Business and research understanding**
- **Genuine interest in facilitating development**
 - **Trust by industrial community**
 - **Trust by research community**
- **Money and funding opportunities**

BALANCE BETWEEN THE SCIENCE, TECHNOLOGY AND SOCIAL DEVELOPMENT

MAINTAIN CLEAR NATIONAL FOCUS

*NATIONAL
POLICY*

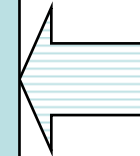


National Authorities

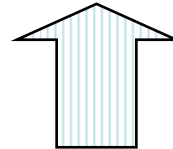
*ADAPTING TO
CUSTOMERS
(The Business
Community, Society)*



*PROACTIVE
VISION
(Science and University
Community, Society)*



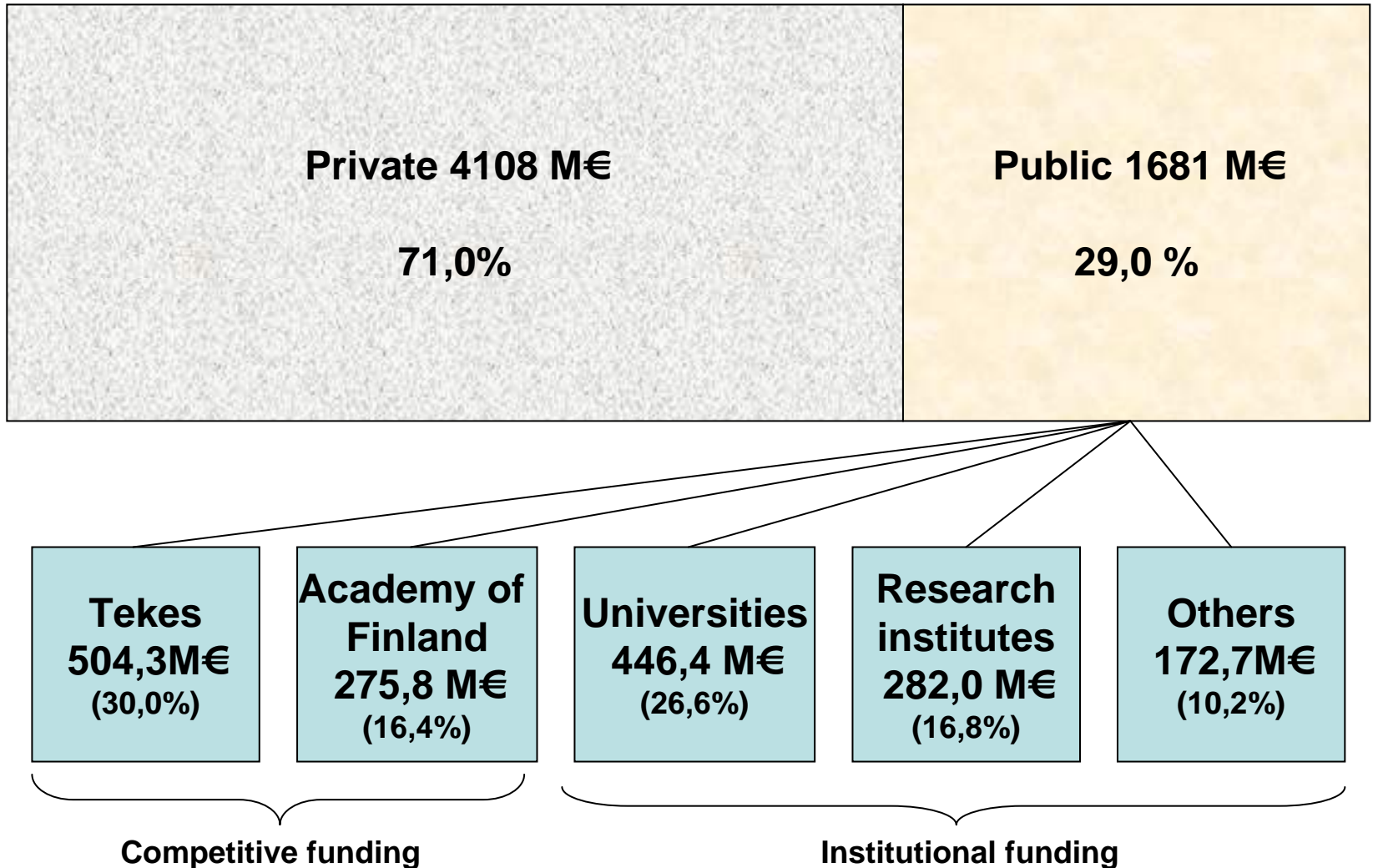
*BOTTOM-UP
REQUESTS*



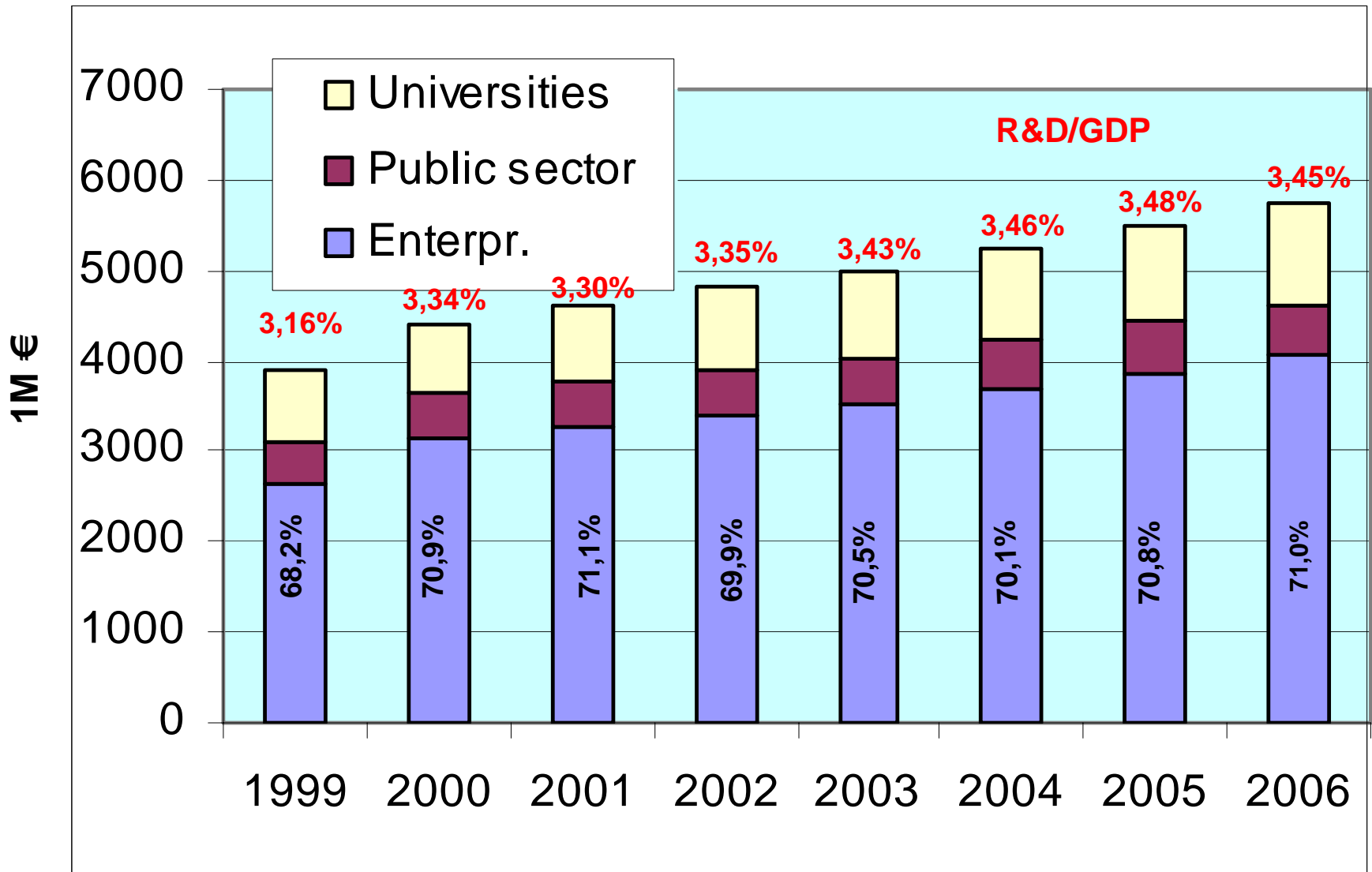
MANAGE KEY DEMANDS

R&D Expenditures in Finland 2006

5789 M€; 3,45%/GDP



R&D investments of public and private sectors 1999-2006 in Finland

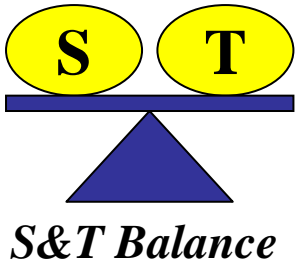


Source: Statistics Finland

Unique features of Finnish innovation system

Simultaneous implementation of following issues:

- **Genuine and voluntary cooperation within Triple Helix**
- **High degree of consensus and implementation**
- **Funding simultaneously universities, research institutes and industry to couple basic, applied research to development**
- **High degree of freedom for decision making**
- **In-house assessment of projects (Tekes)**
- **System for national technology programmes**
- **Genuine, holistic and simple system (few actors: Tekes, Academy)**
- **Clear share of labour: Tekes for applied research and development
The Academy for basic research)**



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3. THE SCIENCE AND TECHNOLOGY POLICY COUNCIL

SCIENCE AND TECHNOLOGY POLICY COUNCIL STPC

Tasks

The remit of the Council shall be to assist the Government and its ministries by:

- following international developments in research and technology and the development needs they cause in Finnish research and technology
- addressing major matters relating to science and technology policy and preparing plans and proposals concerning them for the Government;
- addressing the overall development of scientific research and researcher training;
- addressing the development and utilisation of technology and technology impact analysis;
- addressing important matters relating to international science and technology cooperation;
- addressing the development and allocation of public research and innovation funding;
- addressing important legislative questions concerning research, technology and scientific education; and
- taking initiatives and putting forward proposals in matters within its remit to the Government and its ministries.

SCIENCE AND TECHNOLOGY POLICY COUNCIL OF FINLAND

STRUCTURE **Council**

The Science and Technology Policy Council is chaired by the Prime Minister.

The membership consists of the Minister of Education and Science, the Minister of Trade and Industry, the Minister of Finance, and 0-4 other ministers appointed by the Council of State.

In addition to them the membership includes ten other members well versed in science and technology.

These members must include representatives of the Academy of Finland, the National Technology Agency of Finland, universities and industry as well as employers' and employees' organisations.

The Council of State appoints the members for the term of the Parliament.

Subcommittees

The Council has a science policy subcommittee and a technology policy subcommittee with preparatory tasks. These are chaired by the Minister of Education and Science and by the Minister of Trade and Industry, respectively.

Secretariat

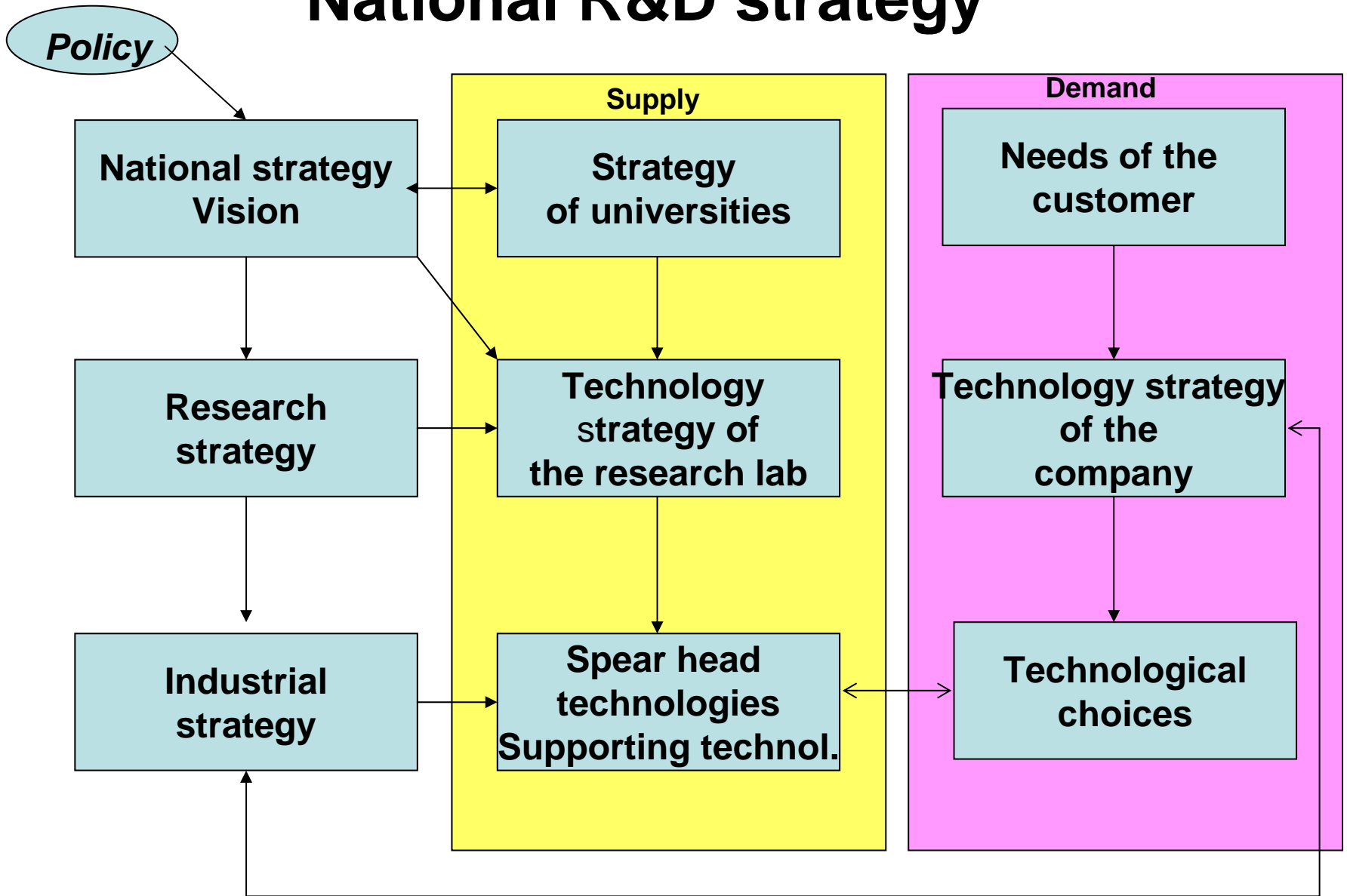
The Council's Secretariat consists of one full-time Secretary General and two full-time Chief Planning Officers. They are appointed for four-year term.

The clerical tasks are taken care of at the Ministry of Education.

Recommendations of the Science and Technology Policy Council of Finland relating to research and innovation funding

other euros	Research funding, million euros		Increase in funding, million	
	2002	increase	2007	2007
<u>Universities</u>				
- research funding	375	45	420	
- other increase in basic funding				105
<u>Funding organisations</u>				
- Academy of Finland	185	70	255	
- National Technology Agency	400	120	520	
<u>Other research funding</u>				
- research institutes	235	40	275	
- ministries	205	25	230	
<u>Total</u>				
- research funding	1400	300	1700	
- other funding				105
<u>Increase, total</u>	300	+	105 =	405

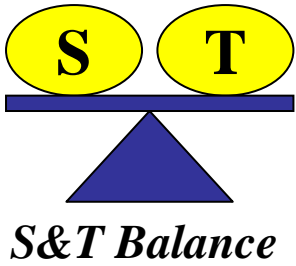
National R&D strategy



Foundations for an Effective R&D Policy

Charles W. Wessner
National Academies of Science, US

- **Understanding the Innovation Process**
 - Avoid the Myth of Linear Innovation
- **Developing a Positive Policy Framework**
 - Regulatory Policy
 - Motivating Entrepreneurship
- **Intermediating Institutions to Foster Innovation**
 - Role of Public-Private Partnerships



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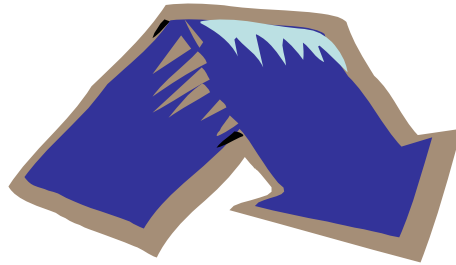
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4. THE TECHNOLOGY AGENCY

The Main Factors of Operations by the National Innovation Agency

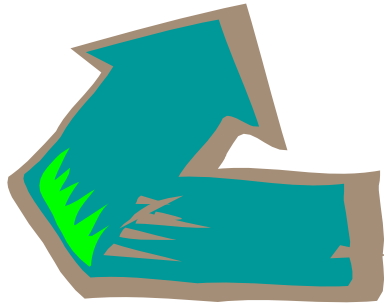
- **Speed and Efficacy
(concurrent development)**
- **Trust (independent, (de)centralized
decision making)**
- **Expertise/competence
(human resources)**

INNOVATION



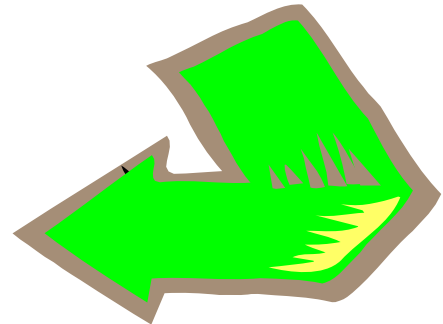
KNOWLEDGE

BUSINESS



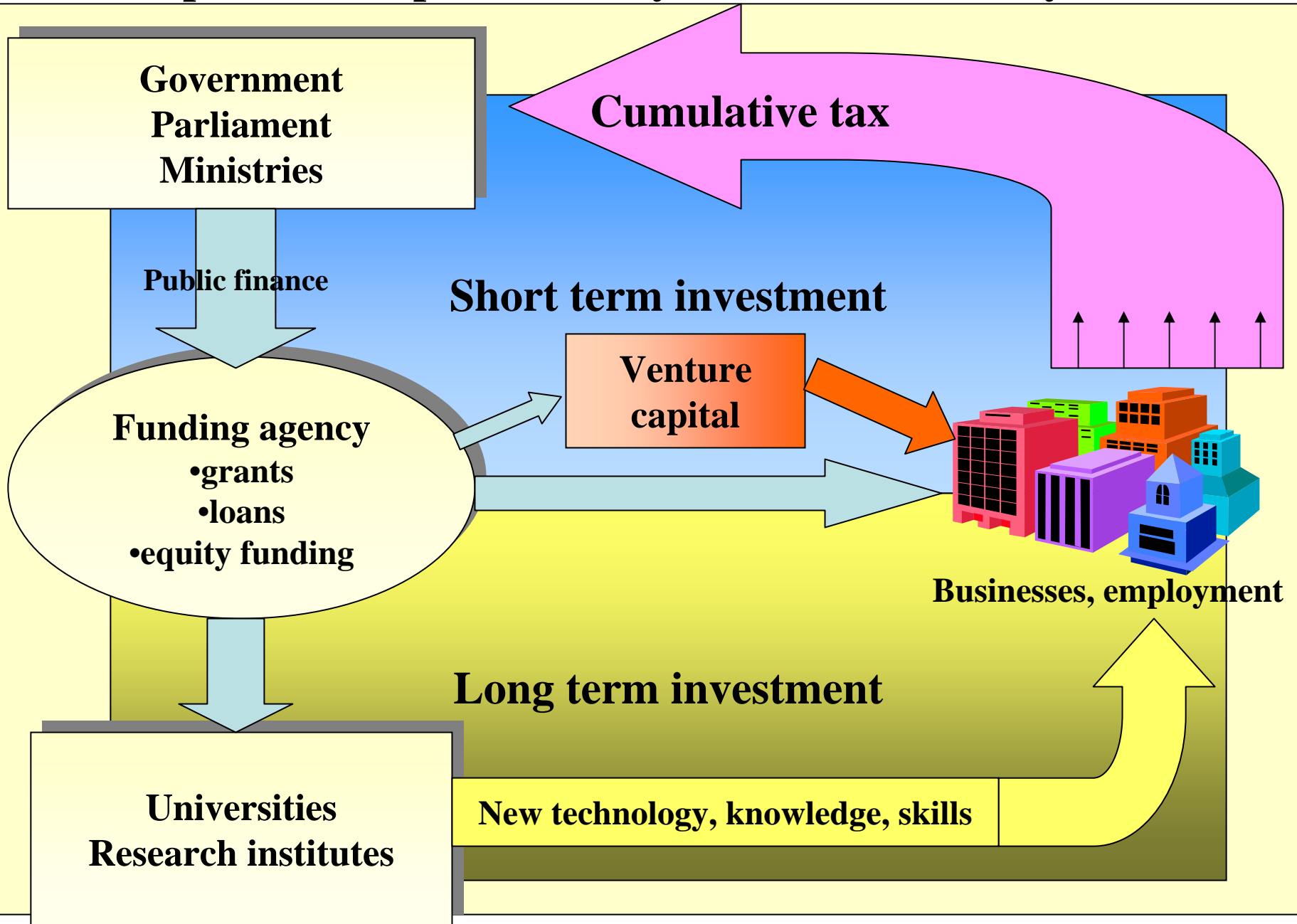
RESEARCH

MONEY

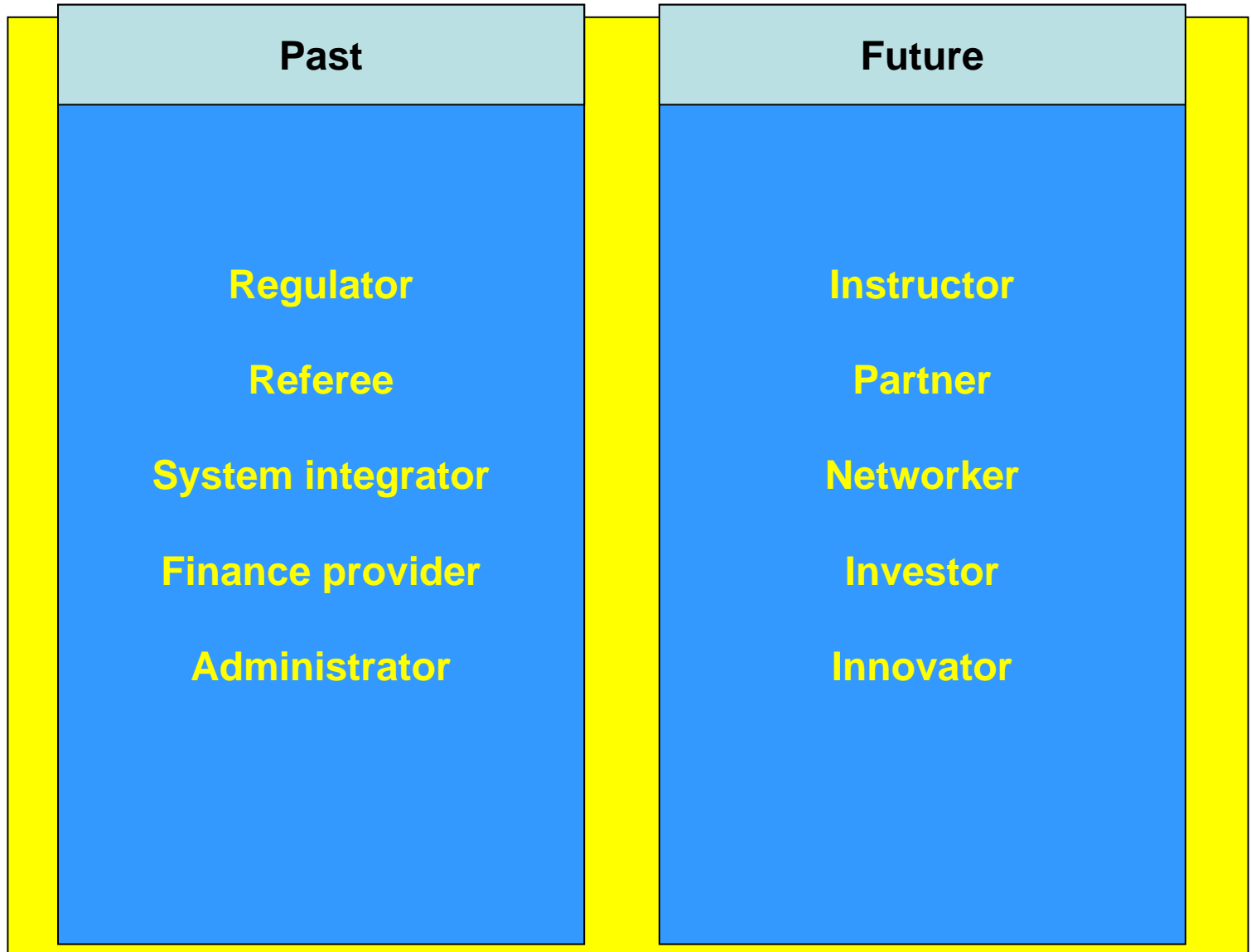


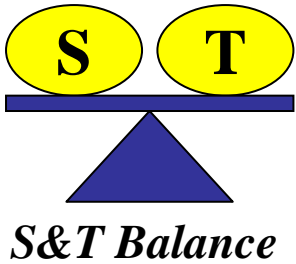
MARKET

Multiplication of public money in the innovation system



Changing Role of the Innovation Agency





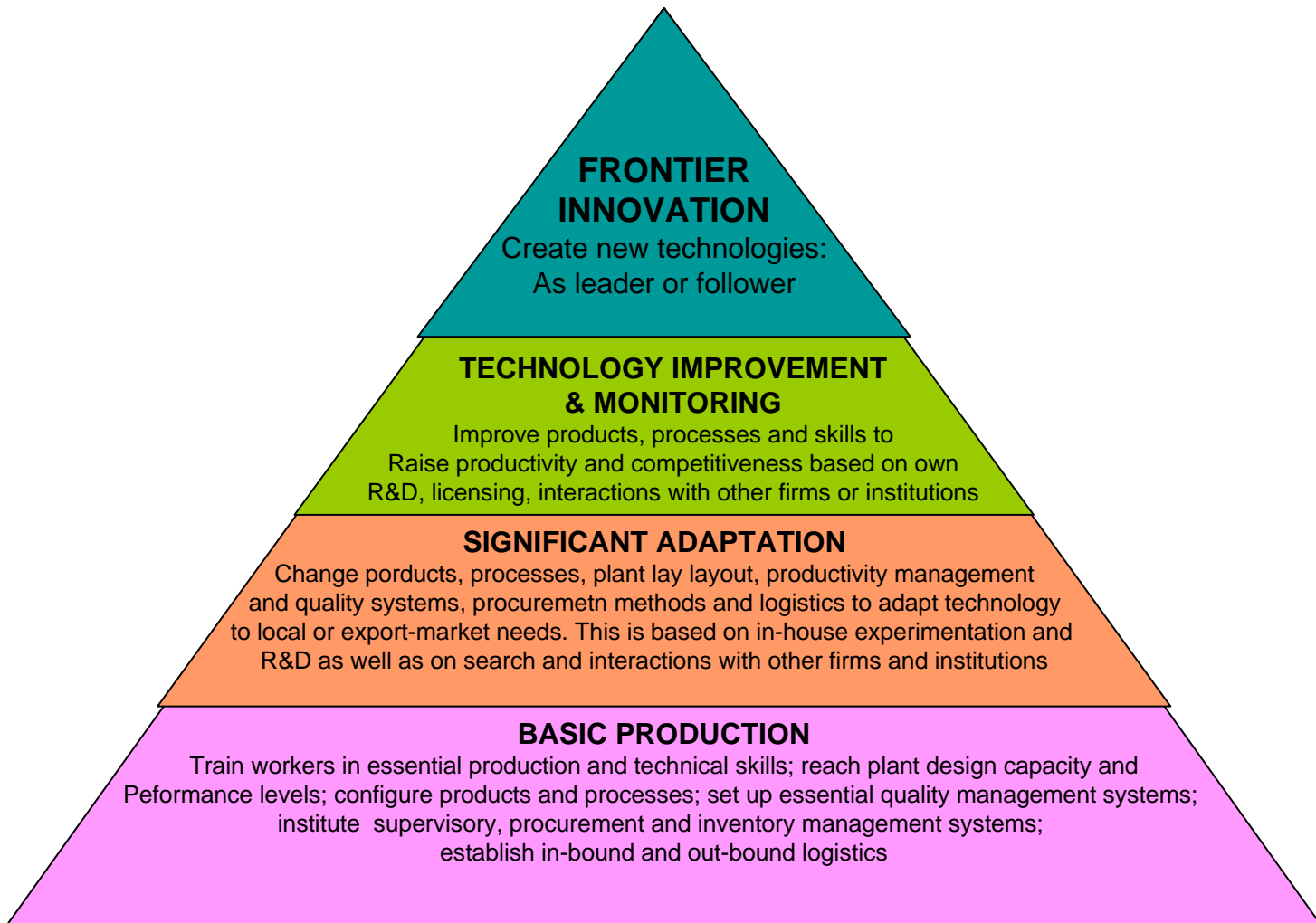
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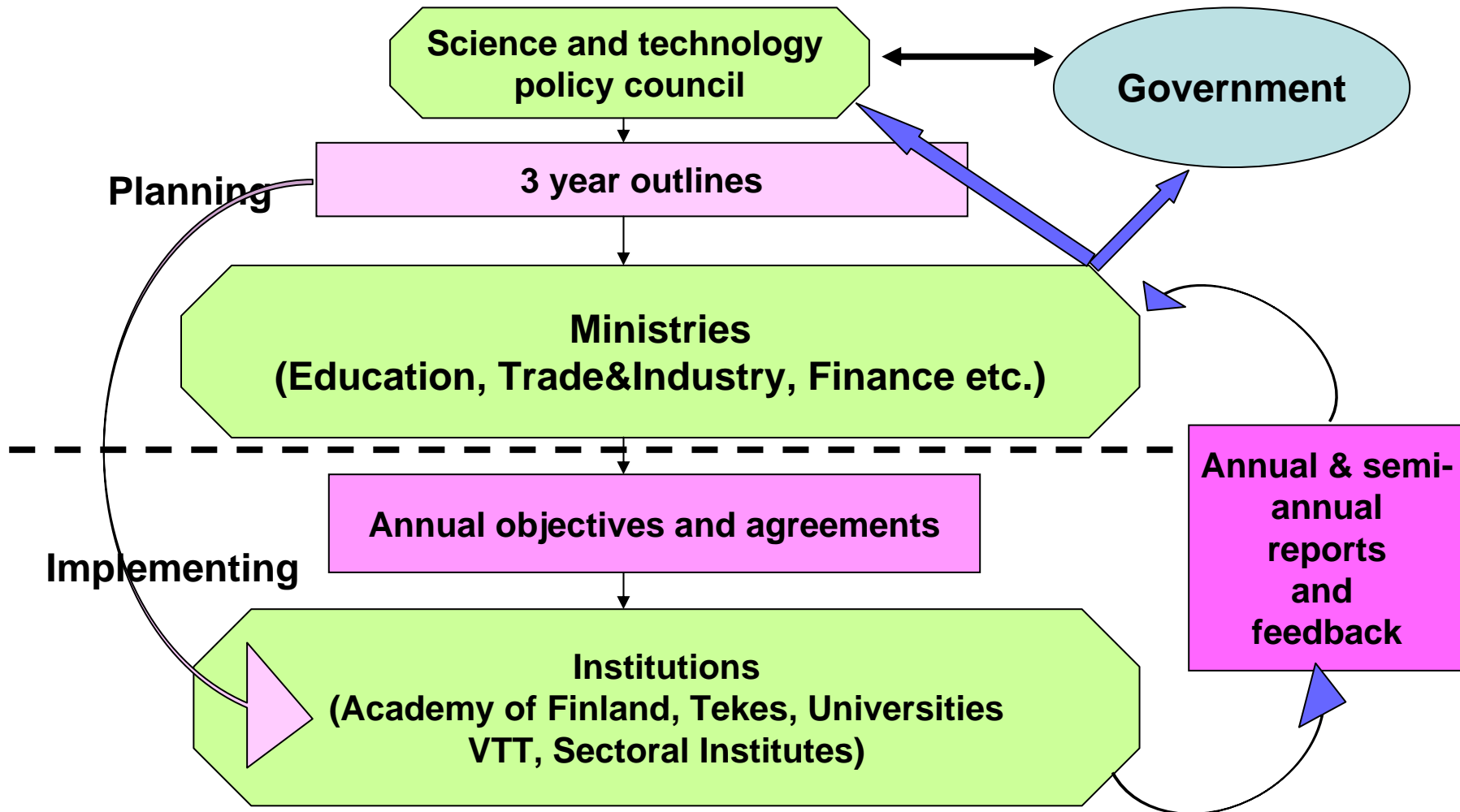
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5. ANNUAL STRATEGY PLANNING AND EXECUTION

Stages of Technology Development by Innovation Effort



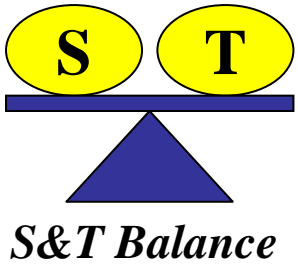
Planning and implementing of technology and innovation policy



Tekes targets and measurement

(Example)

The national skills' base guaranteed by qualified R&D work	
TARGET	MEASURE
The qualified R&D work performed by increased number enterprises and research insitutions increases in Finland. Through this development the national base of knowledge in central sectors of society and clusters will be strengthened.	<ul style="list-style-type: none">•R&D expenditures of GDP•Number of R&D performing enterprises•R&D financing•The shares of private and public financing of R&D•The needs for skills•R&D personnel per 1000 employed•The share of R&D personnel of all employed•Personnel employed by high and medium technology enterprises, share of total employed•Personnel employed by high technology services, share of total employed



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6. THE TECHNOLOGY PROGRAMS

THE GENERAL OBJECTIVES OF THE NATIONAL TECHNOLOGY PROGRAMMES

- To promote the industrial competitiveness to keep up with the global market change
- To give input to the industrial innovation process
- To create new knowledge to fulfil the needs of research, Industry and society
- To create the critical mass and centres of excellence in important technological areas
- To enhance the co-operation between industry and universities and research institution
- To promote international co-operation
- To support research education and to educate internationally oriented research managers
- To enhance the research and high-tech image of the country

Types of national technology programmes

1. **National technology programmes or research initiated programmes**

(technology push); The objective is to strengthen the technological base of research and industry and to enhance the prerequisites of industrial competitiveness. The programmes of this type are oriented towards the development of a single technology

2. **Programmes for the individual sectors of the industry (market pull)**

The objective is to solve a common or typical problem of an industrial sector or to develop new methods, processes and to strengthen technological base of the industry.

3. **Company or corporate grouping concentrated programmes**

The objective is to solve a long term problem, which is not yet product oriented or to develop manufacturing methods, process or technologies according to the technology strategy of the company

4. **Technology implementing programmes (market demand)**

The objective is to diffuse and apply existing (e.g. developed in other programmes) technologies to a group of SME industries

5. **Industrial cluster programmes (market or society pull)**

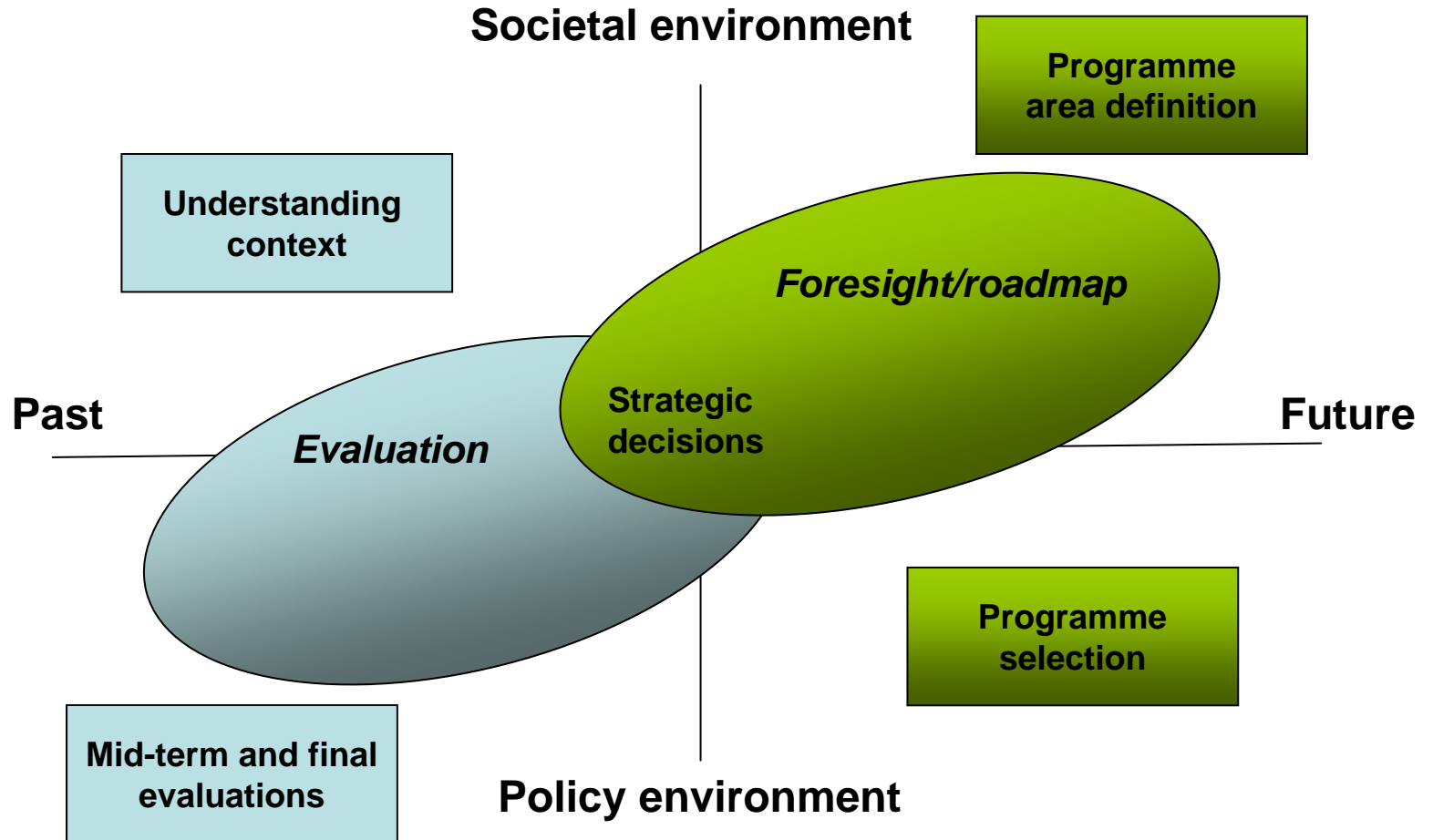
The objective is to develop the skills and multidisciplinary technologies as well as business opportunities of a large entity i.e. clusters

Large cross-disciplinary programmes in non-technological (environment, energy etc.) areas should be part of each national programme.

Technology programmes in innovation system



Technology Programme Selection and Evaluation

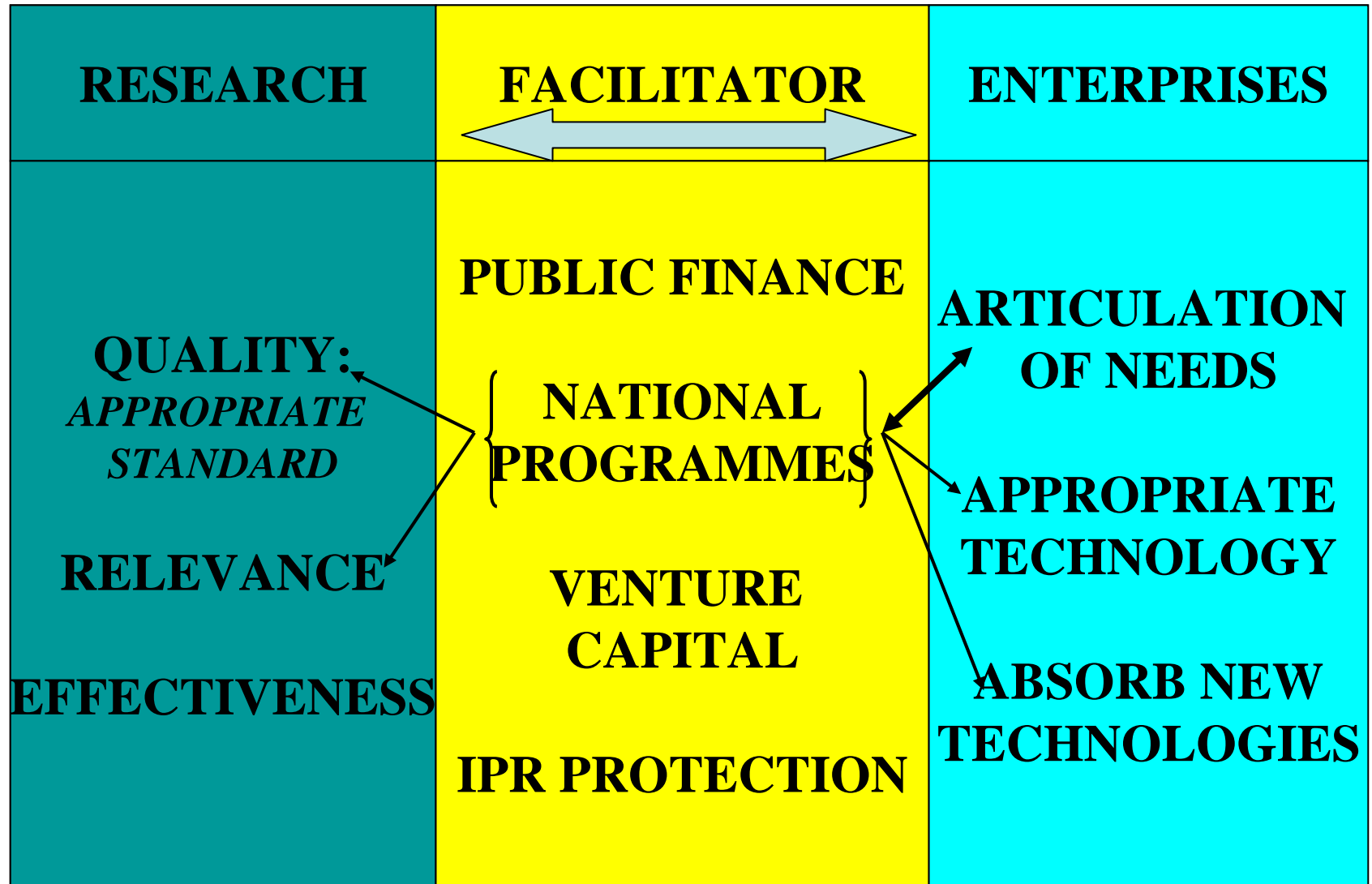


PRIORITIES OF THE INNOVATION SYSTEM

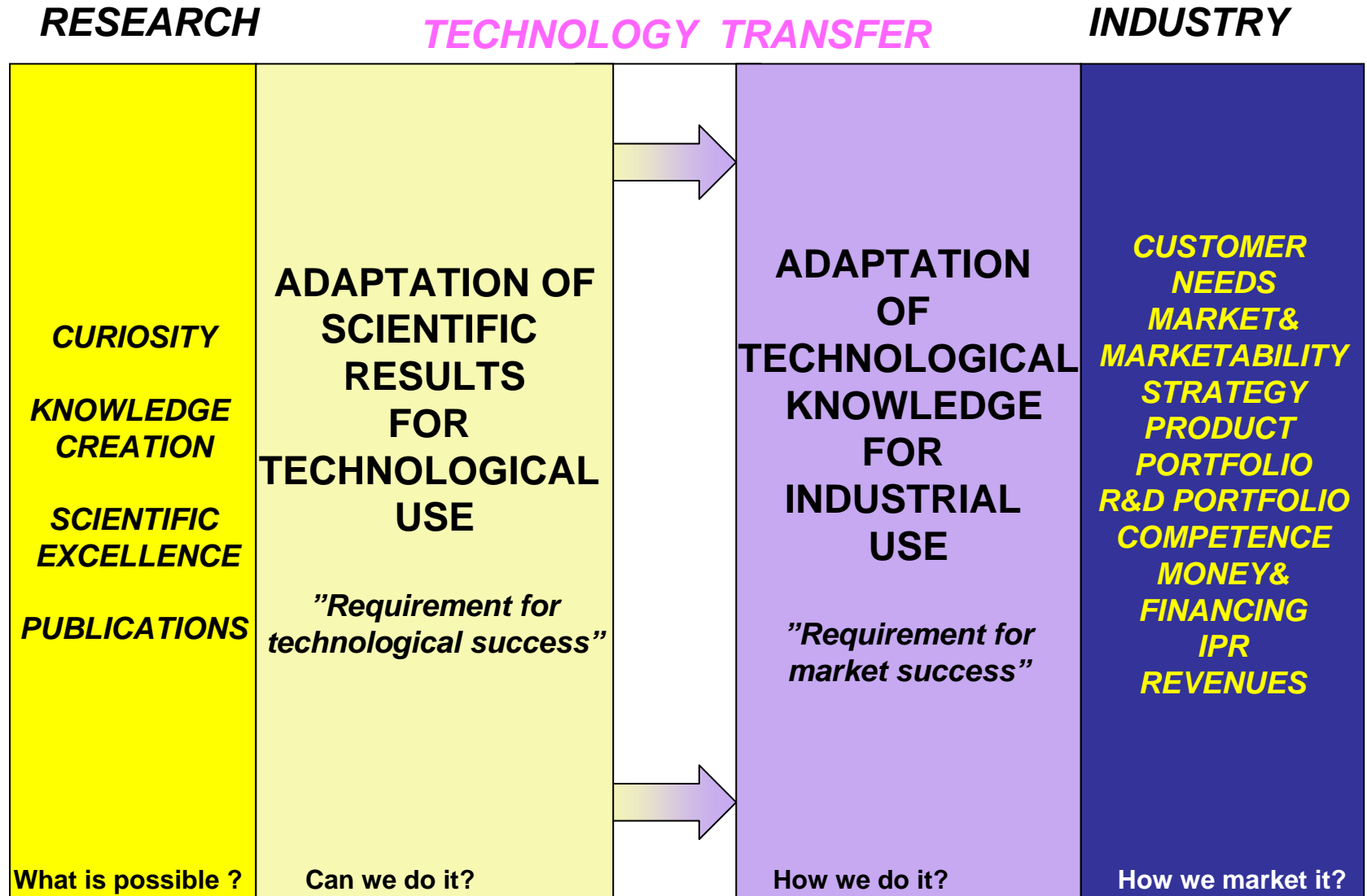
Case: Finland

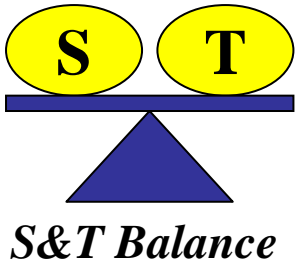
SUPPLY

DEMAND



PROCESS CHARACTER OF TECHNOLOGY TRANSFER





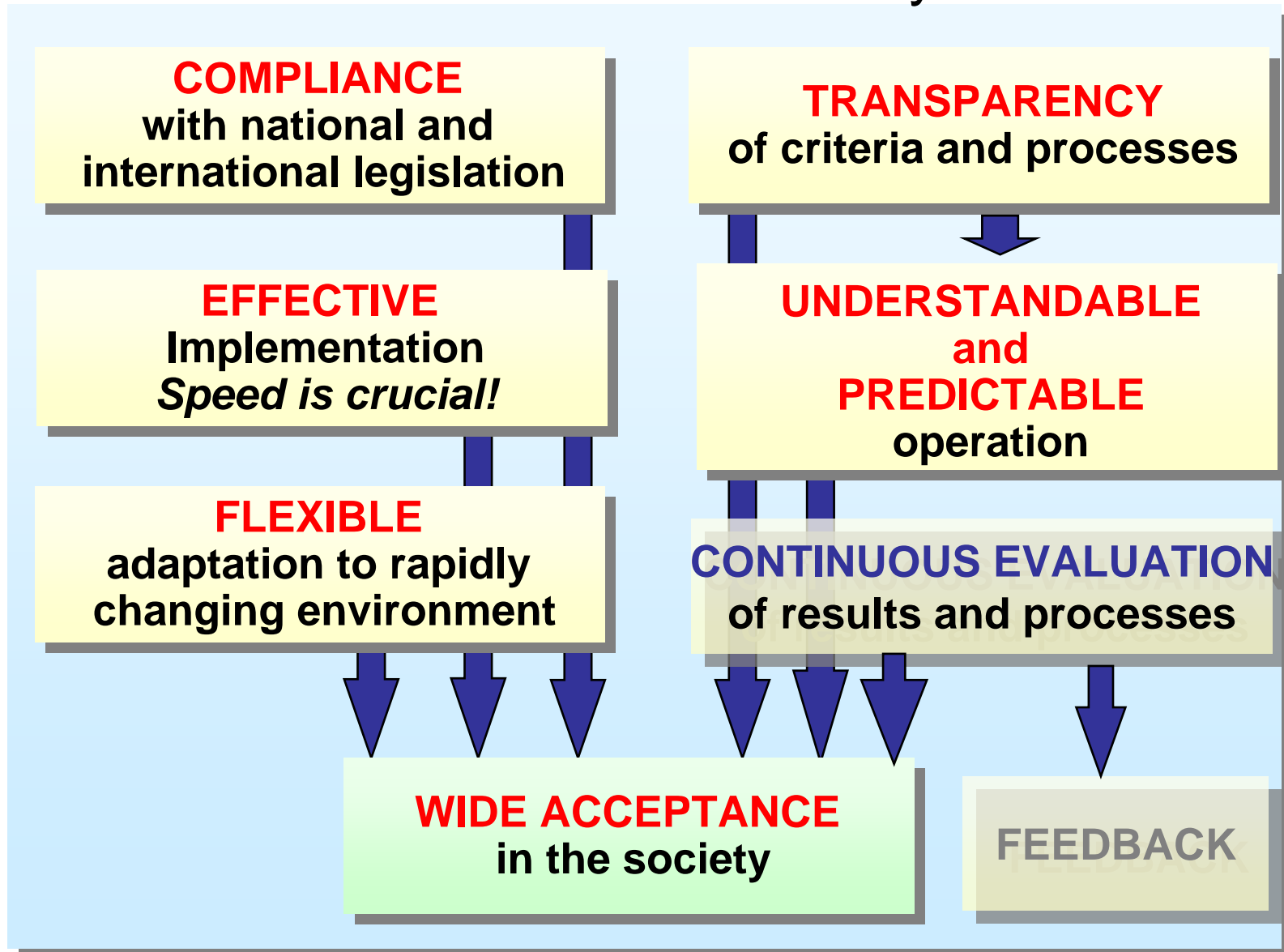
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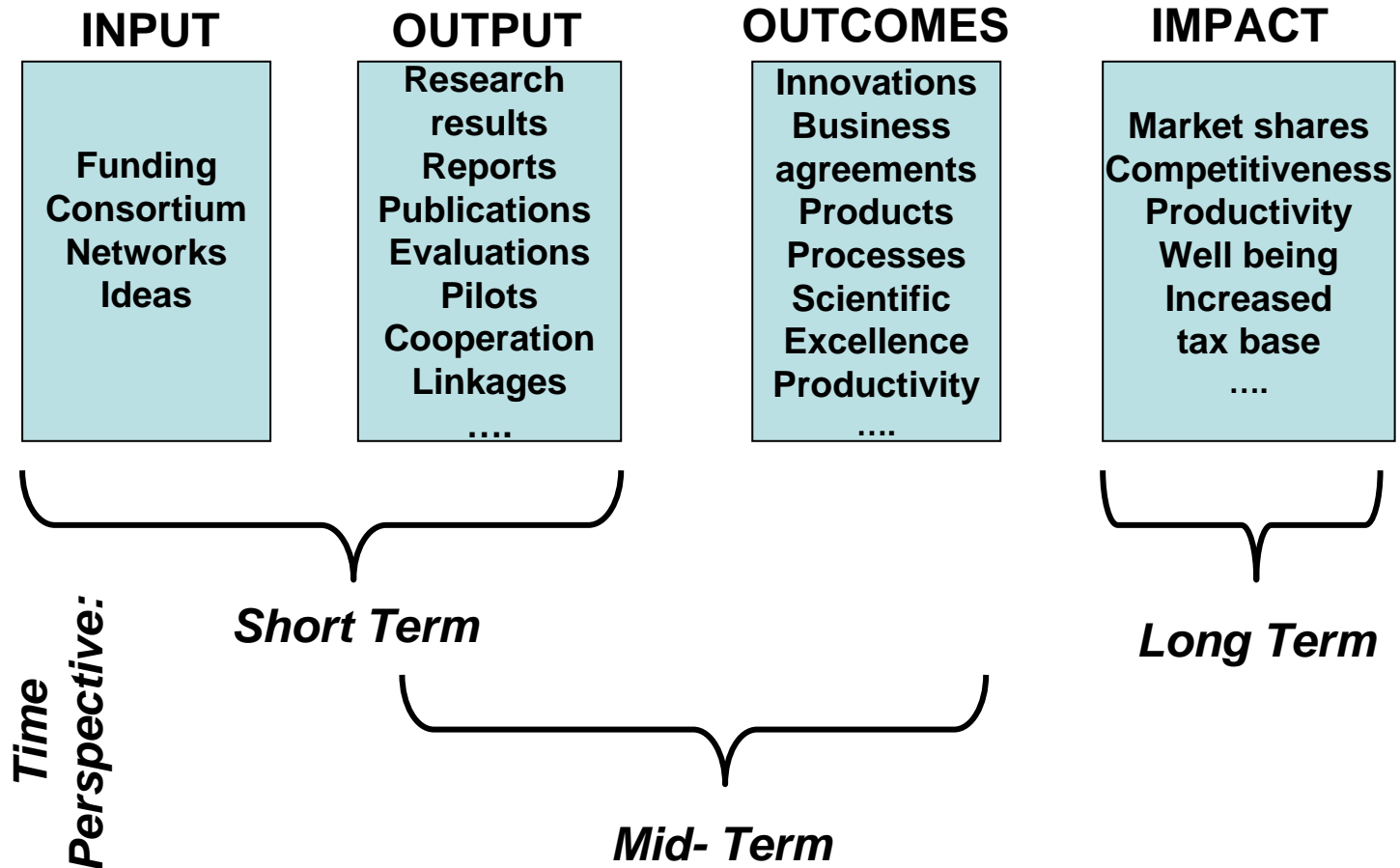
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7. THE EVALUATION

Acceptability of State Aid and Other Incentives in the Society



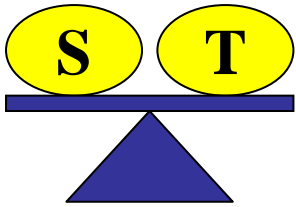
Evaluation Schemes



Allocate 3-5% of the project budget for evaluation

Conclusions Regarding a National Programme Evaluation Process

- **Secure the transparency of the criteria**
- **Secure the clarity of criteria**
- **Secure the calibration of criteria application**
- **Implement a wide use of ICT**
- **Problems in the initial phase of evaluation will cumulate at the end**
- **Keep the objectives of the call clear**
- **Keep monitoring and evaluation separate**
- **Monitoring and ex post evaluation should be carried out by neutral parties**
- **Ex ante evaluation and the financial decisions should be linked**
- **Participation in international projects should be evaluated and monitored like the national ones keeping in mind the national benefits, objectives and demands**
- **Cost effectiveness should not be forgotten**



S&T Balance

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8. CONCLUSIONS

Strengths of the Finnish innovation environment

Consensus on opportunities: knowledge

- Education, research, development, **implementation**

Consideration & Balance

- Goals: economy – environment – wellbeing
- Funding targets: basic – applied – industrial research – development
- Funding instruments: **competitive funding** – co-funding -budget funding

Co-operation – networking

- Universities – enterprises (partnerships)
- Large companies – sme's (**strategic partnerships**)
- **Regional – national – international** cooperation between actors in the innovation system
- Integration of technology foresight, public research funding and industrial r&d funding
- Instruments and incentives, **proactive approach**
- **Government – business** transparent interaction

Trust

- Incorruptibility; mentality (*KISS +start small*)
- Strategic partnerships
- Straight budget lines, **delegation of power to decide**
- **Independent role of funding agencies** (Tekes, Academy)

Lessons learned from the Finnish Case

- **Invest in people**
- **Consistency in policies**
- **Clear national strategy i.e. right choices**
- **Long term investments in R&D; Government as facilitator and investor**
- **Co-operation within the "triple helix"**
- **Strong national agencies with freedom to act and implement the policies**
- **Balanced development of basic research and industrial R&D**
- **Continuous evaluation of the organizations, operations and programmes and quick feedback to decision makers**
- **Benchmark the best performers, don't copy any of them**

Thank you for your kind attention!

S&T Balance

