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S&T and Innovation in the New Economy

Search for Systemic Solutions

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The Soviet R&D model

- **Influenced by:**
  - Political and military objectives
  - Considerations of international prestige
  - Imbalanced sectoral structure of the national economy
- **Centrally planned**
- **Recource-based vs. goal-oriented growth**
- **Poor emphasis on economic payoff of R&D**
- **Lack of efficient adjustment mechanisms**
- **Consequences:**
  - Strategy of the entire front of R&D and oversized R&D base
  - Disproportions in the disciplinary structure of R&D

    Engineering >70% of R&D totals
  - Lack of resources in perspective R&D fields (life science, informatics, etc.)

General R&D trends in the transition period

Influenced by:

- Changes in political and social objectives
- Formation of market economy grounds
- Economic recession, budget deficit, low investment activity
- Disintegration of the USSR
- Unstable political situation
- Integration into the world economy

Consequences:

- Decrease in budget R&D appropriations
- Lack of industry demand for R&D
- Low compensation and prestige of R&D employment
- Discontinued intra-USSR partnerships
- Decentralisation of decision-making
- Development of international S&T co-operation

Technology and innovation are key drivers of increased growth performance *(OECD, 2000)*

- **Correlation between**

  expenditure on R&D / innovation and GDP growth

  1% ⟶ 0.05-0.15%

- **Increasing R&D intensity and innovation activities of all economy sectors**
- **Technology & innovation cycles shortened**
- **Stronger orientation of R&D to market demand**
- **Networked economy**
  - **Nonlinear innovation model**
  - **Overcoming institutional barriers**
  - **Networks & linkages**

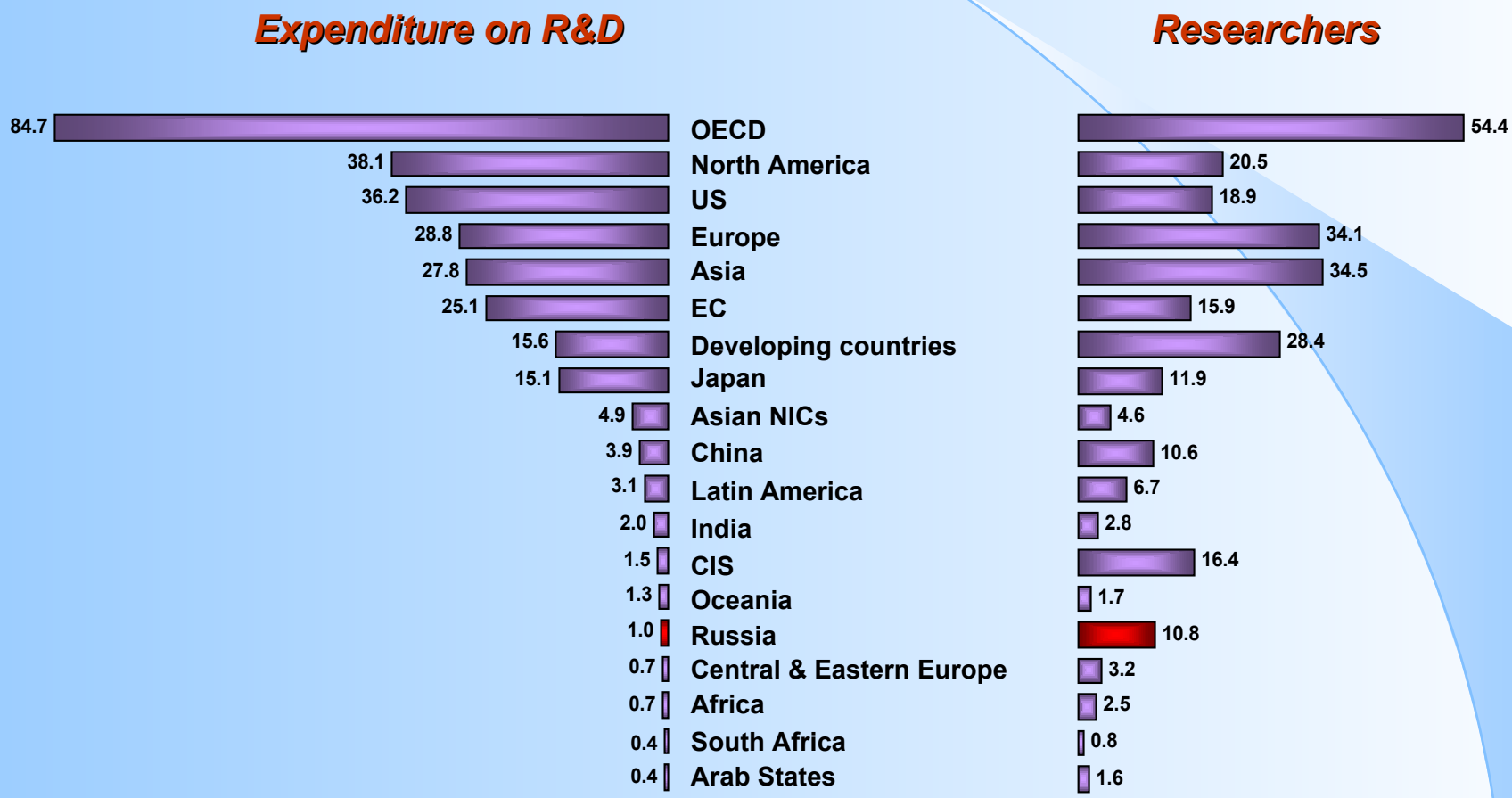
Nations - leaders of the new economy

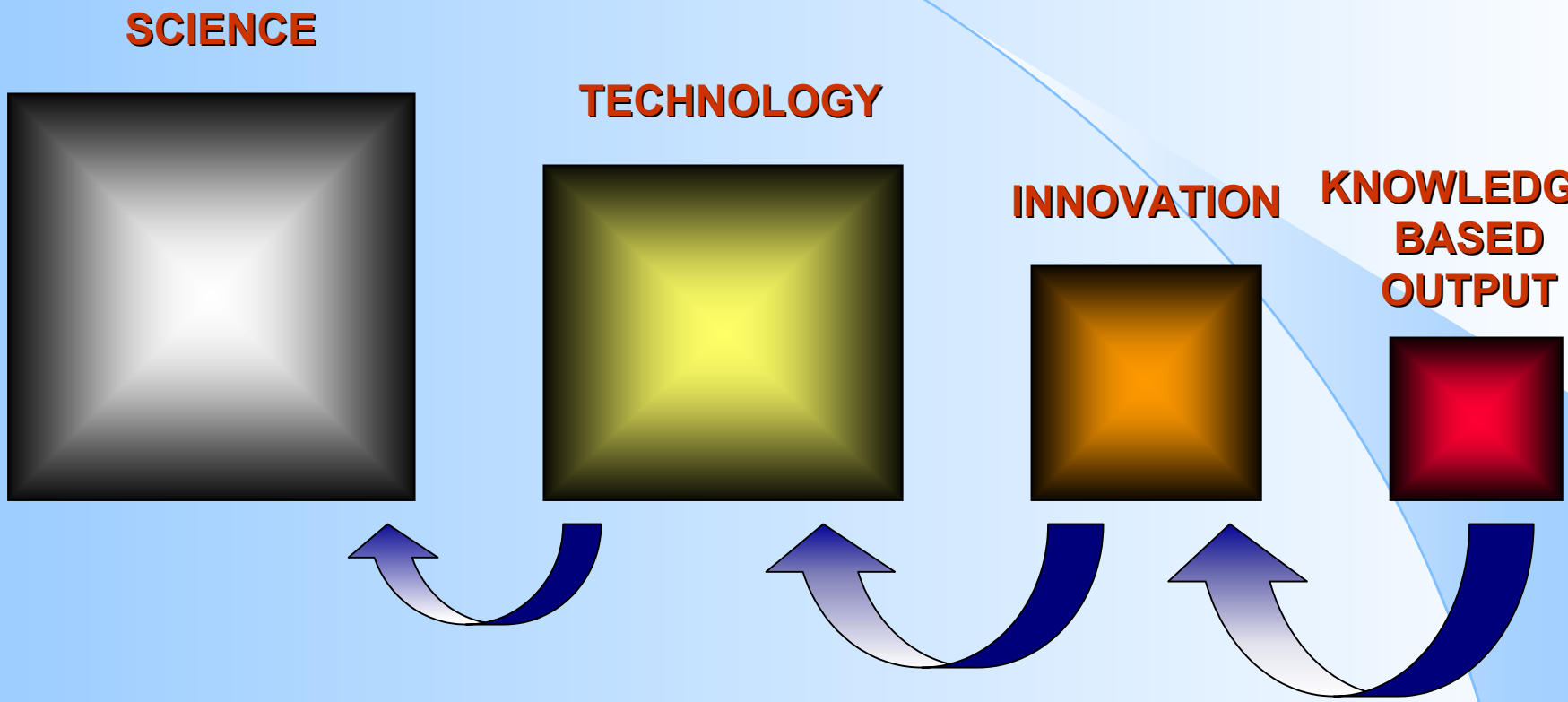
- Innovation
- Companies / universities
- Small firms
- Private capital / ventures

Russia

- R&D
- Research Institutes
- Large enterprises
- Government financing

World R&D indicators by regions *(per cent)*



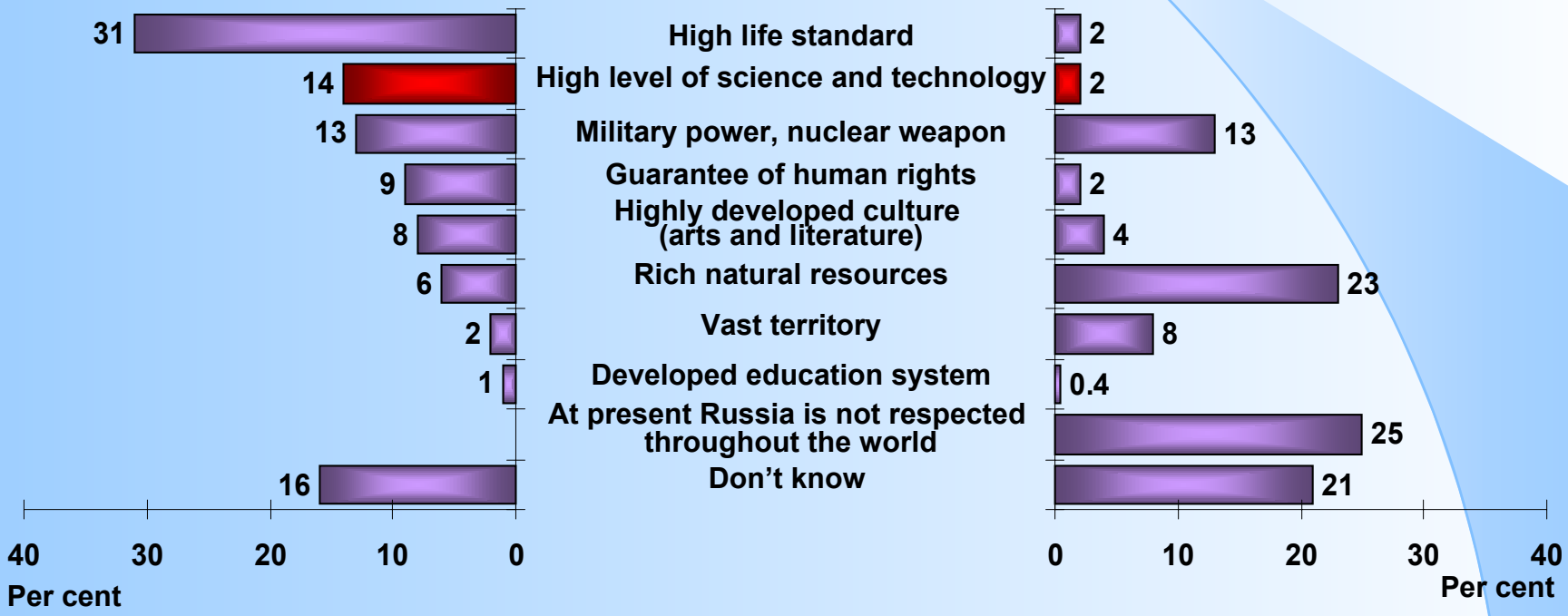

SCIENCE
TECHNOLOGY
INNOVATION
KNOWLEDGE-BASED OUTPUT

WHAT S&T DOES RUSSIA NEED?

Russia's prestige in the world
(per cent of respondents)

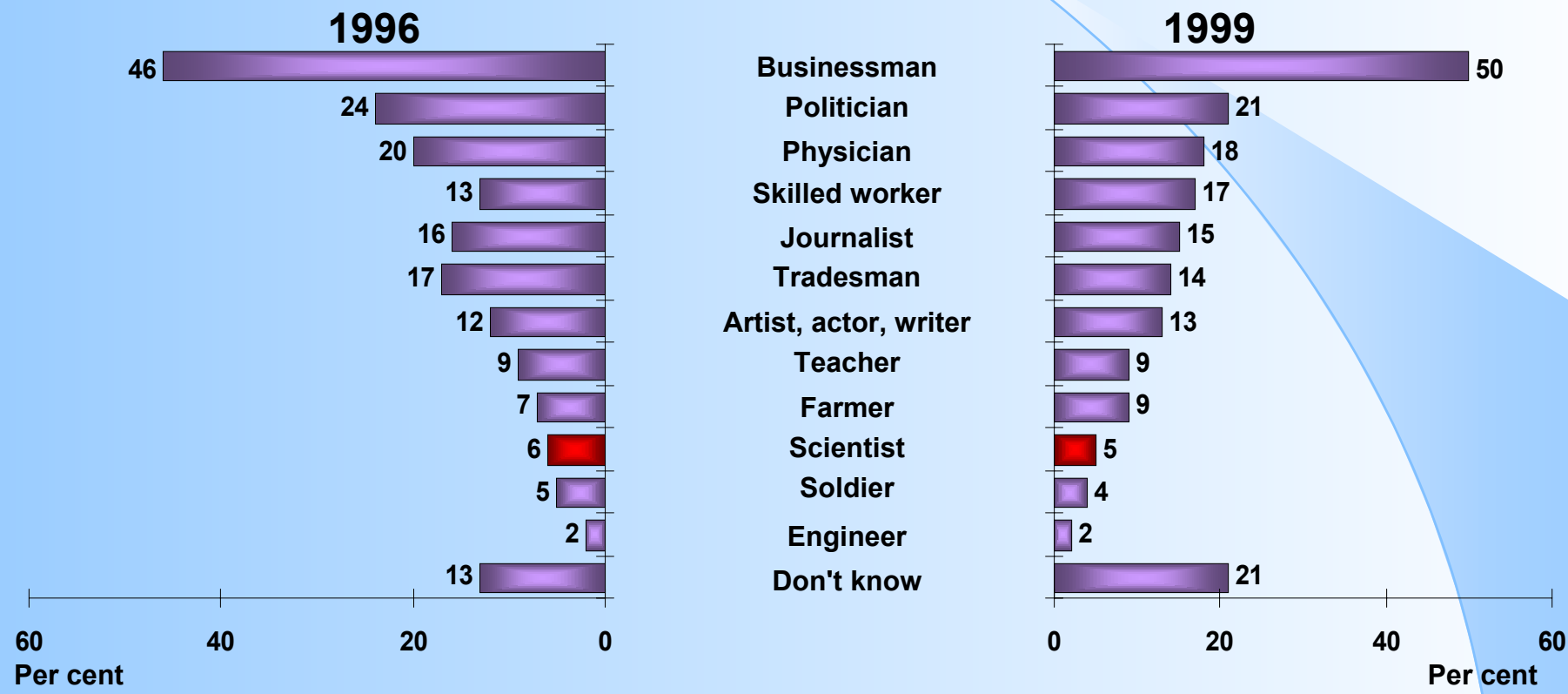
"What does a country primarily require to be respected by other nations?"

"What is now the primary reason of other nations' respect for Russia?"



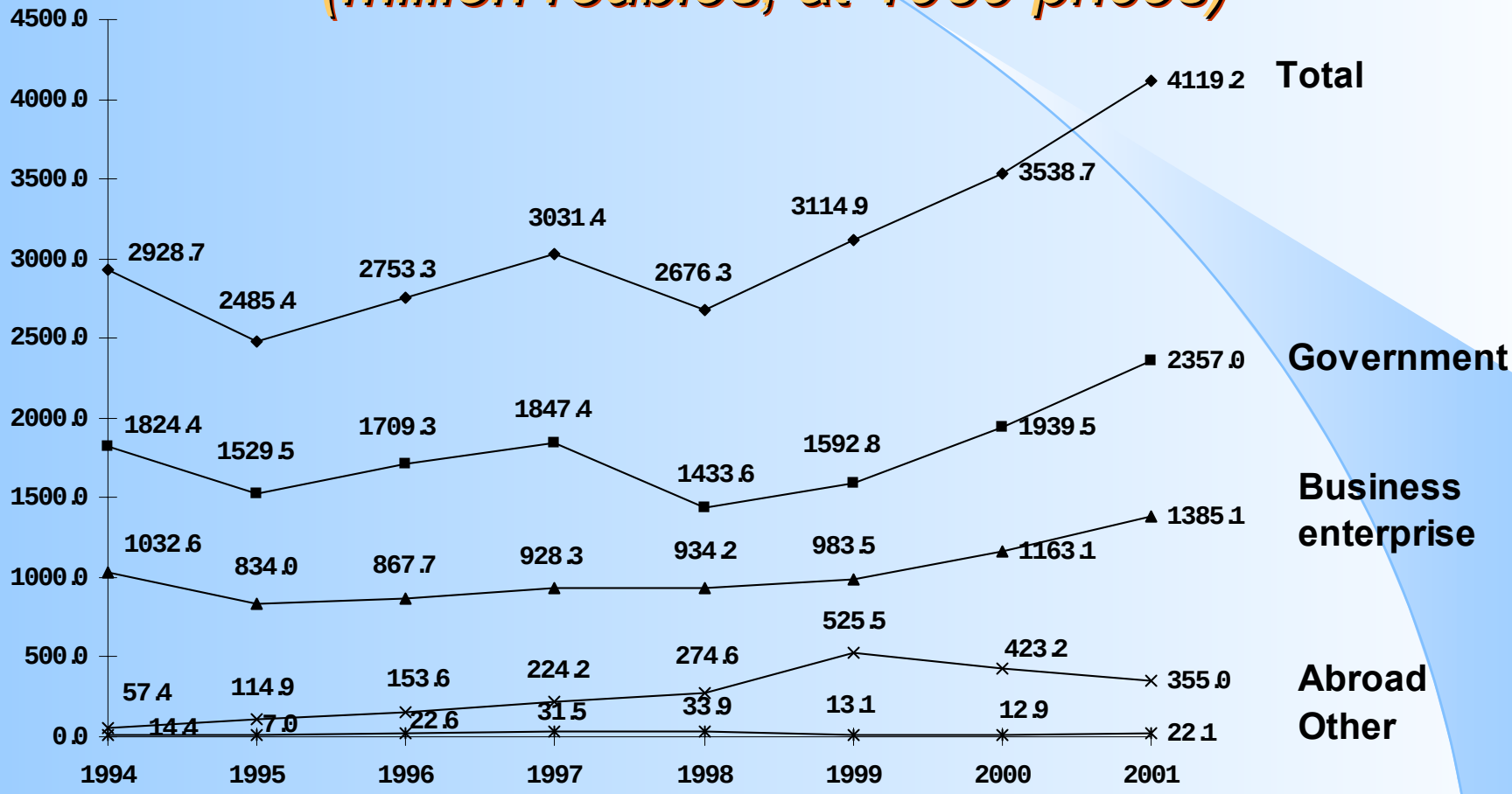
Rating of the most respected occupations
(per cent of respondents)*

In Russia the most respected occupation now is that of...

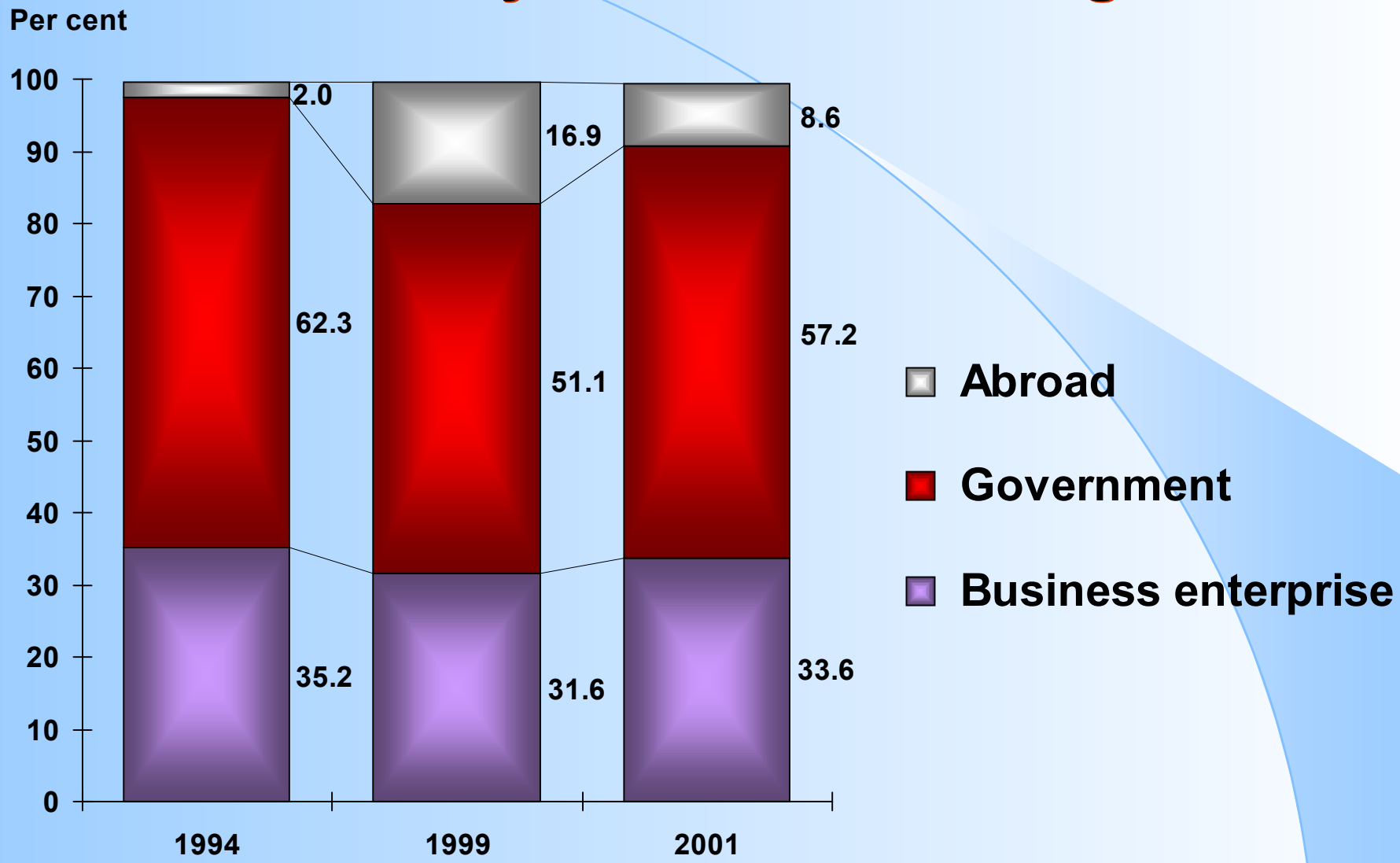


* The sum exceeds 100% because respondents could choose several options (up to 3).

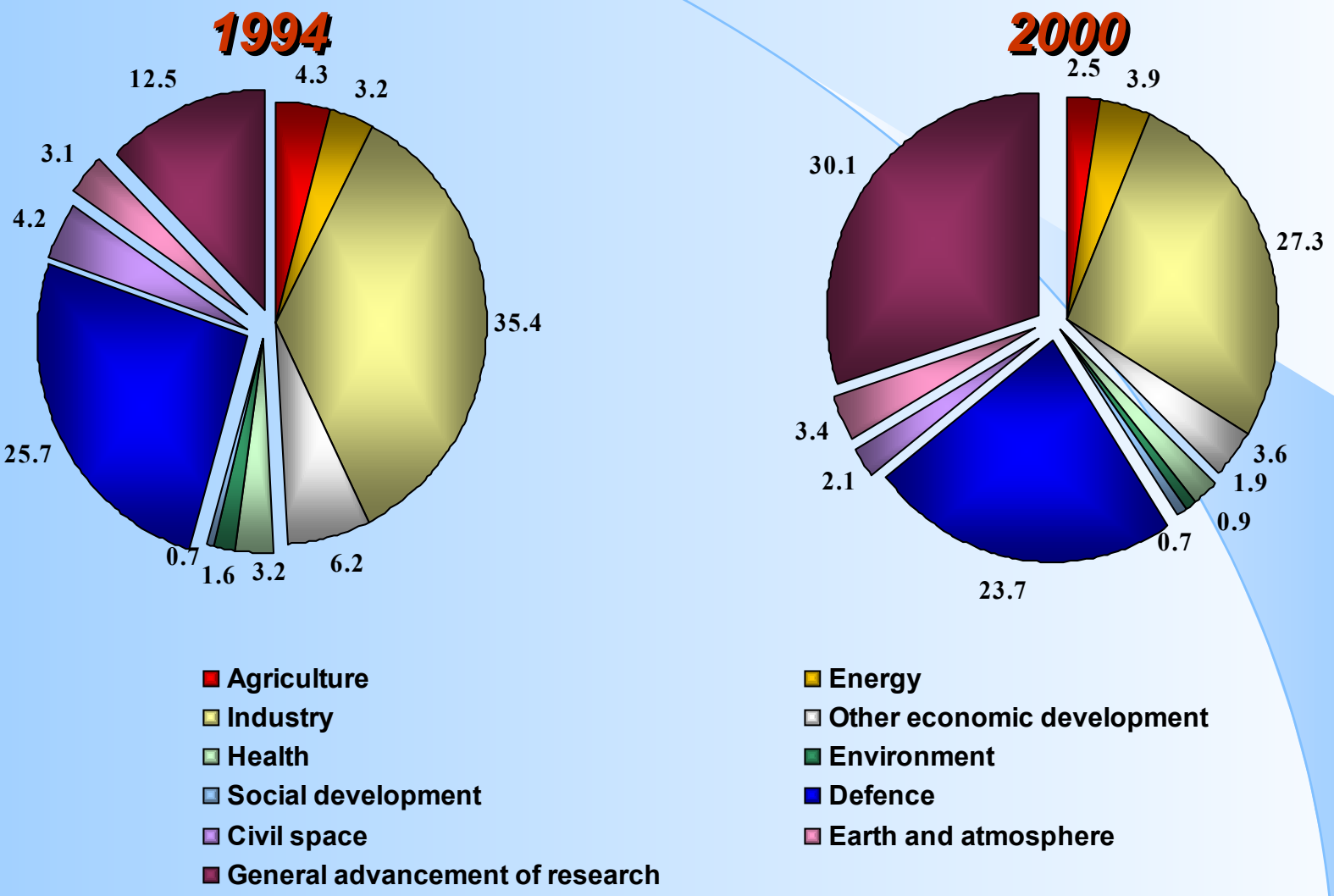
Gross domestic expenditure on R&D by source of funding
(million roubles, at 1989 prices)



GERD by source of funding



GERD by socio-economic objectives



Issues for discussion:

1. **Orientation:**
   - basic research vs. demand of economy
   - domestic market vs. export of technology

Export of technology	Russia – $ 240 million Austria – $ 2.4 billion US – $ 38 billion
% of the world high-tech export	Russia – 0.3% Singapore, Korea, Taiwan – 4-8% each

Identification of *real* priorities

Issues for discussion:

2. Priorities for support:

- **existing vs. stategic**
- **sectoral vs. targeted**

FORESIGHT

- **Integral framework for S&T and innovation policy**
- **Domestic strengths & weaknesses**

  vs.

  Socio–economic objectives & global agenda
- **Consensus mechanism for public/private partnerships (UK)**

Over 10 years of the crisis

- *Economic recession only*

  or

- *Institutional system*
- *Mentality (public R&D funding vs. innovation)*
- *Intellectual property rights*
- *Lacking market skills*

Institutional structure

- ***Research institute – principal form of R&D organisation***
  ~ 80% of R&D personnel (55% in 1990)

R&D institutions by type

	1990	2001
Total	4646	4037
Research institutes	*1762*	*2676*
Design organisations	937	289
Construction project and exploration organisations	593	81
Higher education institutions	*453*	*388*
Industrial enterprises	*449*	*288*
R&D expenditure	100%	37.8%
R&D personnel	100%	45.6%

GERD per an R&D institution
(million 1989 rubles)

1990	2001
2.3	1.02

40% R&D personnel are without university degrees

Structure of R&D expenditure
(per cent)

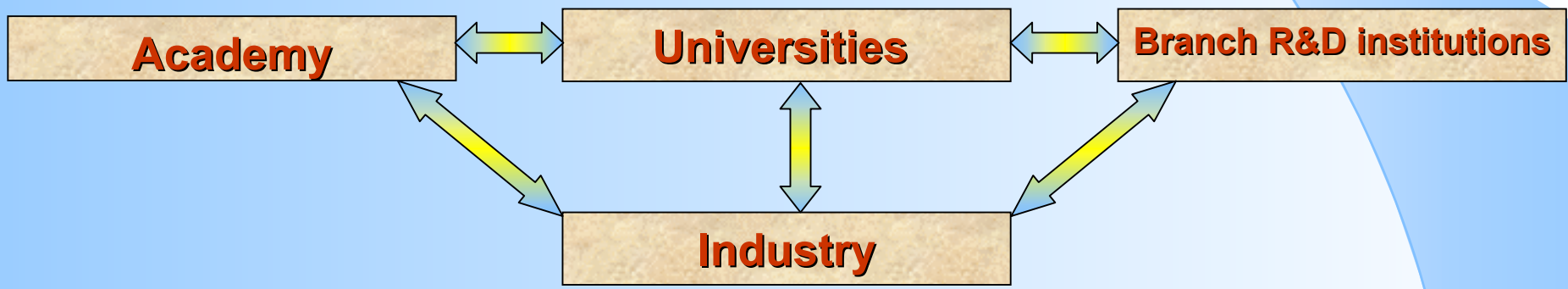
	Enterprises	Universities
Russia	**6**	**5**
EC-15	65	21
Japan	71	15
US	75	14

Issues for discussion :

3. Institutional structures:

preservation or modernisation?

- efficient public sector
- integration

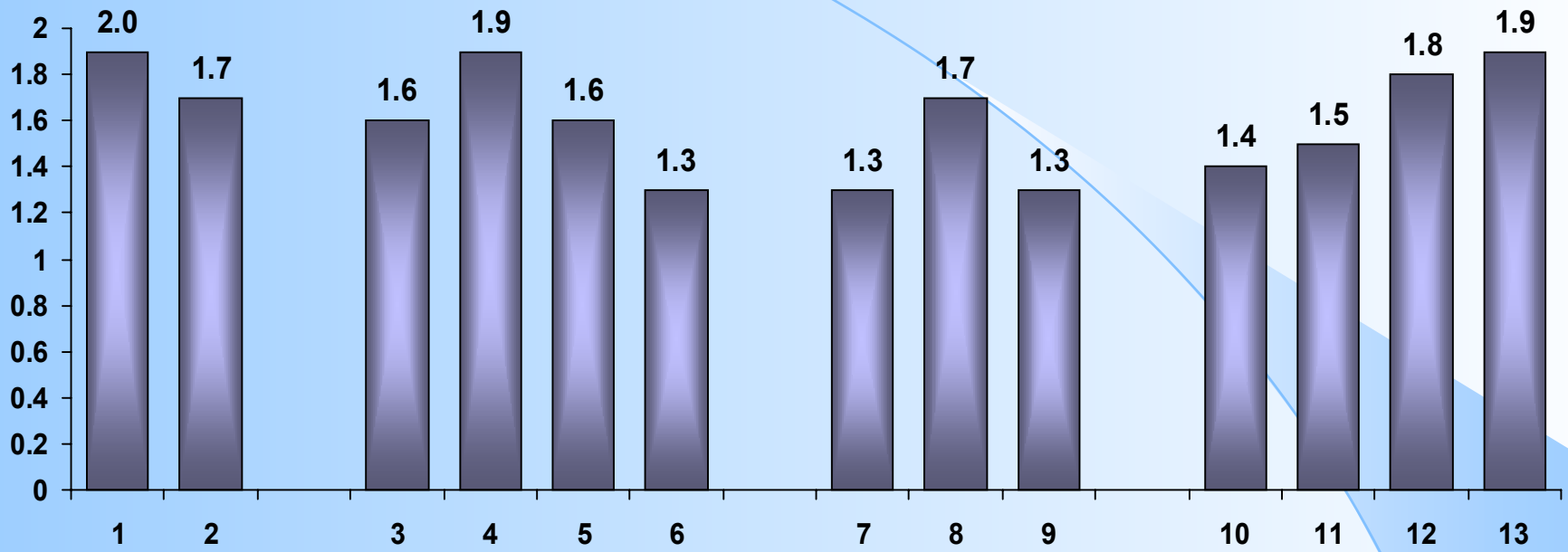


What ways ?

Centres of excellence

- ***A vital solution for scarce resources***
- ***Objectives***
  - Targeted support
  - Preservation vs. development?
  - Institutions as a whole vs. productive groups?
- ***Coverage***
  - Coordination with priorities
  - Pure basic research
  - Industrial R&D as a subject to public funding
- ***Criteria***
  - Scientific excellence
  - Economic & social impact?
  - Market demand?
- ***Implementation***
  - Objective selection
  - Regular evaluation
  - International best practice experience

Sources of information for innovation by rate of importance: 2001



Internal sources:

1 – within an enterprise

2 – within a group of enterprises

External commercial sources:

3 – suppliers of materials, equipment, and components

4 – consumers of products

5 – competitors in the same sector

6 – consulting and information firms

R&D institutions:

7 – academy

8 – industry

9 – higher education

Generally accessible information:

10 – invention descriptions, official publications by Rospatent, etc.

11 – conferences, workshops, symposia

12 – S&T literature

13 – exhibitions, fairs, and other advertising events

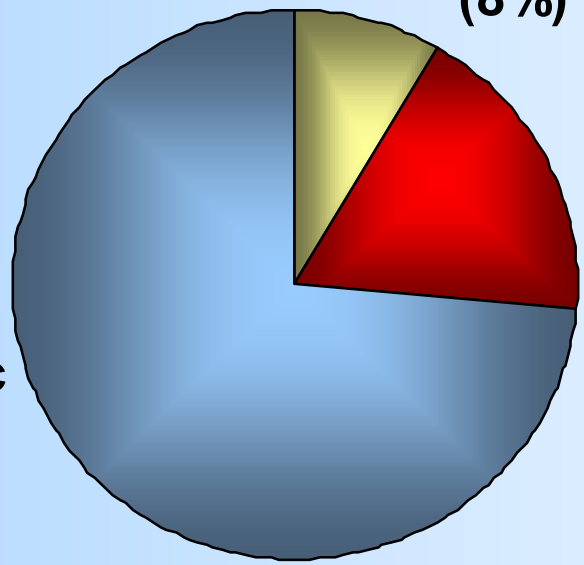
Technology transfer offices

- **Functions**
- **Positioning**
- **Organisational & legal forms?**
  - Public organisations
  - Units of ministries / agencies
  - Units of research institutes / universities
  - Private firms
- **Mechanisms of financing and real estate delivery**
- **Intellectual property rights**

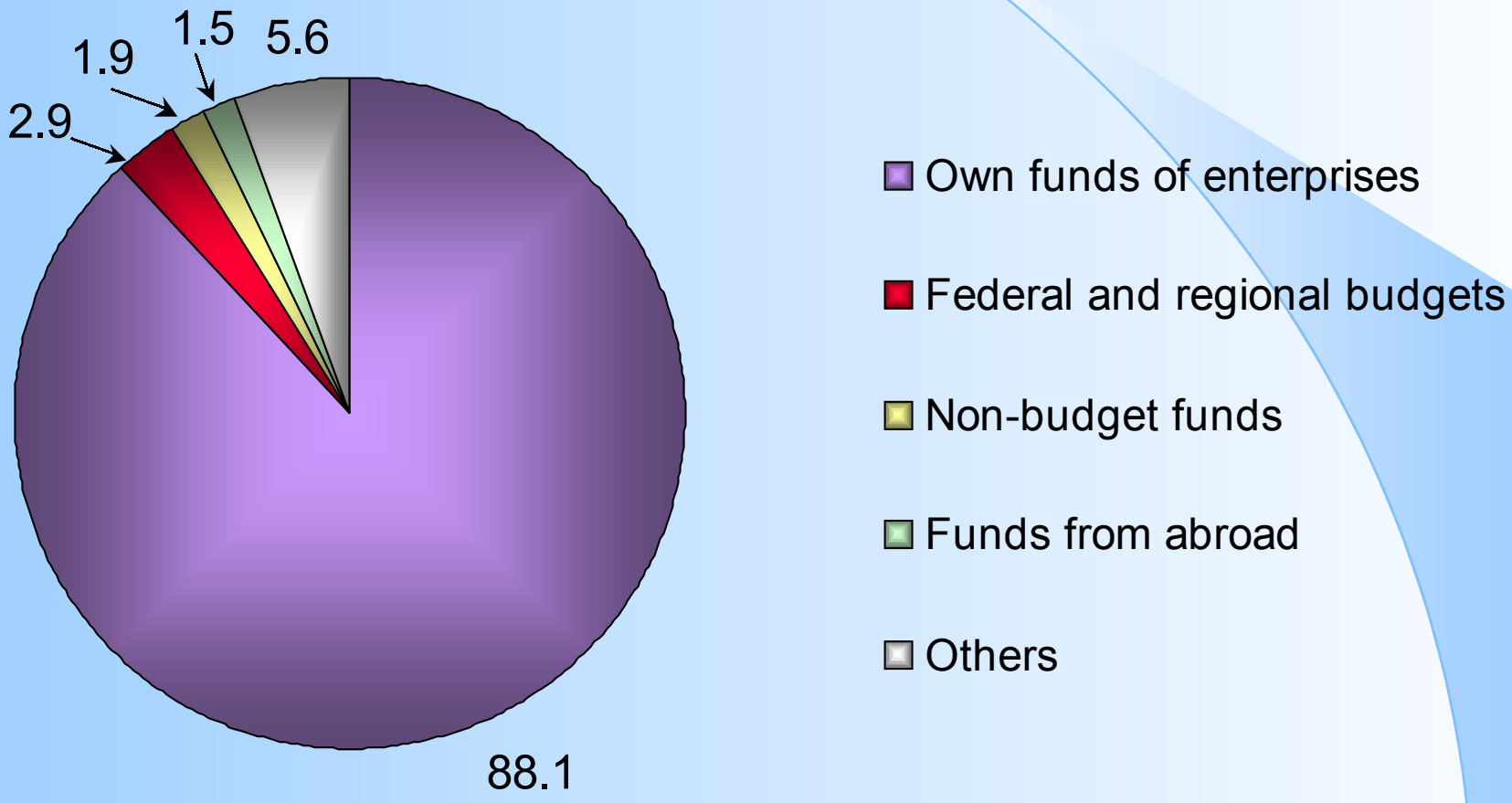
Government financing

	2001	2002
Appropriations for civil R&D as % of federal budget expenditure	1.74	1.56

Composition (2002)



Expenditure on technological innovation in industry by source of funds: 2001



Issues for discussion :

4. Distribution of government funds for S&T (very limited amount):

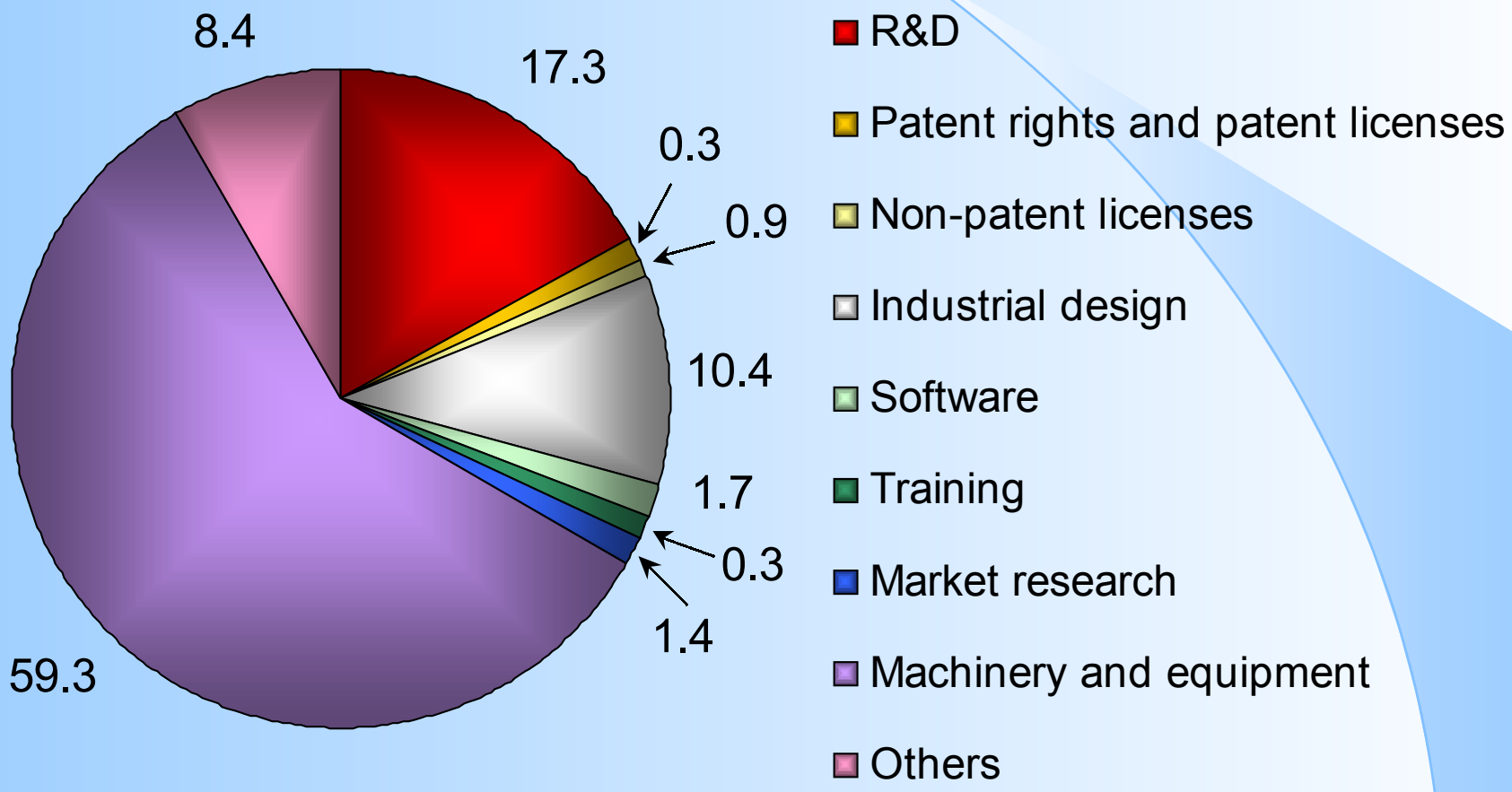
- institutes / priorities / grants
- package financing of institutes / projects
- long-term project financing
- co-financing of applied R&D (matching funds)
- government contribution to innovation funding
- evaluation of institutes / projects

Intellectual property

- 5% of patents and utility models – subjects to commercial transactions (1992-2001)
- Role of public organisations in technology commercialisation

Public organisations:	licensers	8%	licensing contracts
	licensees	7%	

Expenditure on technological innovation by type of innovation activity: 2001



Issues for discussion:

5. **Government financing and intellectual property rights**

But time is running …