資料3

Assessing Research and Innovation Policies and their Impact

Presentation to CSTP

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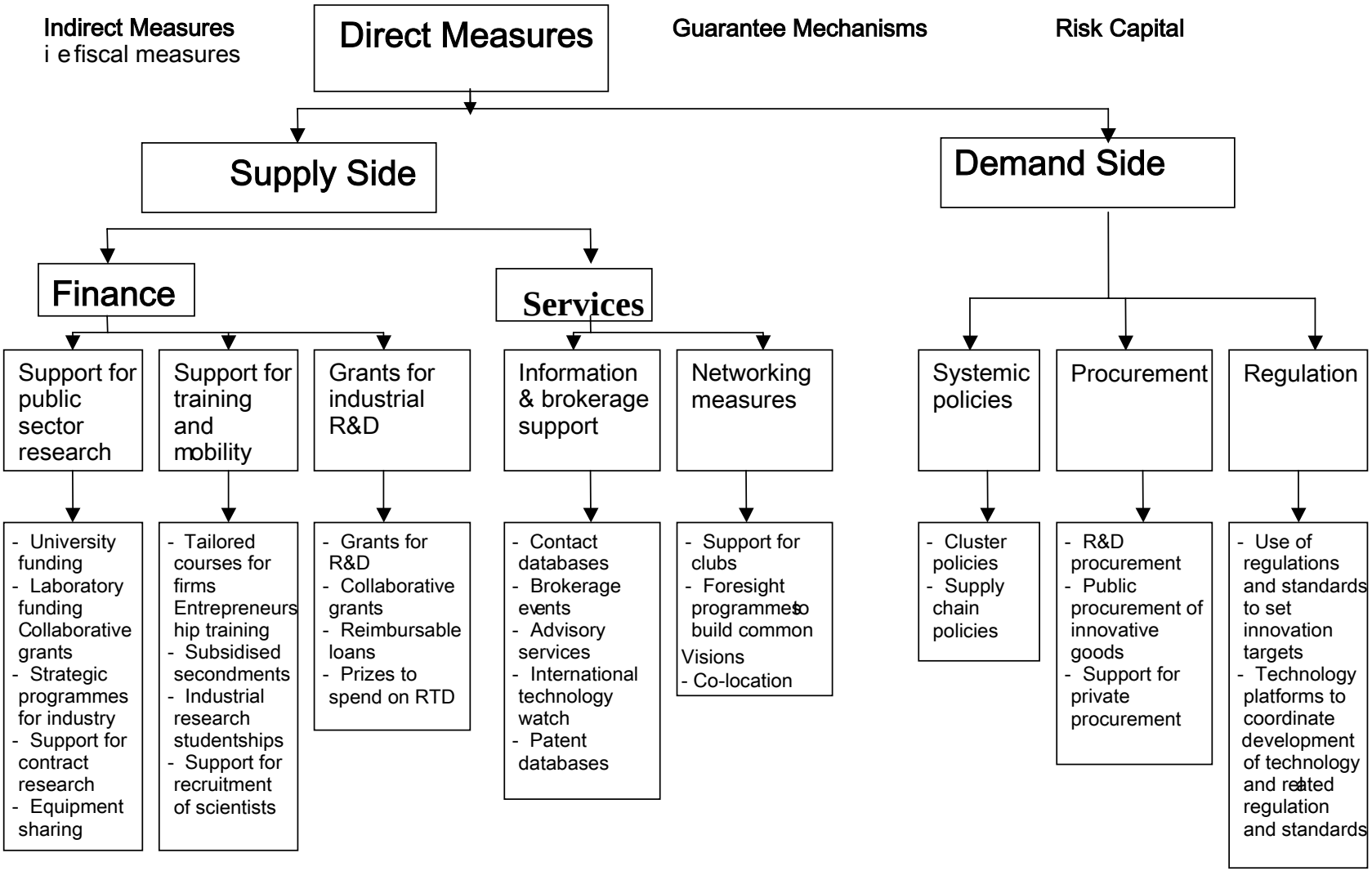
Purpose of evaluating at national level

- Systems of innovation perspective draws attention to institutions and connections within a geographical or sectoral space
- Questions then arise about potential gaps and bottlenecks, opportunities for learning
- Increasing realisation that research and innovation policies are interactive and may reinforce or inhibit each other



Framework conditions: Science base - Contract research - Human resources - IPR - State Aid Regulations

Source: Georghiou et al Improving the Effectiveness of Direct Measures to Stimulate R&D, European Commission 2003

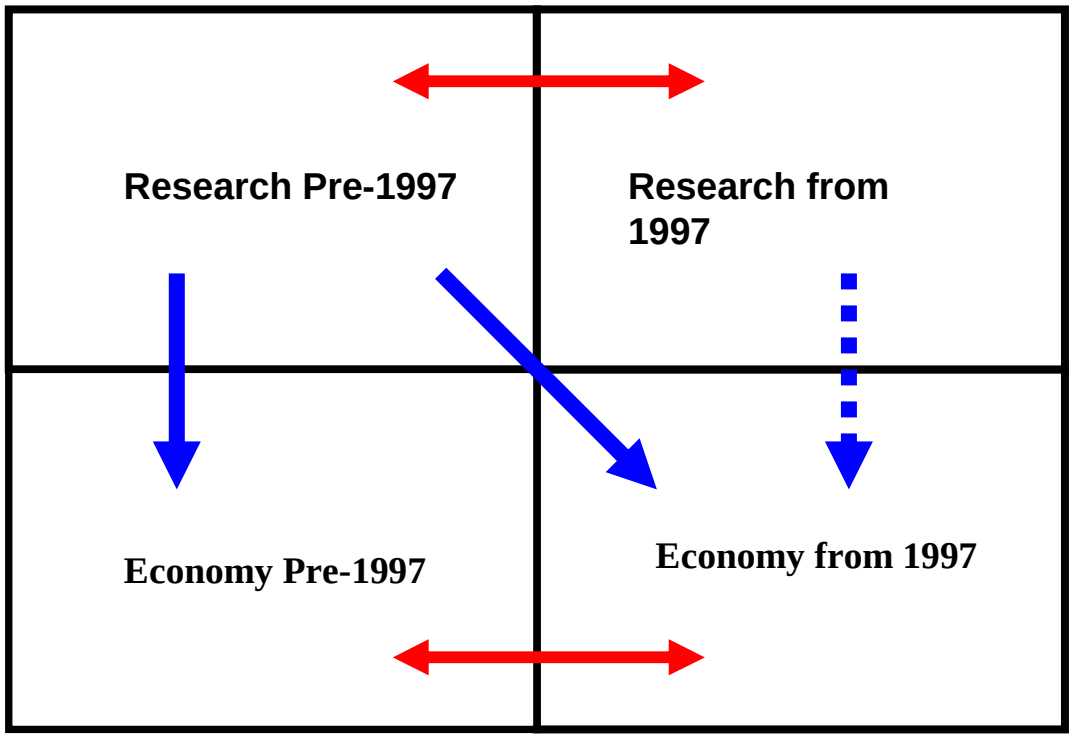
Case study 1: Evaluations of Finnish System

1. Assessment of the Additional Appropriation for Research
2. Evaluation of the Implementation Infrastructure for Finnish Innovation Policy

Case 1.1 Assessment of the additional appropriation for research

- In 1996 Government of Finland decided to increase R&D spending by 25% from 1997-1999
- Independent outside group asked jointly by Minister of Trade and Industry and Minister of Education to evaluate the use of the funds and the effects
- Panel of 7
  - 5 senior Finnish members representing industry, trade union and academia
  - 2 foreign experts

Conceptual framework to deal with timing problem



Effects Measured

Effects Inferred

Comparisons

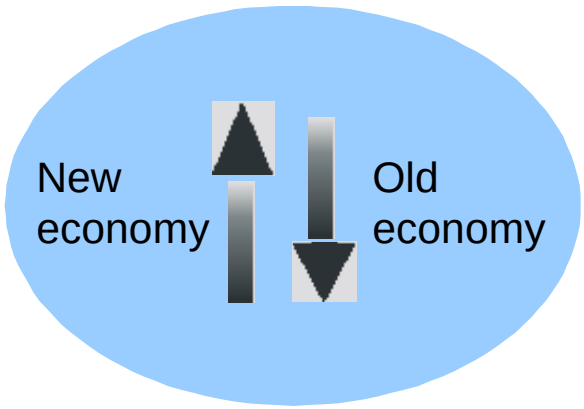
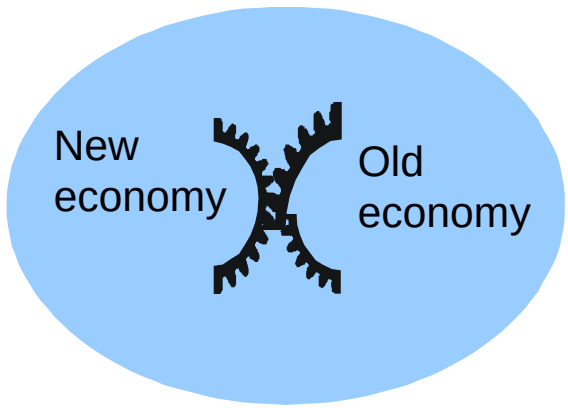
Seven supporting studies commissioned by panel

1. Review of past evaluations of programmes & institutions
2. Economic evaluation of cluster programmes
3. Bibliometric study of Finnish science
4. Panel data study on effect of public R&D funding on profitability & growth performance of firms
5. Econometric study of effects on productivity and job creation
6. Econometric study of regional impacts of R&D & public R&D funding
7. Questionnaire and interviews to firms supported by National Technology Agency

Interviews and hearings by Panel

- Evaluation took place over 2 year period
- Panel conducted extensive hearings with ministry heads, financiers, universities and research institutes
- Supported by informal advisory body

Example of recommendation (1)

	SUBSTITUTION	INTEGRATION
STRUCTURAL		+ 
POLICY	High-Tech markets and sectors	Modernisation, Further Development of existing markets and traditional strengths

Impact of evaluation

- Final Report presented to high level audience including two cabinet ministers and personal copy delivered to Prime Minister
- Significant media coverage
- Government decided to extend additional funding for two years
- Innovation agencies launching programmes on socially based innovation

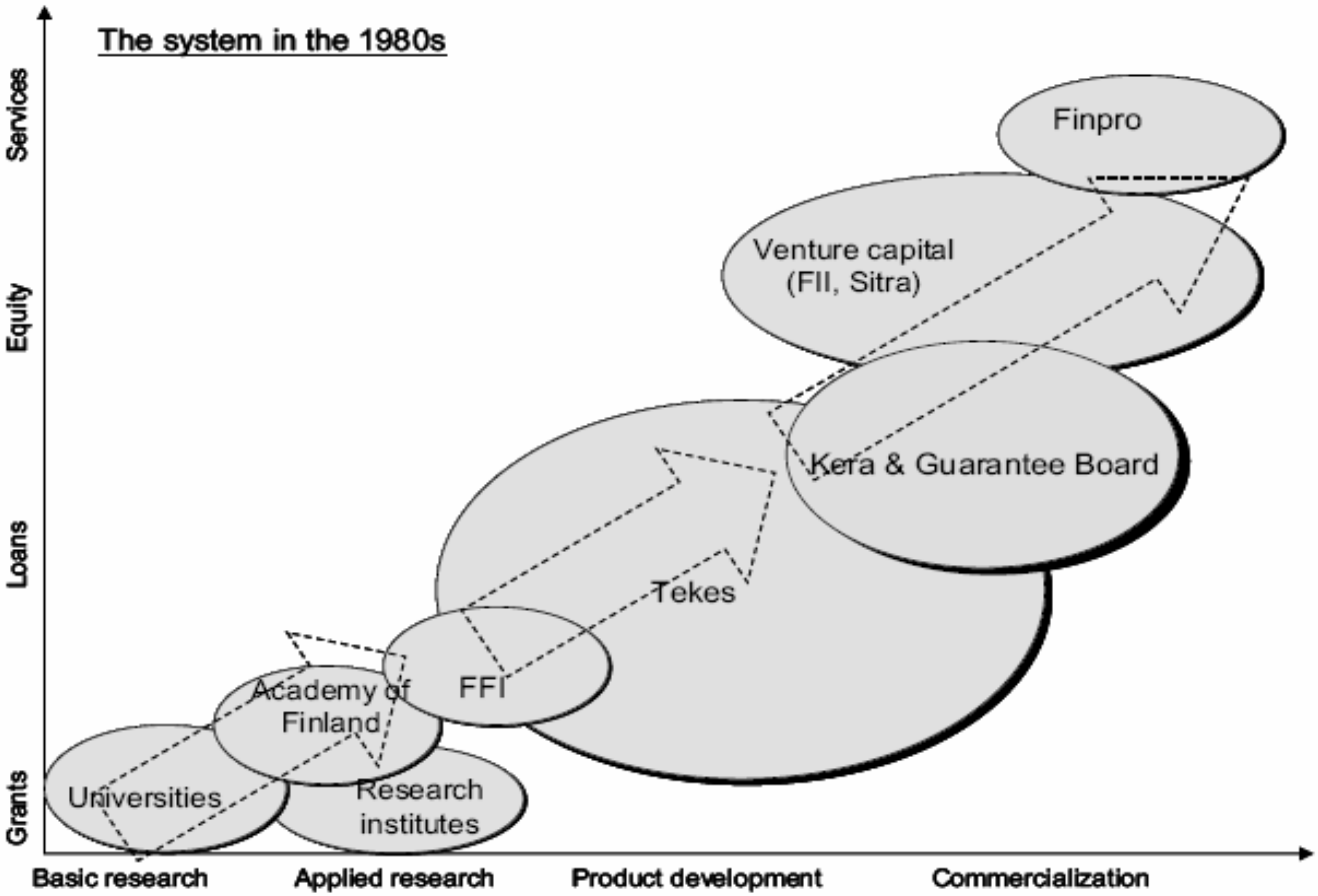
Case 1.2 Evaluation of the Implementation Infrastructure for Finnish Innovation Policy

- June 2002 Ministry of Trade and IndustryI commissioned the evaluation to draw conclusions from the wide but scattered knowledge concerning FIS
  - Focus on structural issues, especially the policy implementation infrastructure (agencies and their networks and the policy instruments applied)
  - Evaluation Team: Luke Georghiou (PREST), Keith Smith (UNU/Intech), Otto Toivanen (HSE), and Pekka Ylä-Anttila (ETLA)
  - Support team formed by key stakeholders

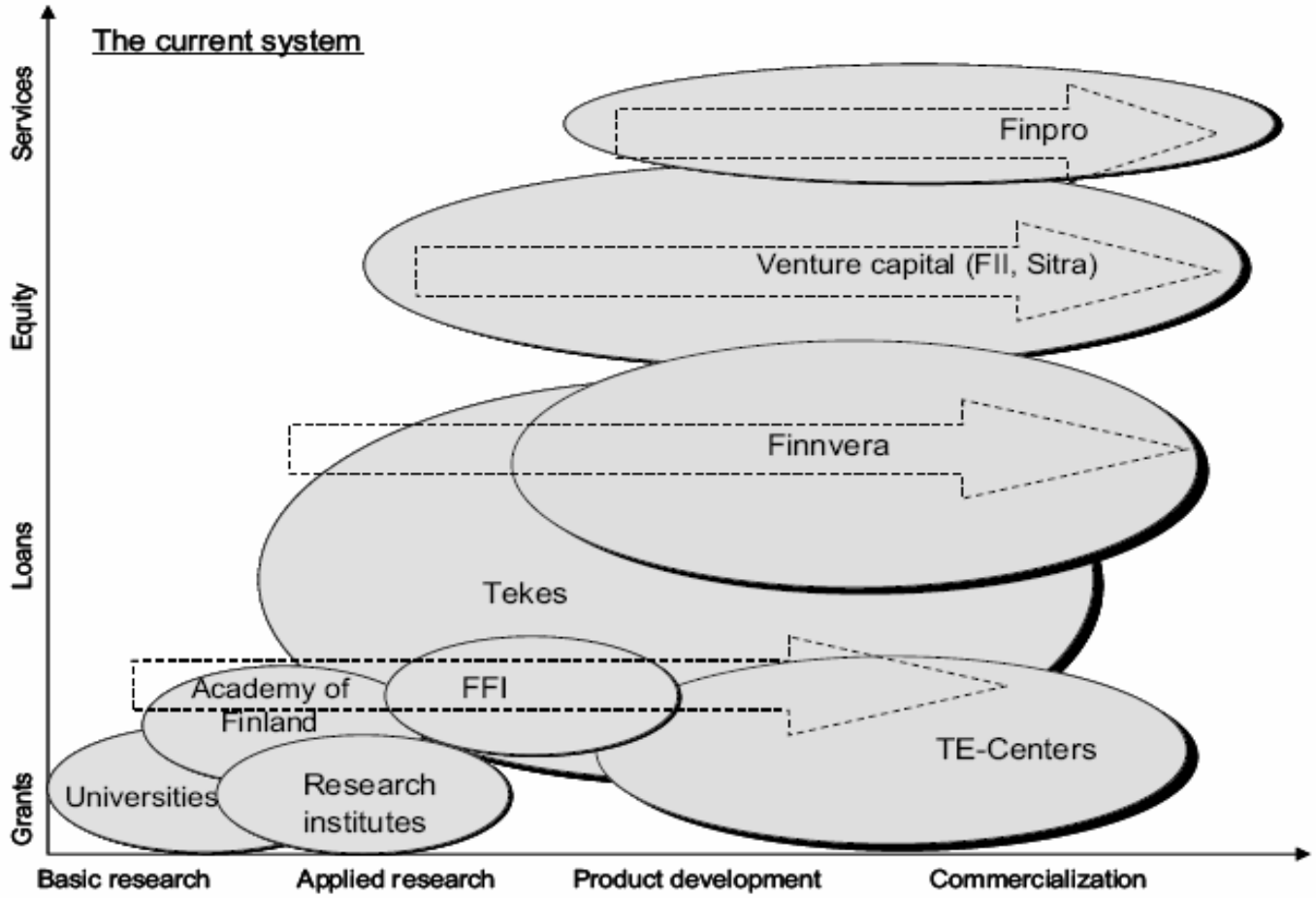
How can innovation policies be evaluated - three basic questions

- Are there market (or system) failures that are not covered by existing policies - and, *can* they be identified?
  - Are there deficiencies that hold back innovation and growth?
  - Are there (identified) problems that markets can not solve?
- Has the policy maker *competence & ability* to solve or mitigate the problem?
  - Can it, in general, be solved by public intervention?
  - Should the policy makers improve their competencies to solve the problem?
- What specific measures should policy makers take to solve or mitigate the problem?
  - Why does the problem exist? What are the basic reasons?

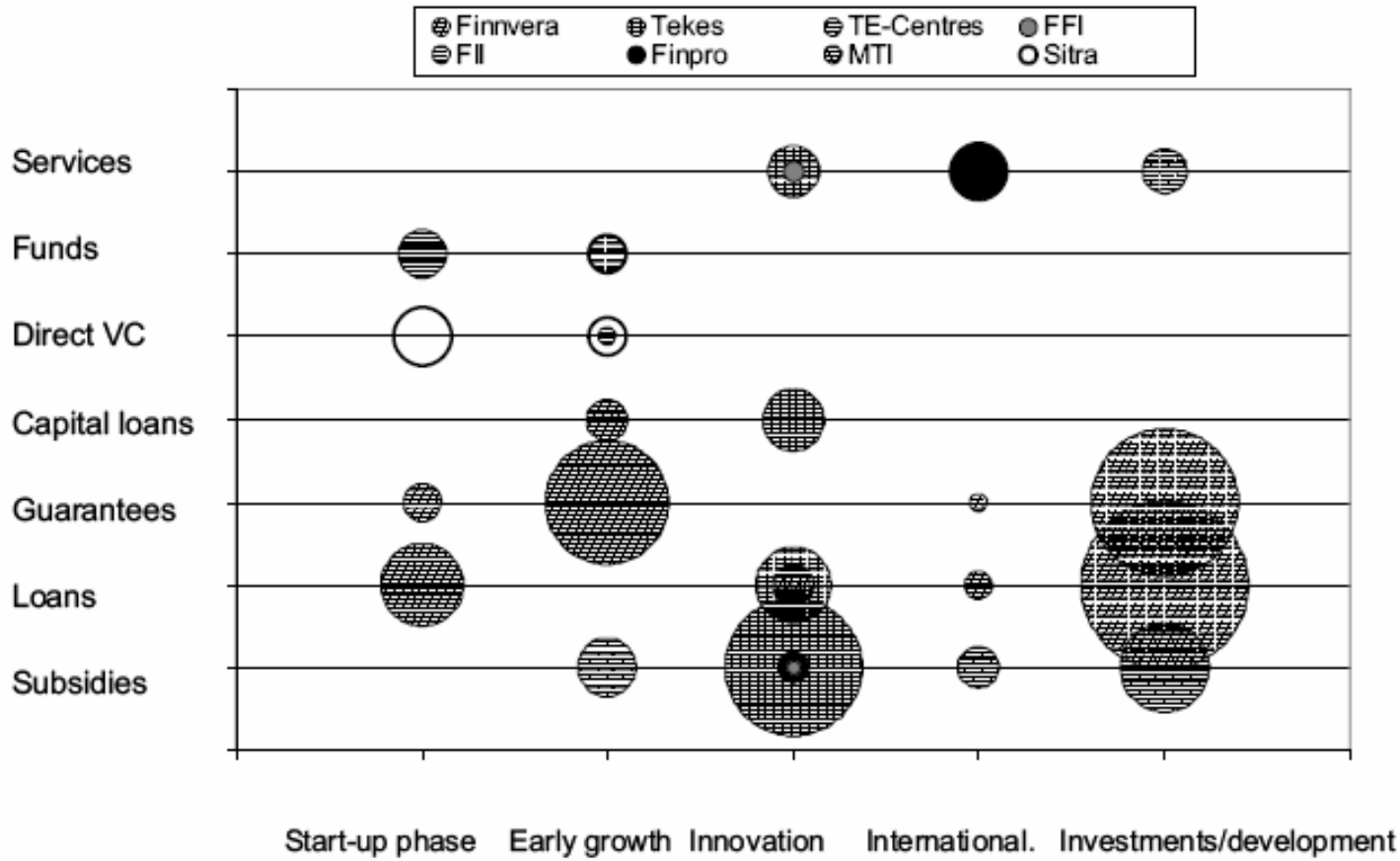
Changing system from…



To….


The current system
Services
Equity
Loans
Grants
Finpro
Venture capital (FII, Sitra)
Finnvera
Tekes
Academy of Finland
FFI
TE-Centers
Universities
Research institutes
Basic research
Applied research
Product development
Commercialization

And analysing funding distribution…



Observations on methodology

- Important to be able to translate from issues of rationale to demonstrations of how it works in practice
  - Simply asking operators about the market and system failures they address produces routine reponses
- Evidence base was unusually good – large scale industrial surveys well attuned to needs of panel
  - in contrast to previous systemic evaluation in Finland where panel struggled to get contractors aligned

Observations (continued)

- Working in an innovation system generally recognised as being one of the world's best it was still possible to find room for improvement and policymakers willing to make those improvements
- Boundary conditions are always a problem
  - Evaluation had to go beyond the institutions sponsored by the Ministry but in reality found itself facing issues of education policy, fiscal policy and public purchasing

Case 2 – UK Evaluation

General framework for performance indicators in Government

- Since 1998, Her Majesty's Treasury attaches Public Service Agreements (PSA) targets to expenditure
- Each PSA covers one Government ministry and consists of:
  - Aim of Department in one sentence
  - Objectives to cover all aspects
  - Performance targets with outcome focus
  - Value for money target
  - Statement of who is responsible for delivery
- 160 targets across Government
- Further detail in Service Delivery Agreements

Hierarchy of Evaluation

- Ministry level – Spending Review and Public service agreements
- Agency level – Quinquennial Review
- Institution level – Research Assessment Exercise, Research Council Institute Evaluations
- Field level – International reviews, QPIE
- Programme level – Programme evaluation
- Plus various thematic and cross-cutting evaluations eg EU Framework Programme from UK perspective, Civil Space Activity

Case 2.1 – DTI's Science-related PSA targets

- In area of Department of Trade and Industry's objective "to make the most of the UK's science, engineering and technology"
  - PSA5: Improve the overall ranking of the UK's science & engineering base, as measured by international measures of quality, cost-effectiveness & relevance
  - PSA6: Increase the level of exploitation of technological knowledge derived from the SEB, as demonstrated by a significant rise in the proportion of innovating businesses citing such sources
- Derived from cross-departmental review

Case 2.2 – Cross Cutting Review of Science

- Review of science and engineering research supported by public funds
- Carried out by Enterprise Team in HM Treasury under leadership of Minister for Science and Innovation in DTI to provide input to Government's Comprehensive Spending Review in which overall priorities are set for government spending for three years

Method

- Literature Review
- Supporting studies
- Consultation with over 100 stakeholders, including site visits

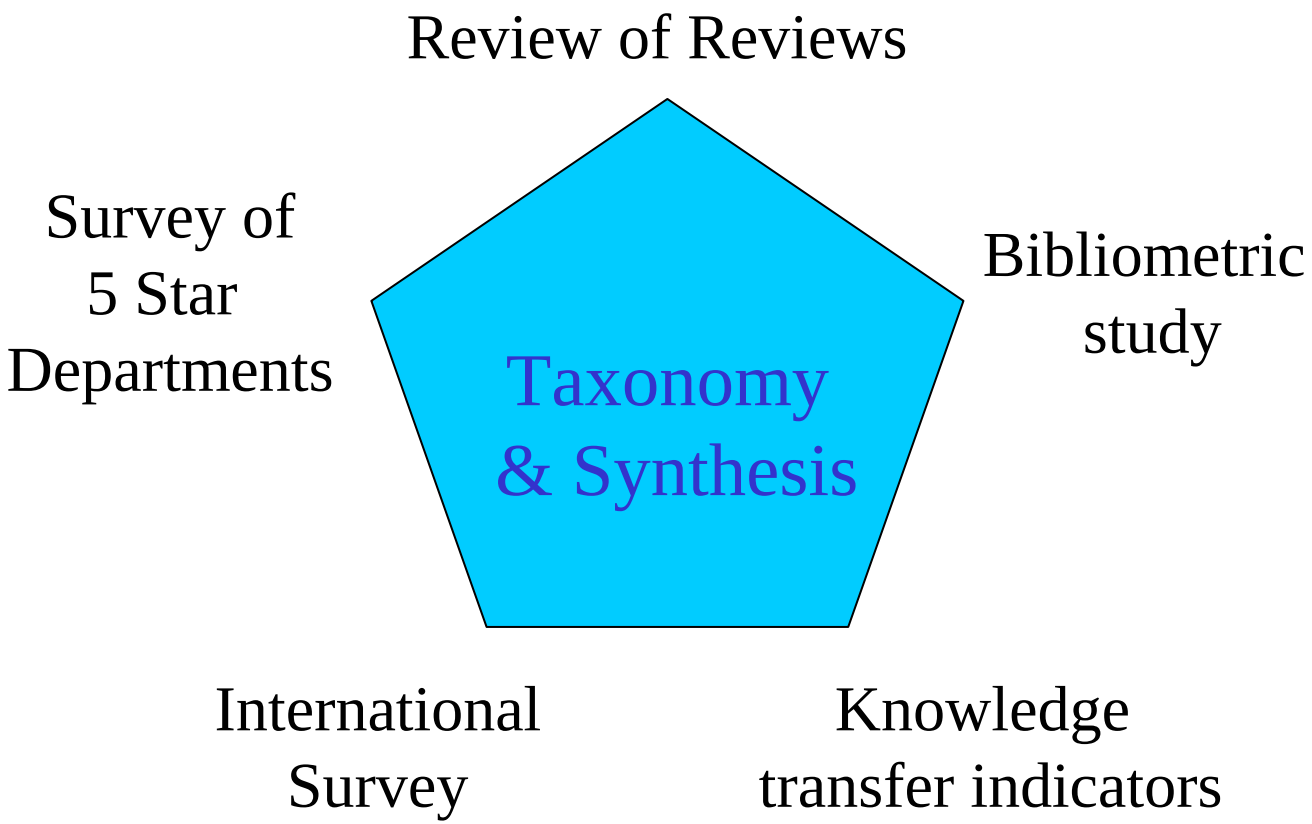
Example of supporting study

- Review of Strengths and Weaknesses of UK Science (SWOT)
- Report by PREST and Evidence Ltd

Study objectives

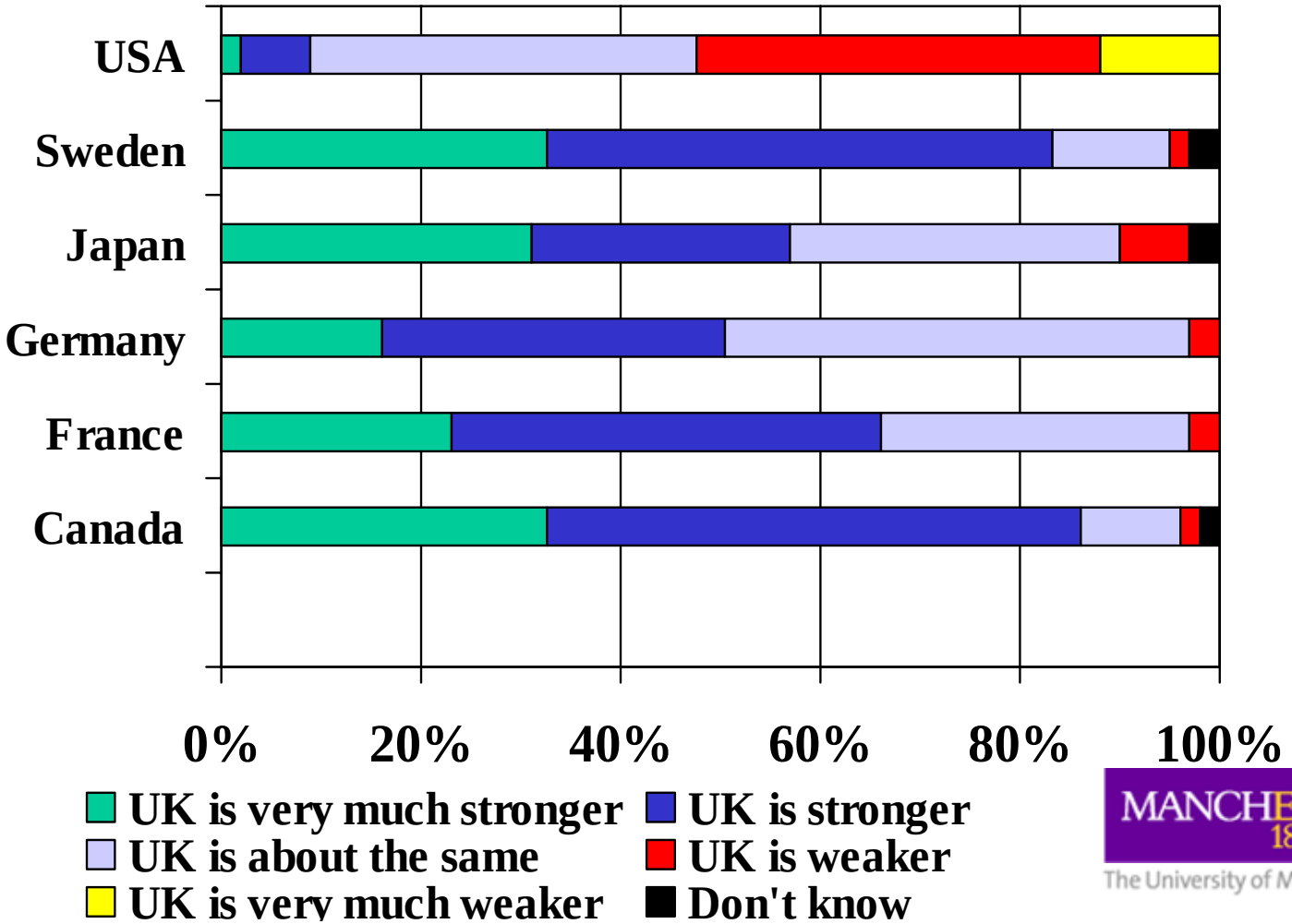
- Identify
  - Present strengths and weaknesses
  - Factors which influence them
- Science and Engineering Base covering all areas funded by Research Councils

Methods


Review of Reviews
Survey of 5 Star Departments
Bibliometric study
Taxonomy & Synthesis
International Survey
Knowledge transfer indicators

International Benchmarking

Comparing best two or three research groups



S&W Biological sciences

Few outstanding groups	Neuroscience, structural biology, cancer biology, molecular plant systematics, plant protein structure, food materials science
Strength in depth	Cell signalling, cancer-related genetics
General weakness	Biophysics, instrumentation for genetics & proteomics, mycology, food engineering
Weak with islands of excellence	Molecular physiology, food microbiology

Fields of critical importance to other areas

- Computer science & computer modelling
- Bioinformatics
- Chemistry
- Physics
- Biology
- Mathematics

- Engineering depends upon maths & physical science
- Physical and bioscience depend on engineering
- General interdependence in social sciences

Effects of Cross-Cutting Review

- Many detailed recommendations reflected in Spending Review settlement and Innovation White Paper
  - Spending on science and research to increase by 5.4% per year in real terms for 3 years
  - Major infrastructure renewal fund
  - Boosted funding for genomics, e-science and basic technology
  - Increased stipends for PhD researchers
  - Higher Education Innovation Fund to increase universities ability to work with industry

Conclusions

- Science is treated in a similar way to other areas of public spending in terms of targets and institutional reviews
- Nonetheless using indicators in the science and innovation sphere is problematic
- Science has become a central focus of economic policy and therefore received special attention in the Spending Reviews
- Evaluation evidence is used in setting policy but not always systematically – the evidence selected may be different from one review to another
- There is a hierarchy of evaluation in the UK but evidence is not systematically passed from one level to another – transfer is more ad hoc
- Overall policymaking is more securely grounded and supported as a result of the inputs from evaluation but they are not the only inputs