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Are the steering and organisation of the Norwegian research system optimal?

Discussion with the Norwegian Productivity Commission

Gardermoen
20 August 2015

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Road map …

- So why do we fund research anyway?
- Structure and organisation
- Governance and some of its pitfalls
- Steering and incentives
- Norwegian choices

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Why do we want research at the national level?

- Why?
  - *Good cultural reasons, including a need to understand*
  - *Manpower development*
  - *Absorptive capacity – accessing global science*
  - *Providing inputs to innovation*
  - *Providing underpinnings to economic and social activities through the provision of public goods (standards, health, security …)*
  - *Supporting government and regulation*
- Institutionalised in
  - *Universities*
  - *Scientific research institutes*
  - *Government laboratories*
  - *RTOs/industrial applied research institutes*

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The modern state intervenes in knowledge production for two sets of reasons

Market failure (Nelson-Arrow) - often about basic research

- Indivisibility
- Inappropriability
- Uncertainty

Systems failure - mostly about inadequate performance

- Capability failures
- Institutional failures
- Network failures (including lock-in and transition failures)
- Framework failures

The social contract has been changing over time

- Post-War – *Endless Frontier* – 'hands-off' approach to science funding; expectation that welfare would increase in response but in unpredictable ways
- 1960s, OECD and the start of 'science policy' as tuning science to societal needs (Freeman, Frascati and the resurgence of Bernal ..)
- 1970s on, breakdown in trust; politicisation of technology (eg Vietnam); societal demands of S&T focus on industrial and technological development
- Circa 2000, 'grand' (systemic?) challenges; no longer about industry but fear that we have finally hit the limits to growth (climate, energy, ageing, disease …)

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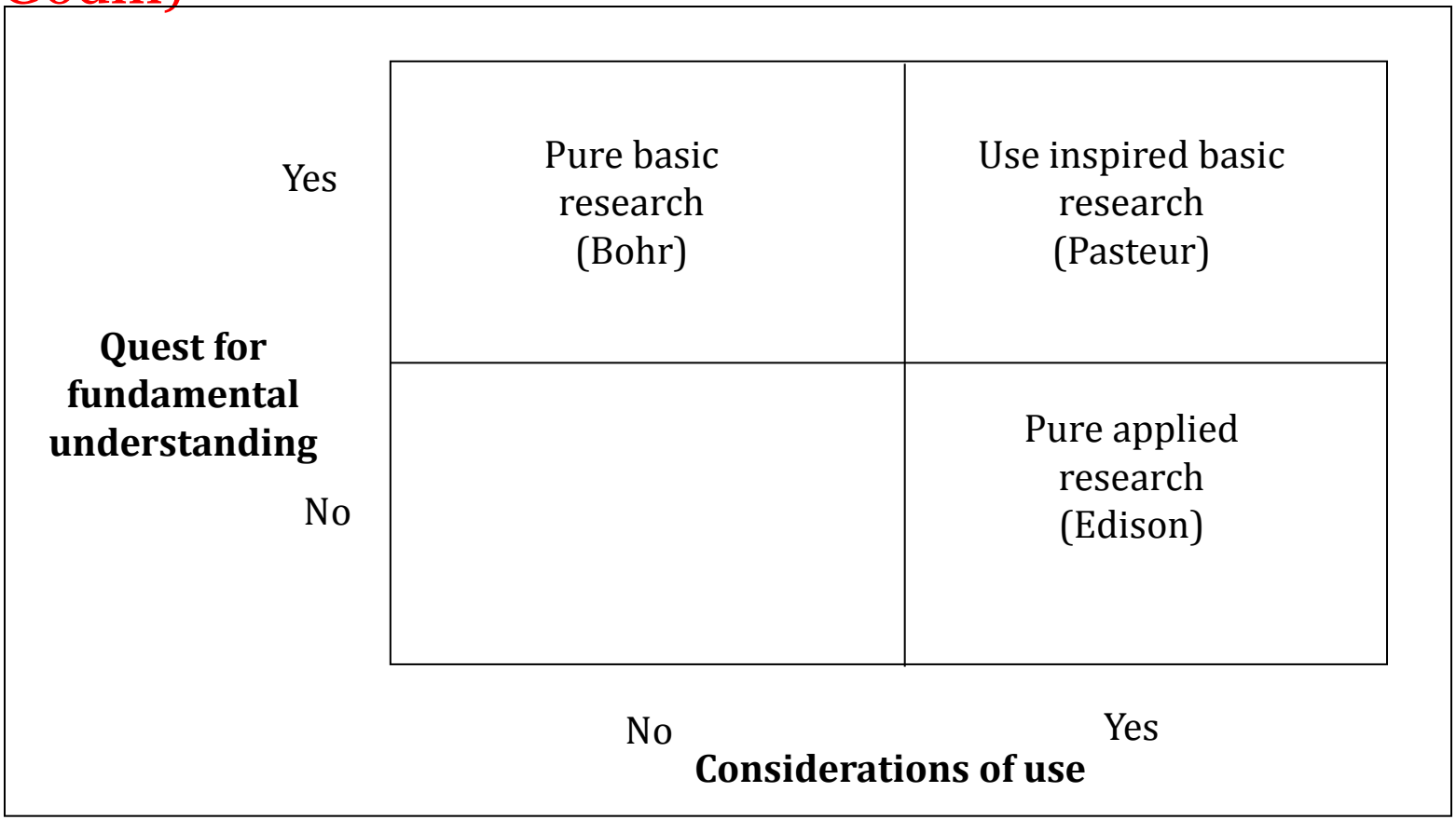
If the OECD didn't collect statistics about it, the idea of basic research would have been dropped a long time ago (Godin)



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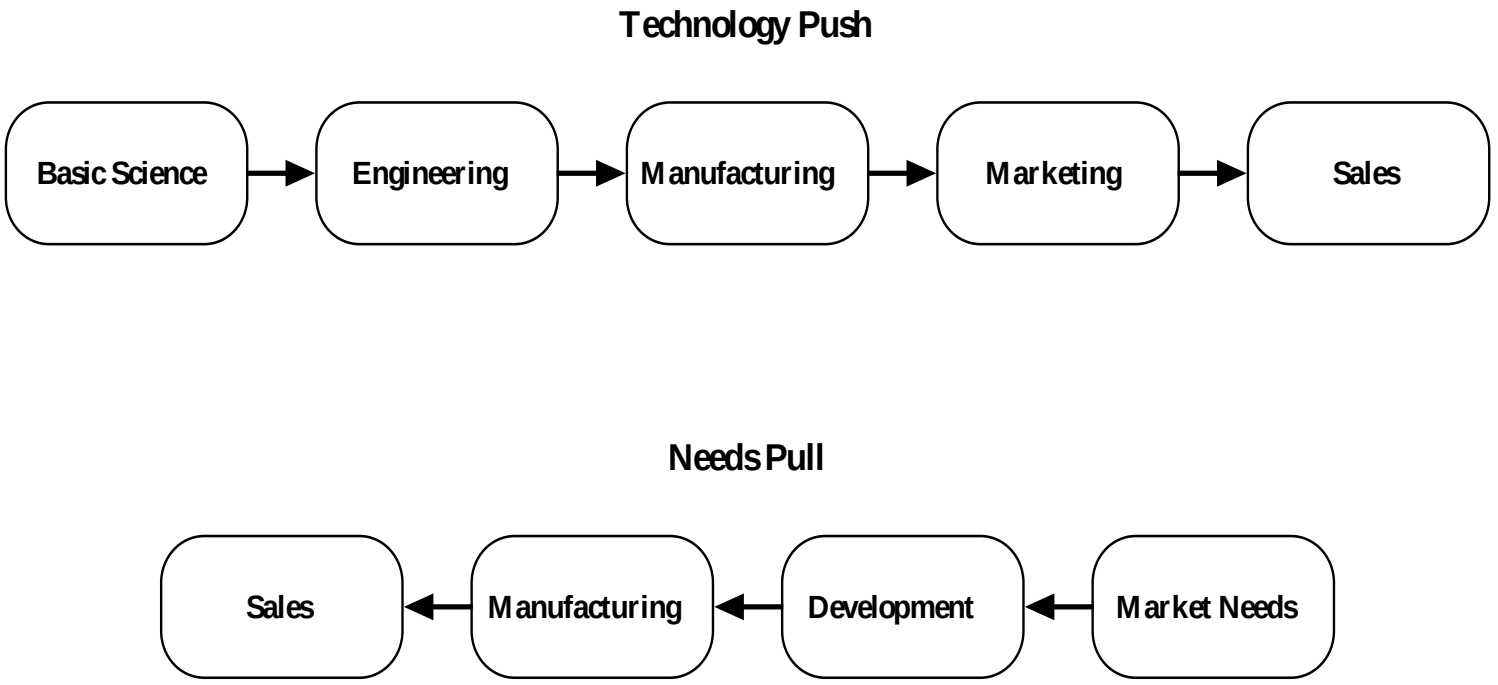
To understand research relevance we need to drop the linear, new-knowledge-based idea of innovation



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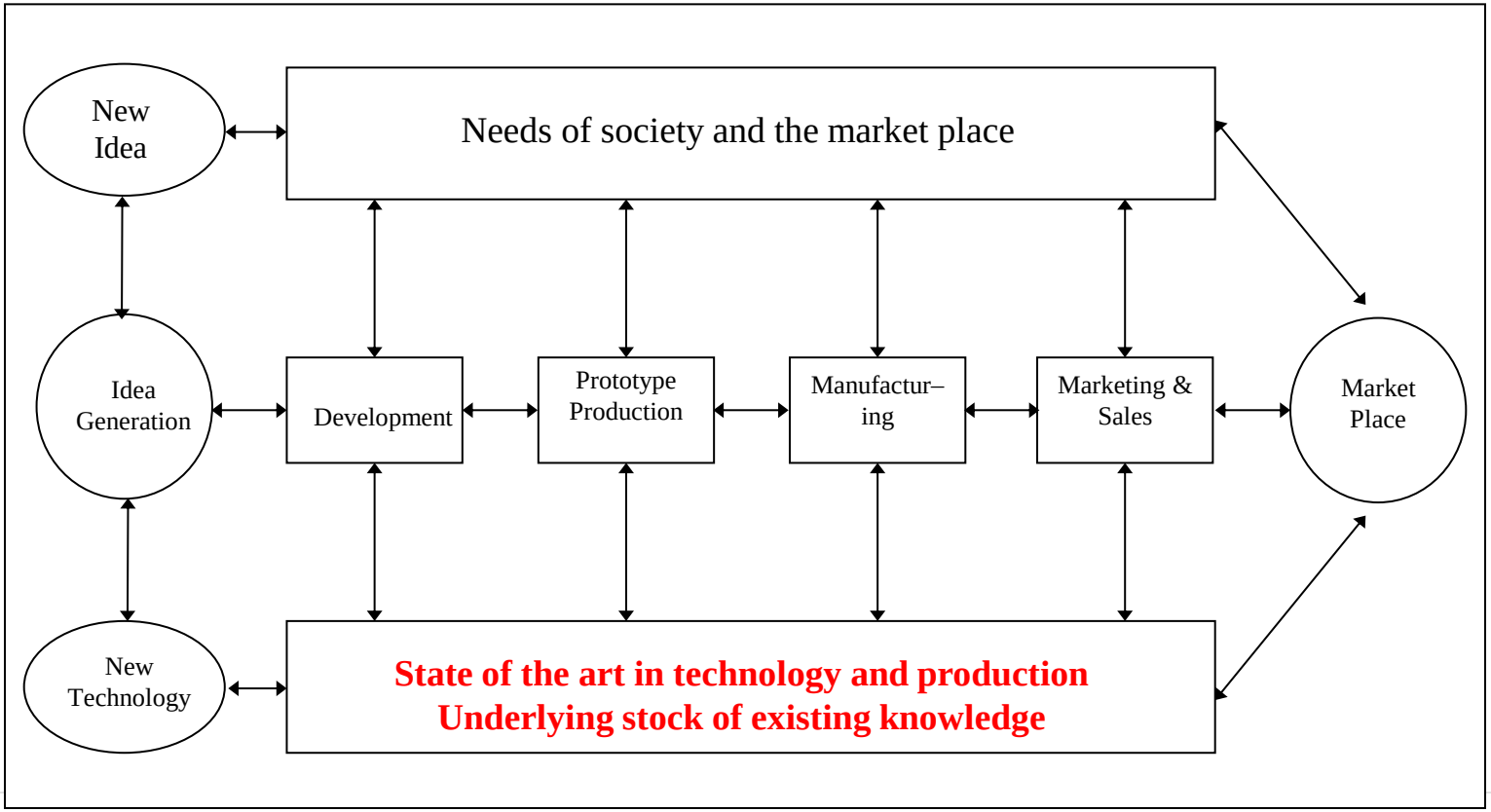
And see innovation primarily as imitation and the reworking of existing knowledge



Source: Modified from Roy Rothwell, "Towards the Fifth-generation Innovation Process" *International Marketing Review*, 11 (1), 1994, 7-31

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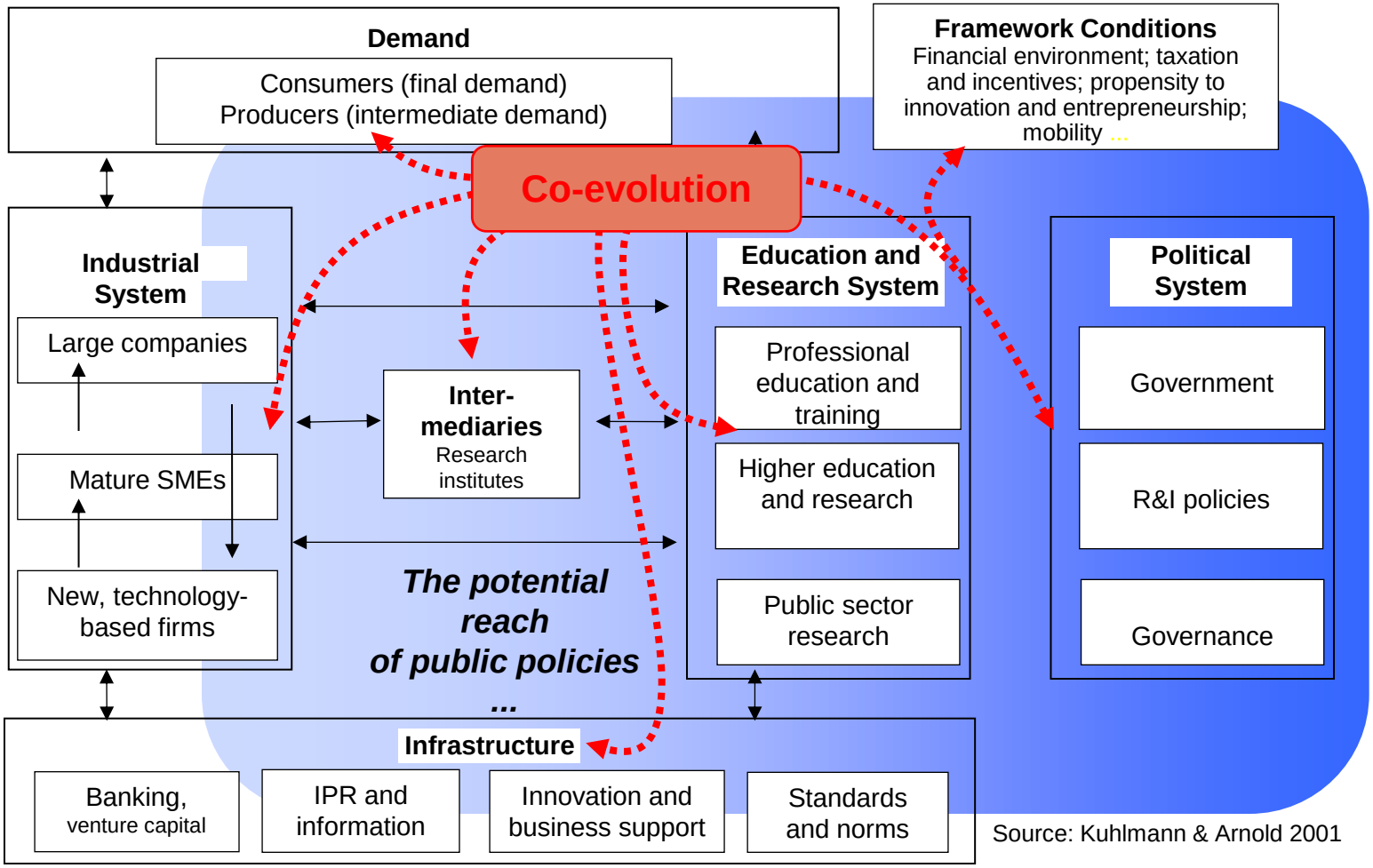
Innovation systems – all the bits have to work – firms are at the core



Source: Kuhlmann & Arnold 2001

Which is better – basic or applied research?

- Some of the most interesting evidence about the importance of basic and applied research comes from the budget rivalry between the US National Science Foundation (NSF) and mission-orientated research in the 1960s
- The US Department of Defence commissioned the Hindsight study, which traced the research antecedents of a number of weapons systems back for twenty years or so and concluded that the underpinning research was largely mission-orientated in nature
- NSF retorted with the TRACES study, which traced backwards for up to fifty years from five important civil innovations and found critical connections to basic research
- The unsurprising implication is that both sorts of research are at various times needed

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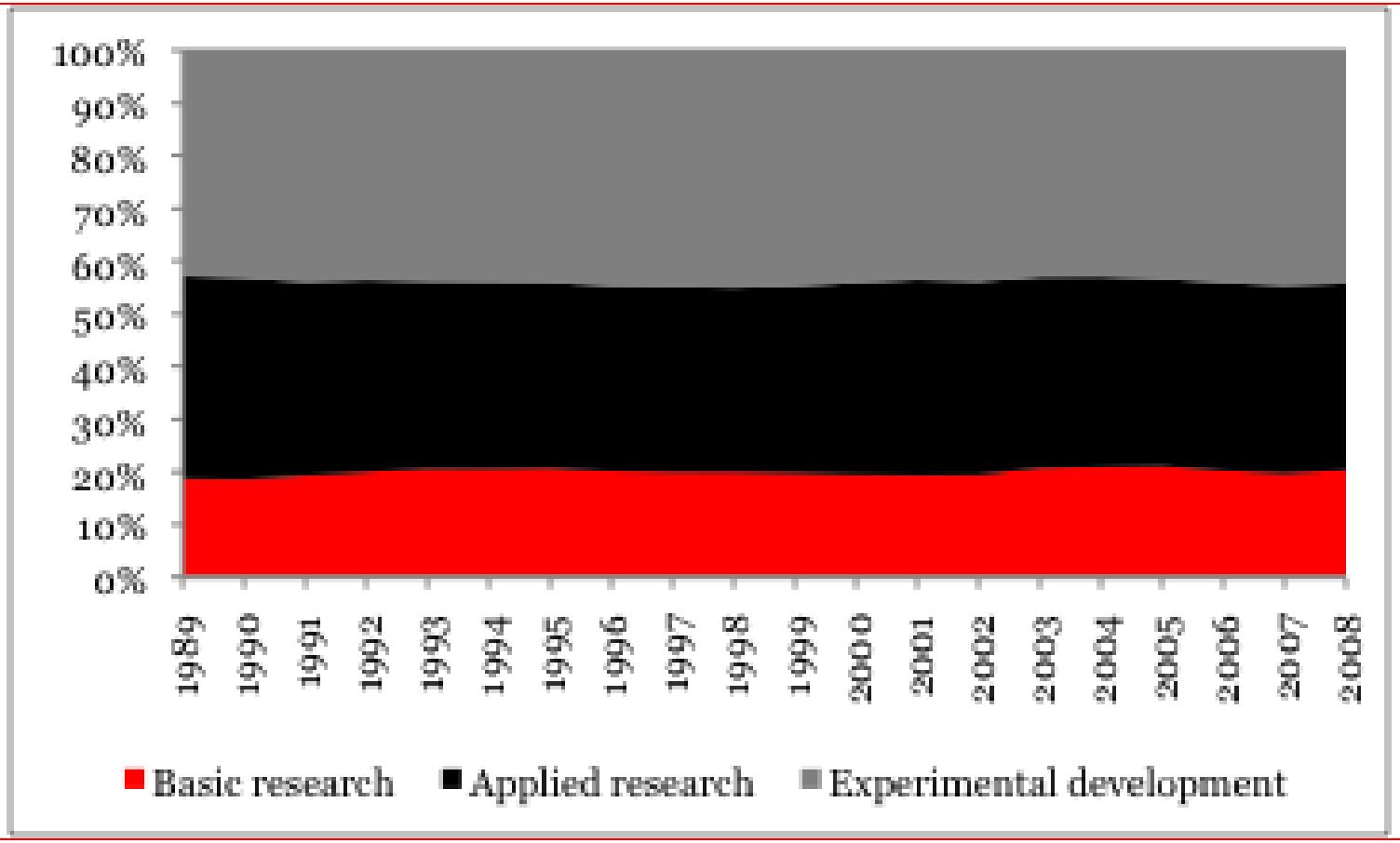
The basic share of GERD in a basket of Western countries rises from 18.6% in 1989 to 20.2% in 2009



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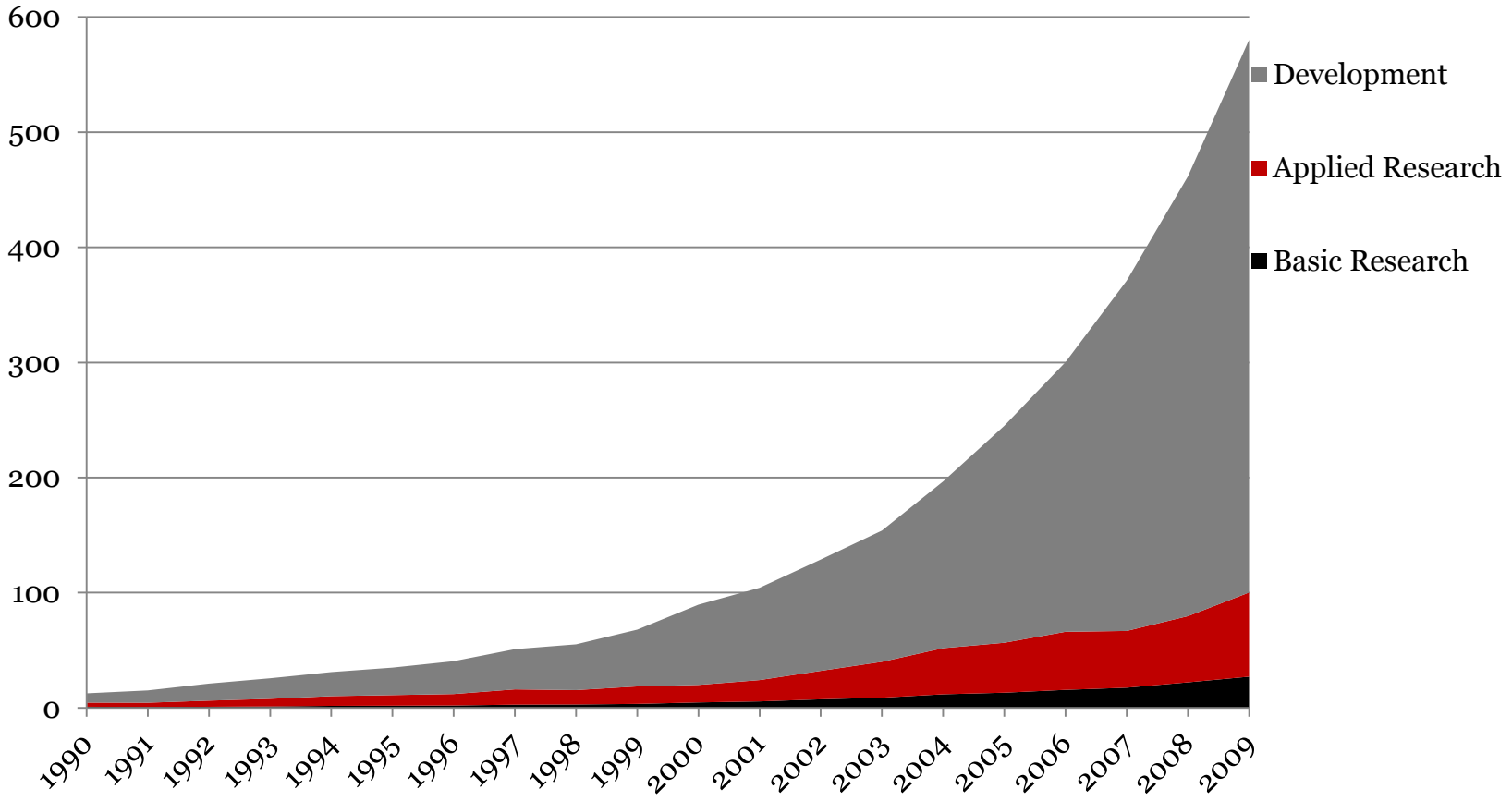
China: Stupendous growth in GERD. Basic share constant at 5% (RMB billions)



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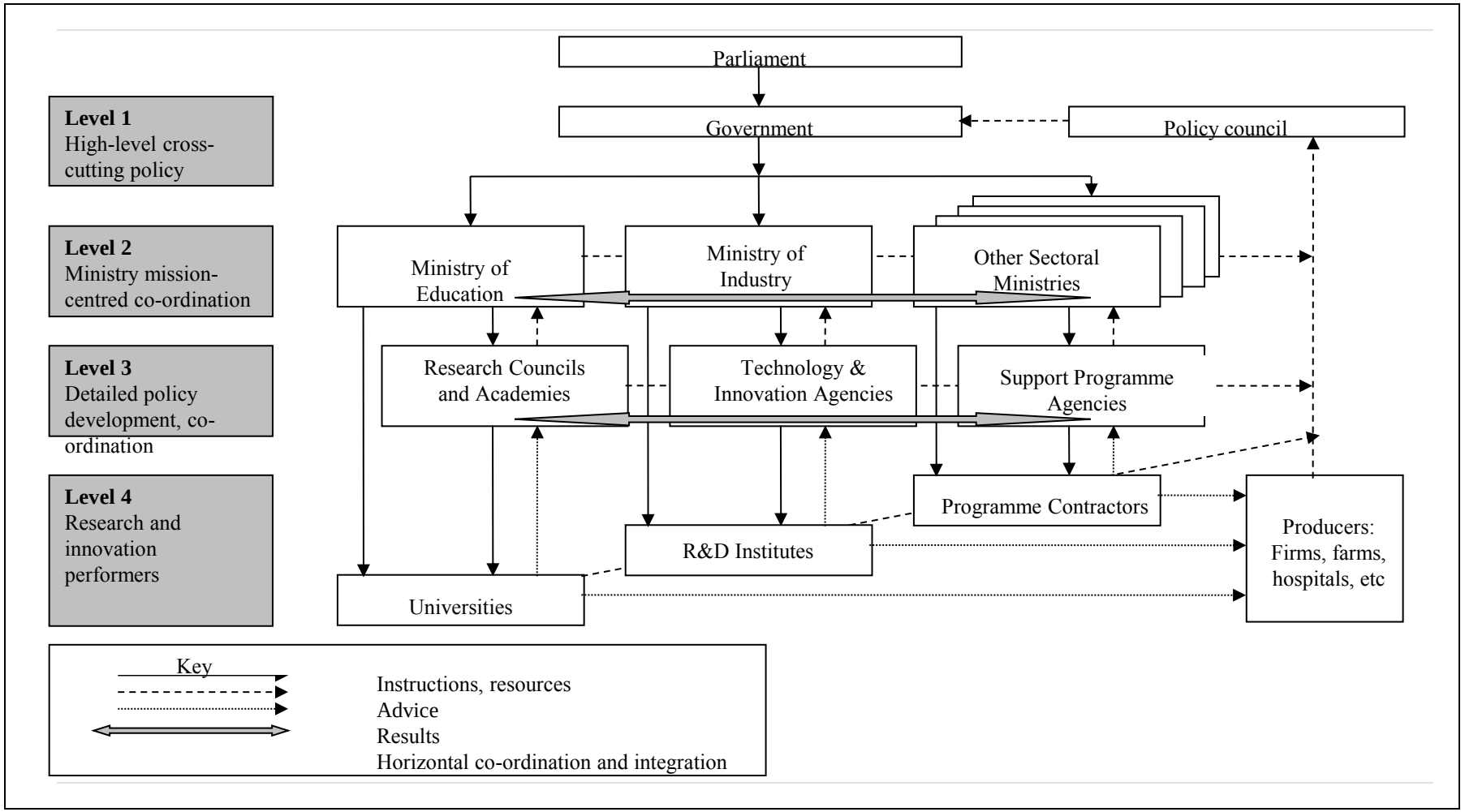
The Western way of research structure and governance



Key design issues

- Number and specialisation of ministry 'pipes'
- Degree of vertical division of labour (agencification, new public management, management by objectives …)
- Balance among the four types of performing organisations
- How to coordinate national policy so that it addresses needs and is coherent
- How to address horizontal coordination, eg the societal challenges
- Broad policy mix in terms of basic, applied, development activities to be funded by the state
- How and where to use stakeholders to influence decisions
- Change agency

Who governs research funding? Issues …

- Stakeholder takeover of allocation mechanisms in a three-level hierarchy (ie two principal-agent relationships) promotes stasis and self-reproduction of the research-performing system (Braun)
  - *Ministry*
  - *Research council, innovation agency, sector funder*
  - *Research performers*
- Self-governance or autonomy at the level of performers also leads to lock-ins (typically a university problem but can also affect institutes, cp SICS …)
- A multi-principal agency locks in, in the absence of adequate internal or external policy coordination (van der Meulen – RCN)
- Adjusting the governing role of the national state when research performers need to optimise performance at an international level
- Dynamic inconsistency and power struggles among ministries

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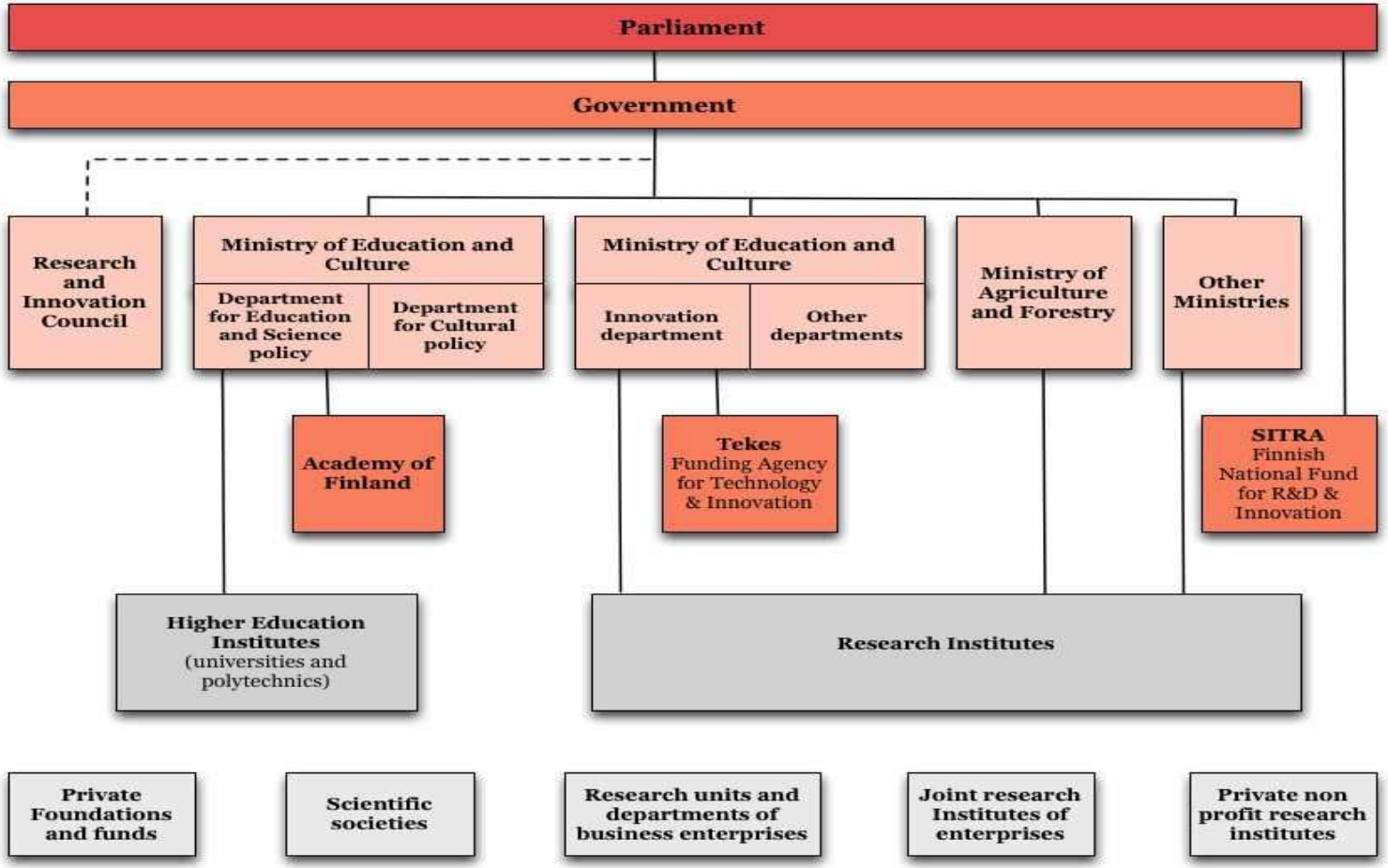
Finland structure



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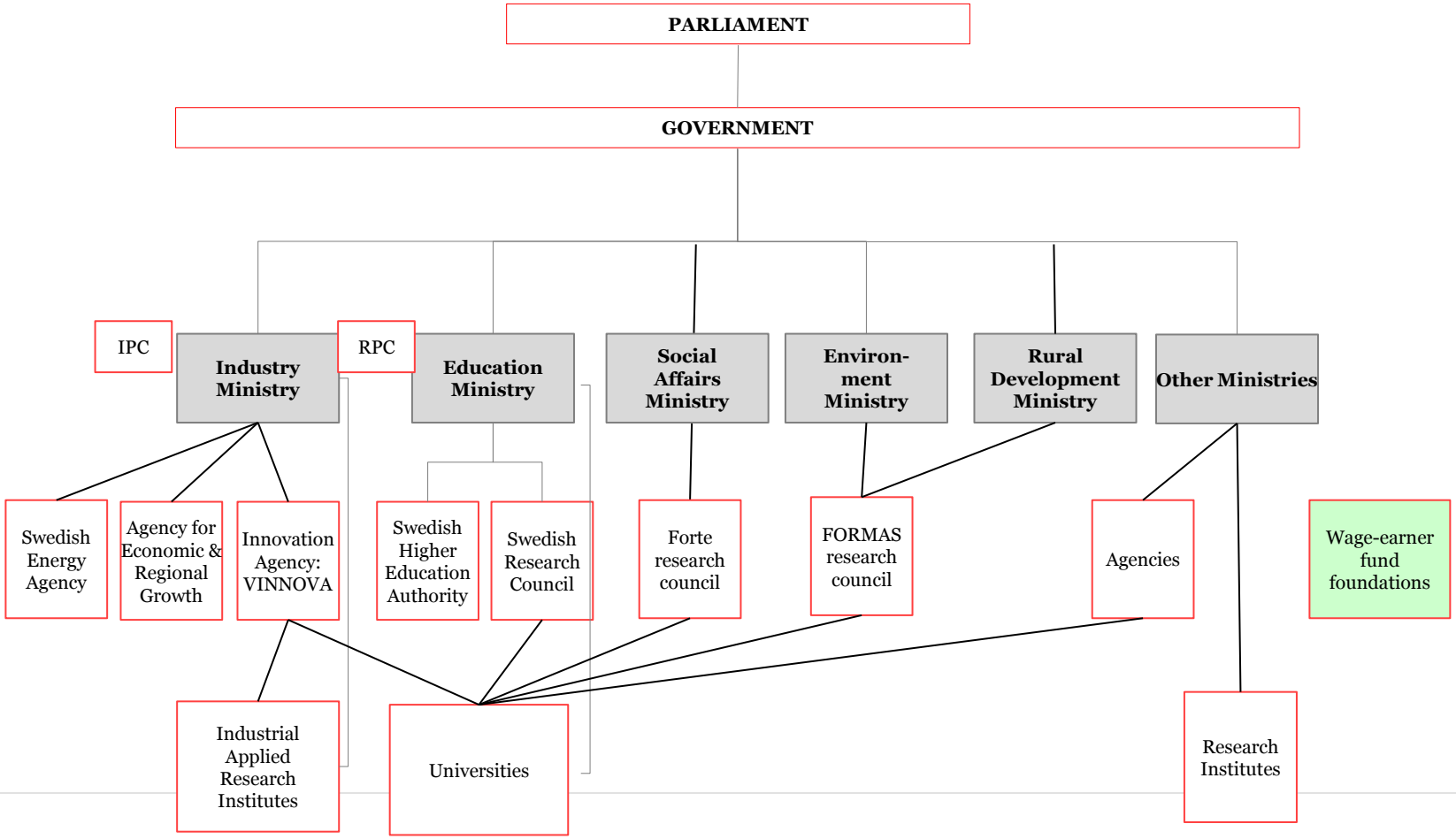
Sweden structure



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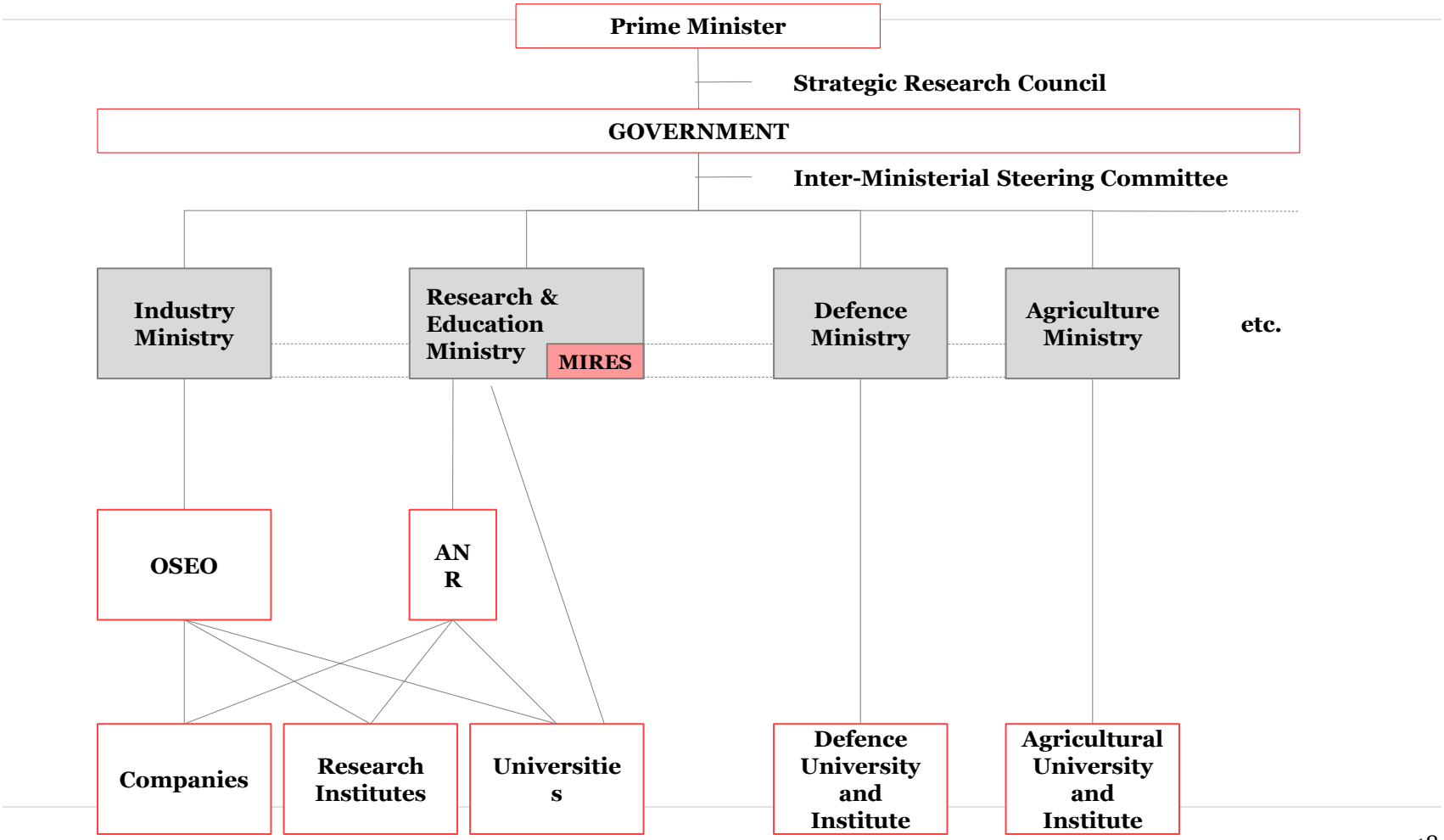
Coordination by a science ministry (France) has limitations



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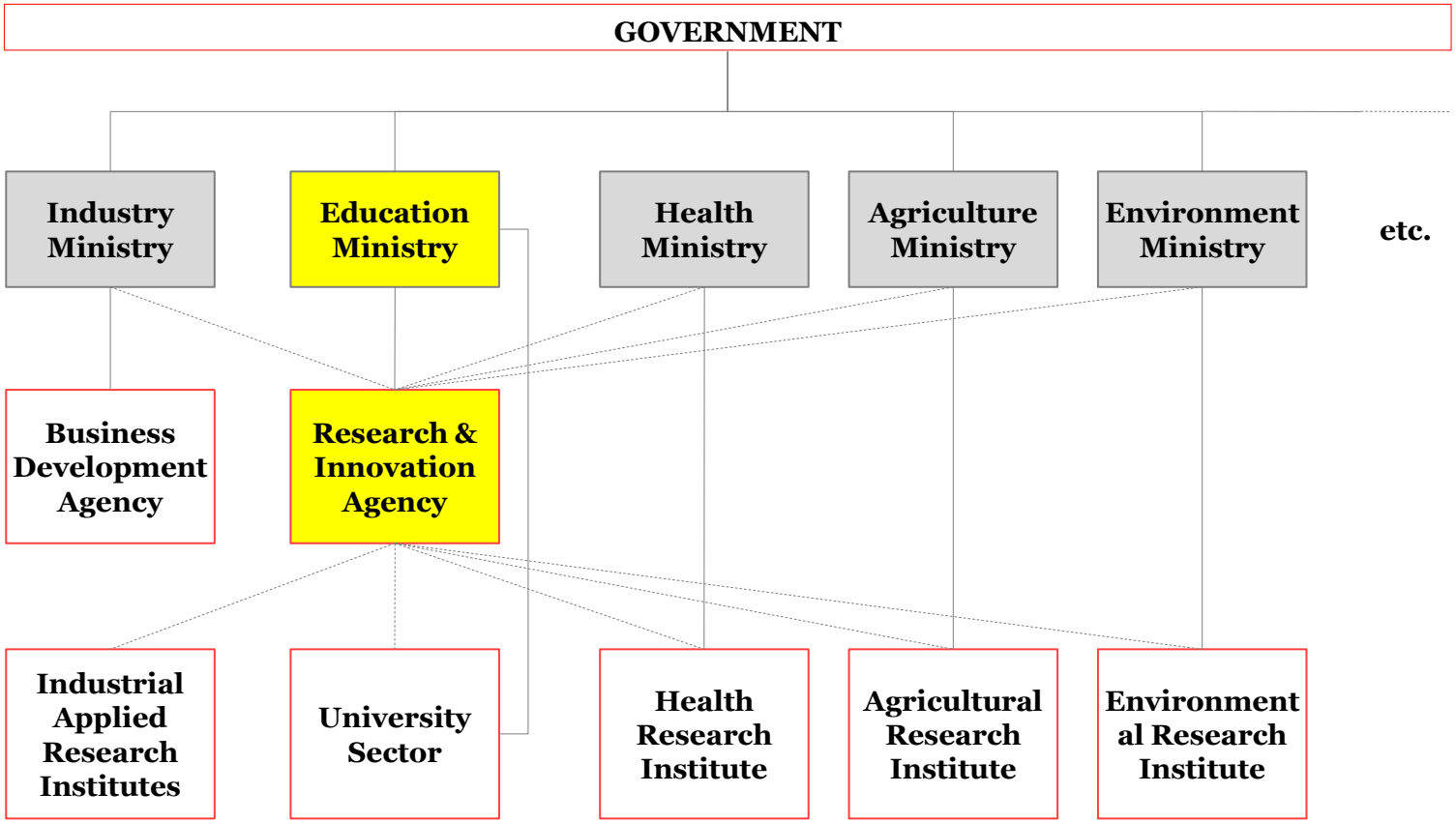
Norway structure



Ownership and money
Money

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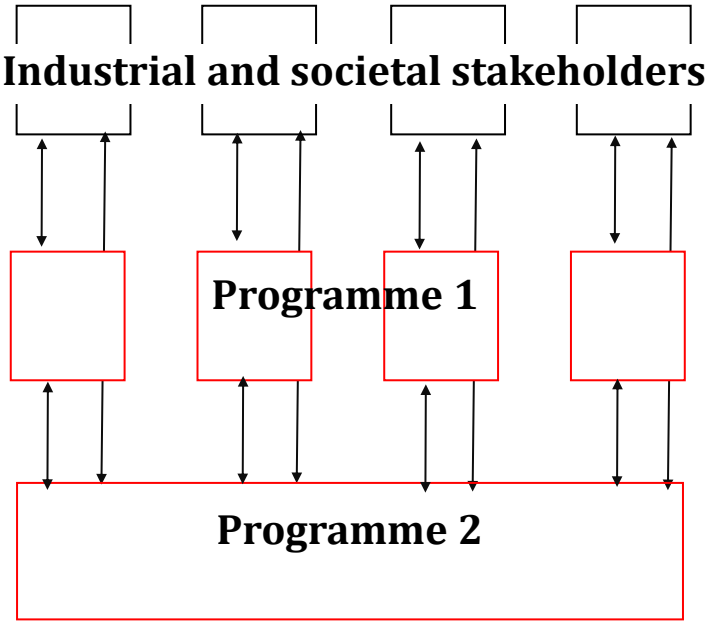
Two-pillar funding logic from Sweden (STU) – largely tuned for industrial development



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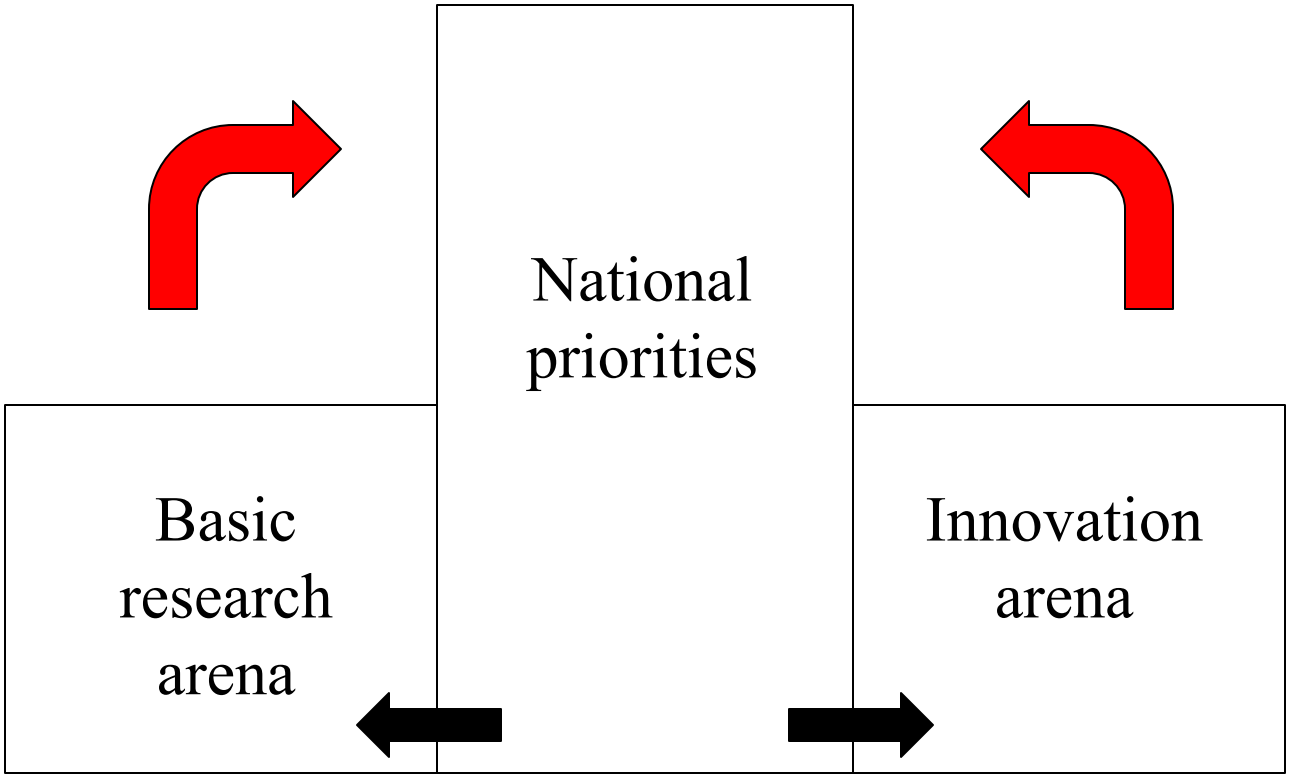
Three-in-one pillar logic from Norway – integrating industrial, scientific and other societal needs



Norwegian particularities

- NTNF and the institutes came before the research councils to foster industrial development. Is the institute system still adapted to national needs?
- Why a single research council?
  - *Massive coordination failure with the innsatsområder in the 1980s*
  - *Holistic policy view was retrofitted after the 2000 evaluation*
- Coordination failures endemic in the Norwegian system
  - *Strong sector principle – sectors' refusal to pay fo rbasic research*
  - *Low political power of the education/research sector*
  - *Practical solutions appear after 2000 with inter-ministry cooperation, KD finding resources to coordinate research and RCN increasing its efforts at horizontal programming*
- Tough policy problem of the weakness of industrial R&D
  - *'Weak demand' in the research system*
  - *A touch of 'Dutch disease' causing lock-ins in industrial structure?*

Incentives: importance of competitive funding, 2009

	PRFS used?	Government sector funding	General university funds (GUF)	Government competitive research project funding
Belgium	Flanders	1,117	36%	64%
Denmark	X	1,653	72%	28%
Ireland		704	31%	69%
Germany		7,575	71%	29%
Spain	X	3,012	66%	34%
France		7,972	50%	50%
Italy	X	5,204	85%	15%
Austria		1,669	76%	24%
Finland	X	1,033	58%	42%
Sweden	X	2,041	57%	43%
United Kingdom	X	5,545	48%	52%
Iceland		55	51%	49%
Switzerland		2,000	82%	18%
Norway	X	1,380	73%	27%

Source: Eurostat

UK Experience with PRFS

- The RAE is the 'mother of all PRFS'; allocates most of the money
- Peer review – in more recent times 'informed' by bibliometrics
- Driven by massification and a need to justify cuts in the 1980s
- "A complex process whereby the Russell Group gives itself most of the money"
- Non-linear allocation formula intended to concentrate resources
- Widely acknowledged bias against multidisciplinary and heterodox research
- Stable outcomes; high correlation with performance in research council system
- Anecdotally, massive effects on recruitment, promotion, research management
- High cost: recurring question about greater reliance on metrics

Czech Republic

- Post-reform system of 'research intentions' as basis for funding abandoned owing to low trust and low governance capability
- 'Coffee grinder' 2009-11 wholly metrics based – across fields and different types of research organisation
- 'Coffee Grinder points' devalued by 60% 2009-11
- Included many categories of non-scholarly output – which were clearly gamed (as were some peer-reviewed publications)
- Combined with erratic allocation of state research budget, the Coffee Grinder caused instability in institutional funding
- Despite constant fiddling with the parameters, the Coffee Grinder was dropped as unfit for purpose following our Research Audit in 2012

Norway

- PRFS introduced following the university 'quality reform' of 2002 – at first in the universities, later (separately) in the institutes
- Simple, metrics-based, no field normalisation, includes a classification of local publication channels
- Reallocates 2% of funding – huge change for little money
- University PRFS
  - *Quantity but not quality of publications has risen (cp Australia)*
  - *Proportion of faculty publishing has risen – especially in weaker organisations*
  - *Decline in monetary value of a publication*
- Institutes PRFS: effects on publication volume, research management and HR but not on international income or cooperation with universities (already quite high)

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Emerging conclusions on PRFS

- There's not much evidence behind the policy trend to PRFS
- Policy purposes seem rarely to be made explicit
- If you dig, you can find them
  - *UK: Matthew effect*
  - *NO: Quality of the whole system*
  - *CZ: Overcoming governance failures*
- PRFS are high-leverage interventions
  - *Behaviour change drivers are probably career and status*
  - *Possible to use them without destabilising institutional funding*
- Highly prone to gaming and unintended effects
- Longer-term risks include 'normalisation' of science and research (Kuhn), changes in cooperation behaviour and undermining academia/rest-of-society links

Aarhus Declaration – Science lobby on the march again

- "It is essential that Europe strengthens its science base, with excellence as the guiding principle. In order to be recognised as an attractive partner and a competitive area for research, innovation and higher education in a global knowledge-based economy"
  - *Use unbureaucratic, non-thematic instruments; let the very best researchers evolve and pursue the research ideas they are most intrigued by*
  - *Europe should be the scene for scientific breakthroughs that open up for unforeseen opportunities for humankind*
  - *Research excellence has , time and again, changed our lives and our thinking. Excellence remains essential to the future of Europe*
  - *Excellence is the essential foundation that secures the development and availability of human capital to meet the needs of the future*

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The underlying argument starts with knowledge and ends with governance

- New fundamental knowledge causes innovation
- "We cannot programme scientific breakthroughs or order them from a menu…We can't foresee the consequences of what we discover." [Helga Nowotny, ERC]
- Hence we should not prioritise thematically
- Using any other criterion than excellence means funding sub-optimal research
- Only scientists can decide what excellent research is, therefore
  - *Fund investigator-initiated, 'blue skies' research*
  - *Only the scientific community should decide what to fund*
  - *The more money you give us the richer we'll all get*
- In other words, the 'excellence' argument is not about quality but about who controls the money

Norwegian particularities

- NTNF and the institutes came before the research councils to foster industrial development. Is the institute system still adapted to national needs? What about coevolution with the universities?
- Why a single research council?
  - *Massive coordination failure with the innsatsområder in the 1980s*
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Thank you

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The basic economics of research

- In economic theory, knowledge is 'non-rival' in the sense that it can be used by many people without being consumed
  - *If I make a cake and you eat it, I cannot consume it*
  - *But if I make some knowledge, we can both use it*
  - *A rare case where you can have your cake and eat it?*
- Knowledge is 'non-excludable' in the sense that it is difficult to prevent people who want it from getting hold of it
- Non-rival, non-excludable goods are 'public goods'. They cannot be produced by the market so the state must make them
- In economic reality, however, there is imperfect information, path-dependency and costs to acquire and use knowledge
  - *It appears even more costly to absorb science than technology*
  - *Knowledge is useless without know-how*

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The rate of subsidy is consistent with degree of spillover