

S&T Strategy and Foresight Activities in Japan

February 27, 2003

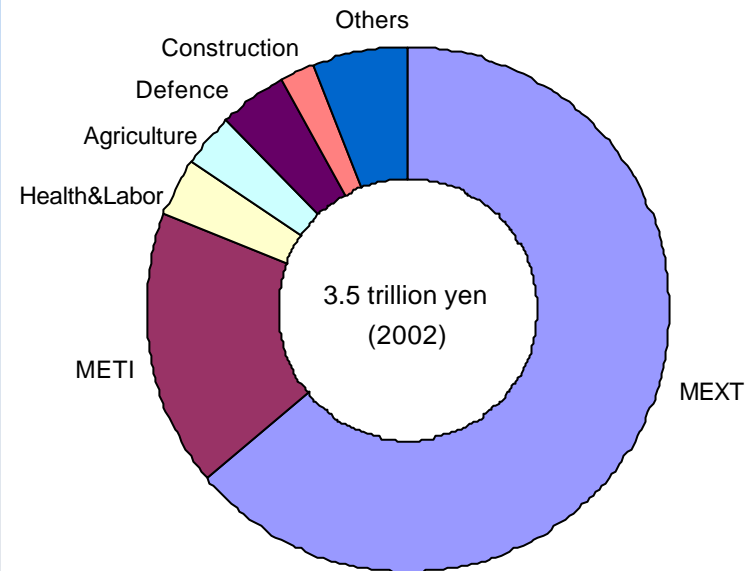
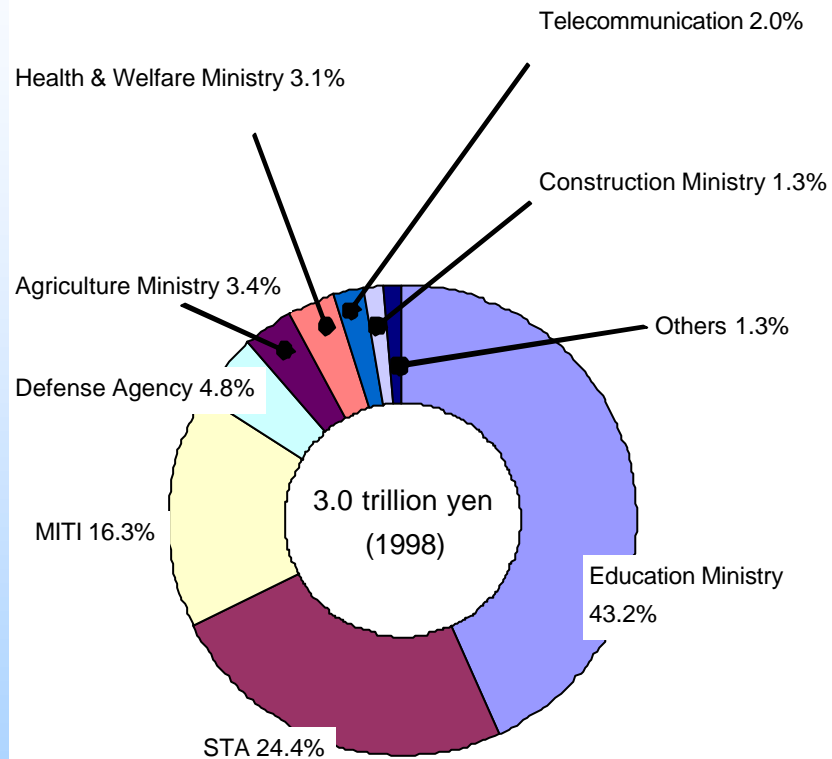
The Second International Conference on
Technology Foresight

Terutaka Kuwahara
Director, Science & Technology Foresight Center
National Institute of Science and Technology Policy (NISTEP)

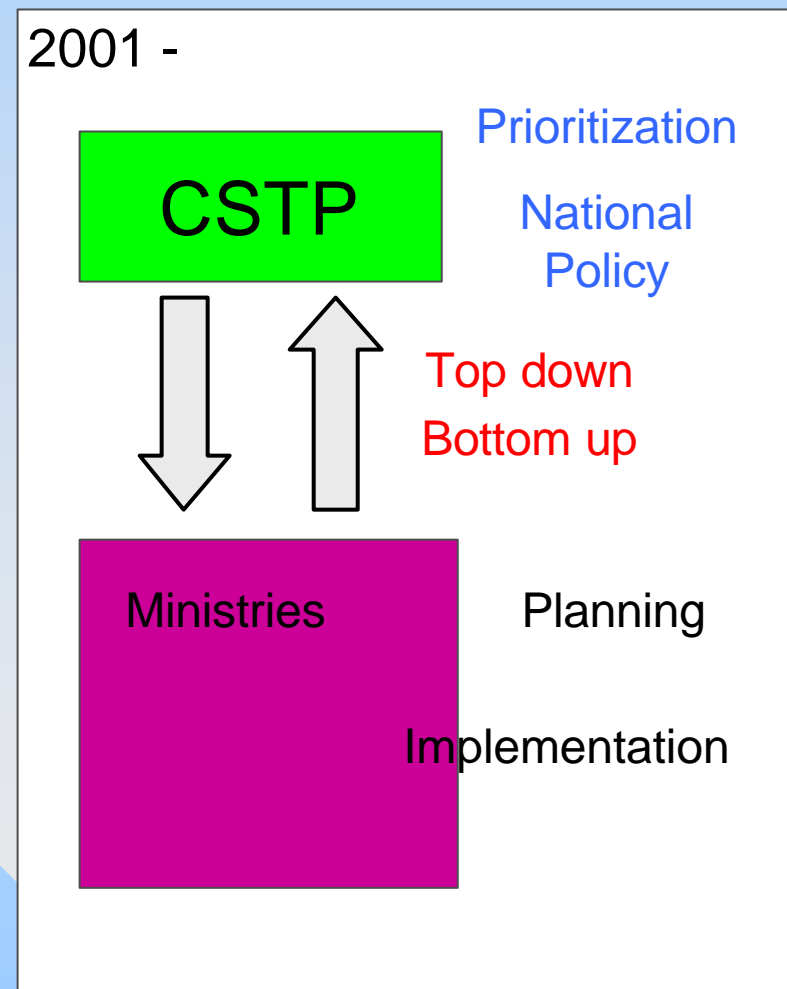
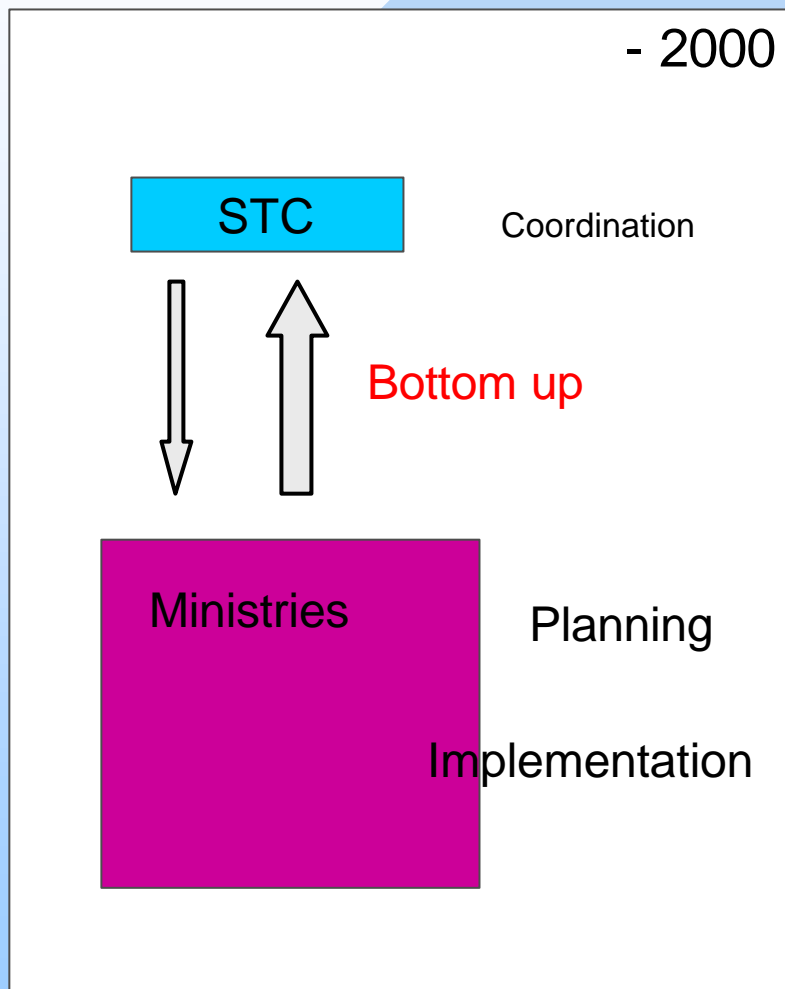
Outline

1. Political Backgrounds of S&T
2. Review of Past Foresight
3. STFC of NISTEP
4. Future project

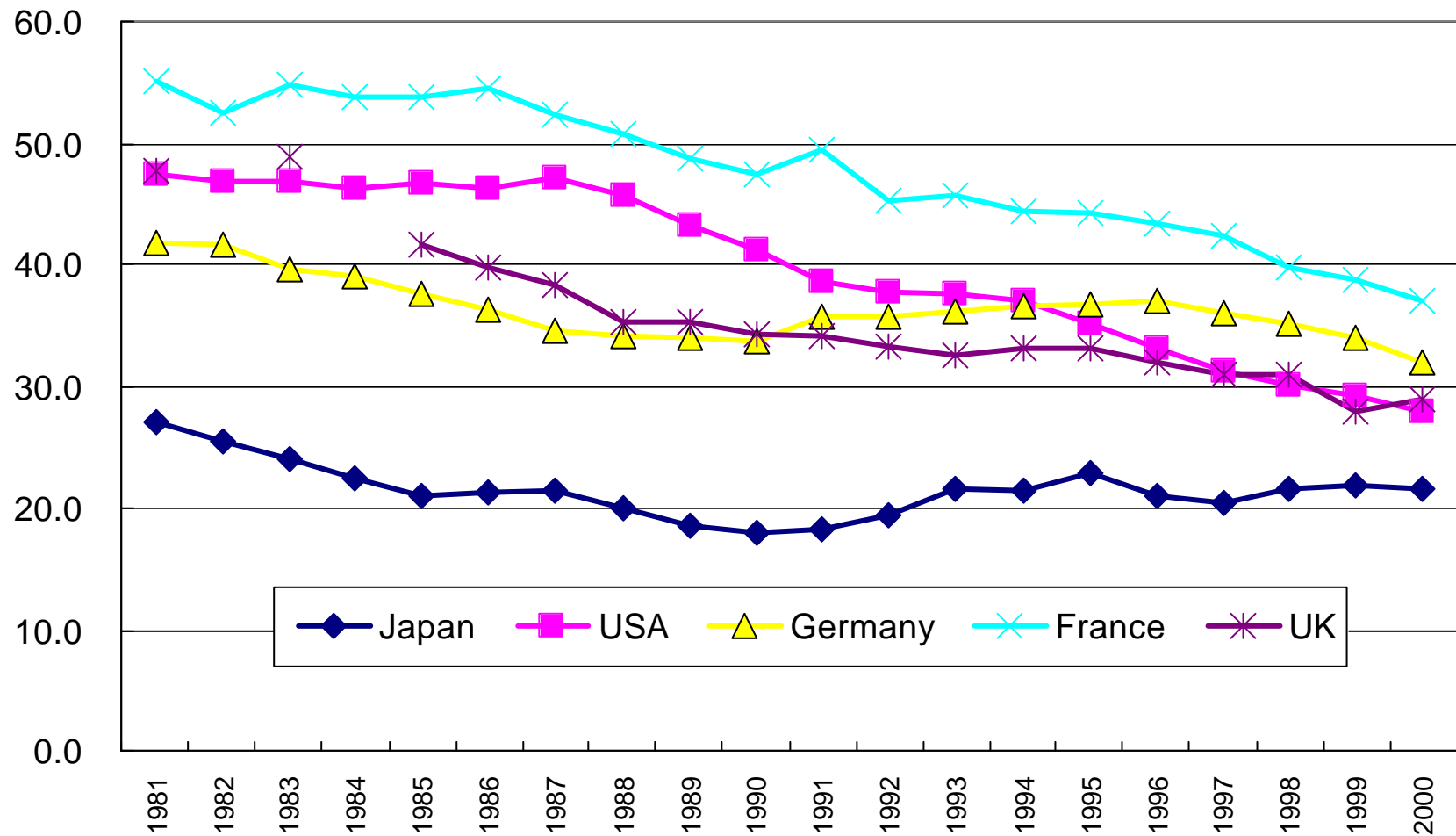
S&T Budget



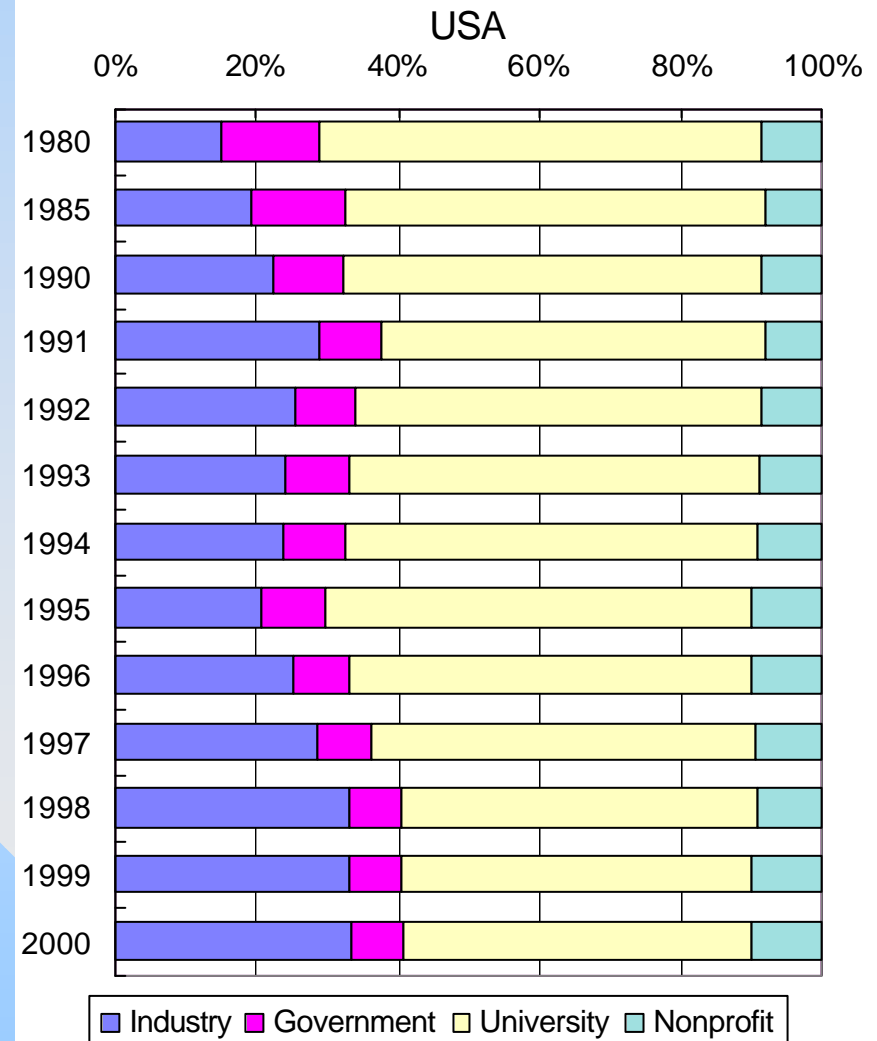
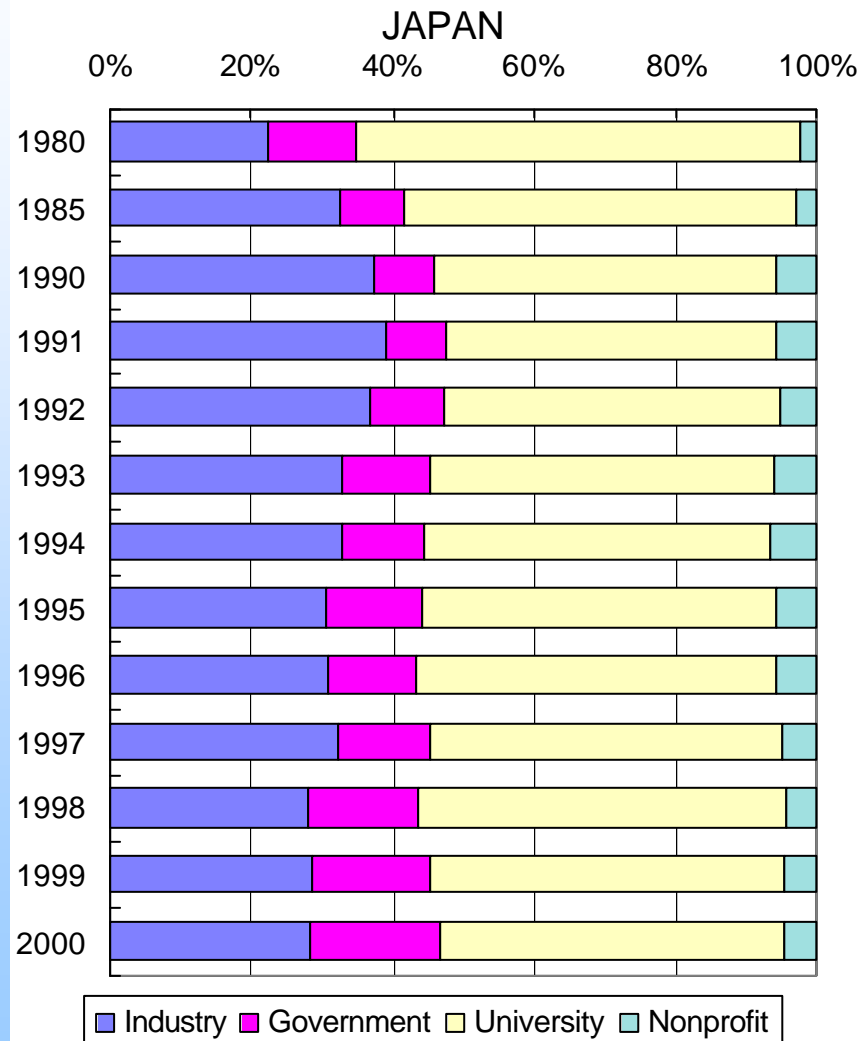
Political Structure



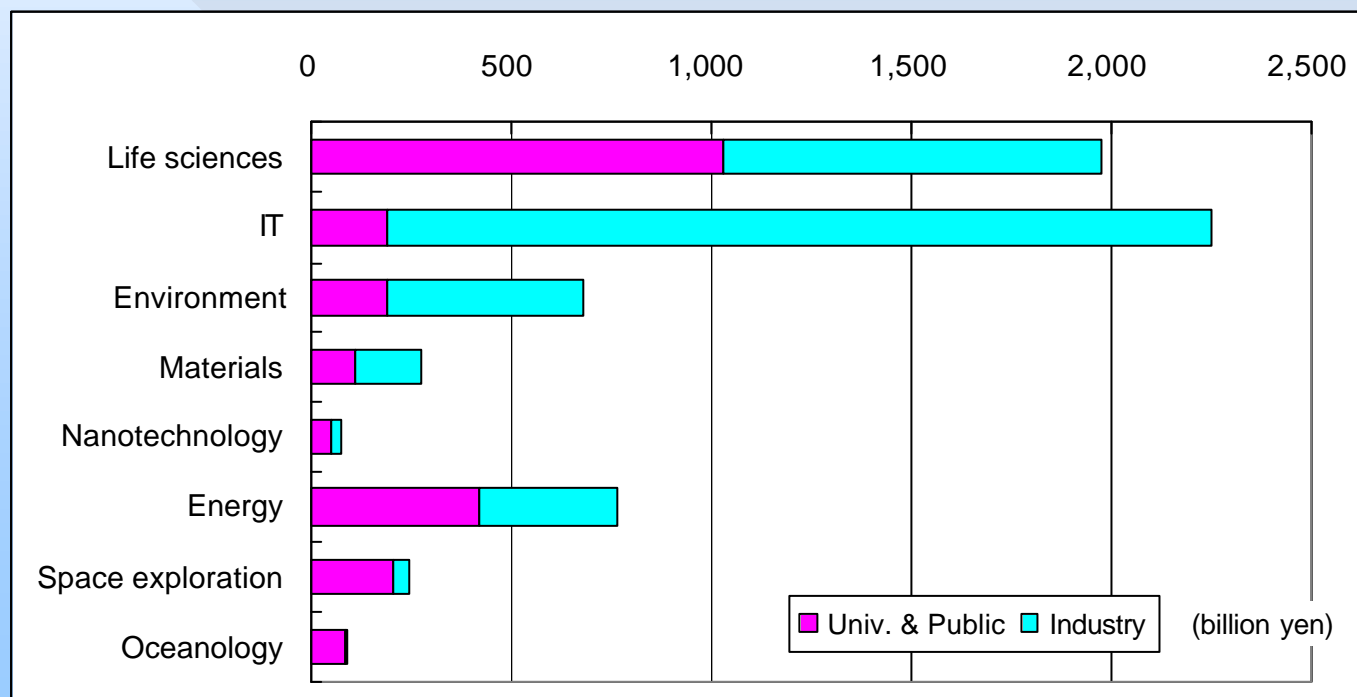
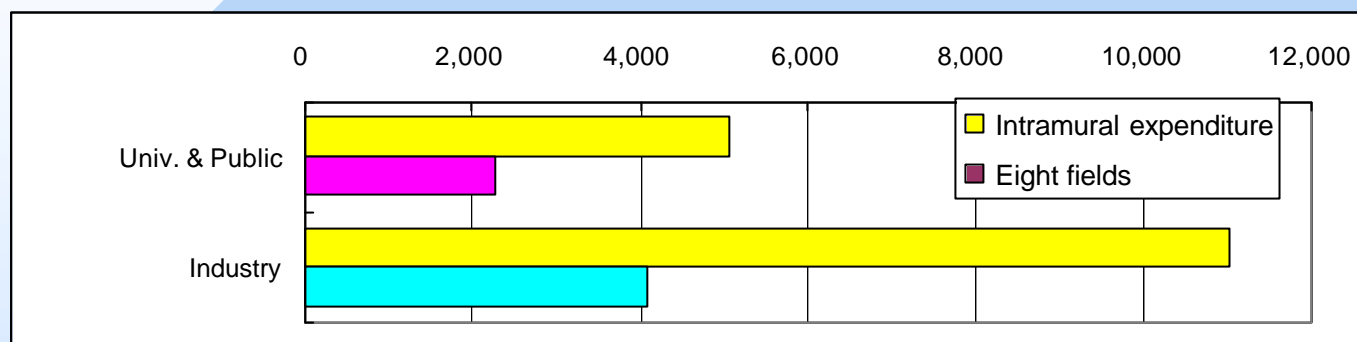
Government's Share of R&D Expenditure



Basic Research by Sector



R&D Expenditure by Fields (2001)



Japanese Technology Foresight in 1970s and 1980s

- Japan was on the catch up process
- To form common vision/consensus on future priority and perspective
- To lead industry through “long term visions”
- Moderate link to government’s S&T policy
 - Indirect effects to R&D resources allocation

Structure of National Foresight

◆ Holistic
DELPHI

NISTEP

◆ Macro-level

Ministries

◆ Meso-level

Groups of companies

◆ Micro-level

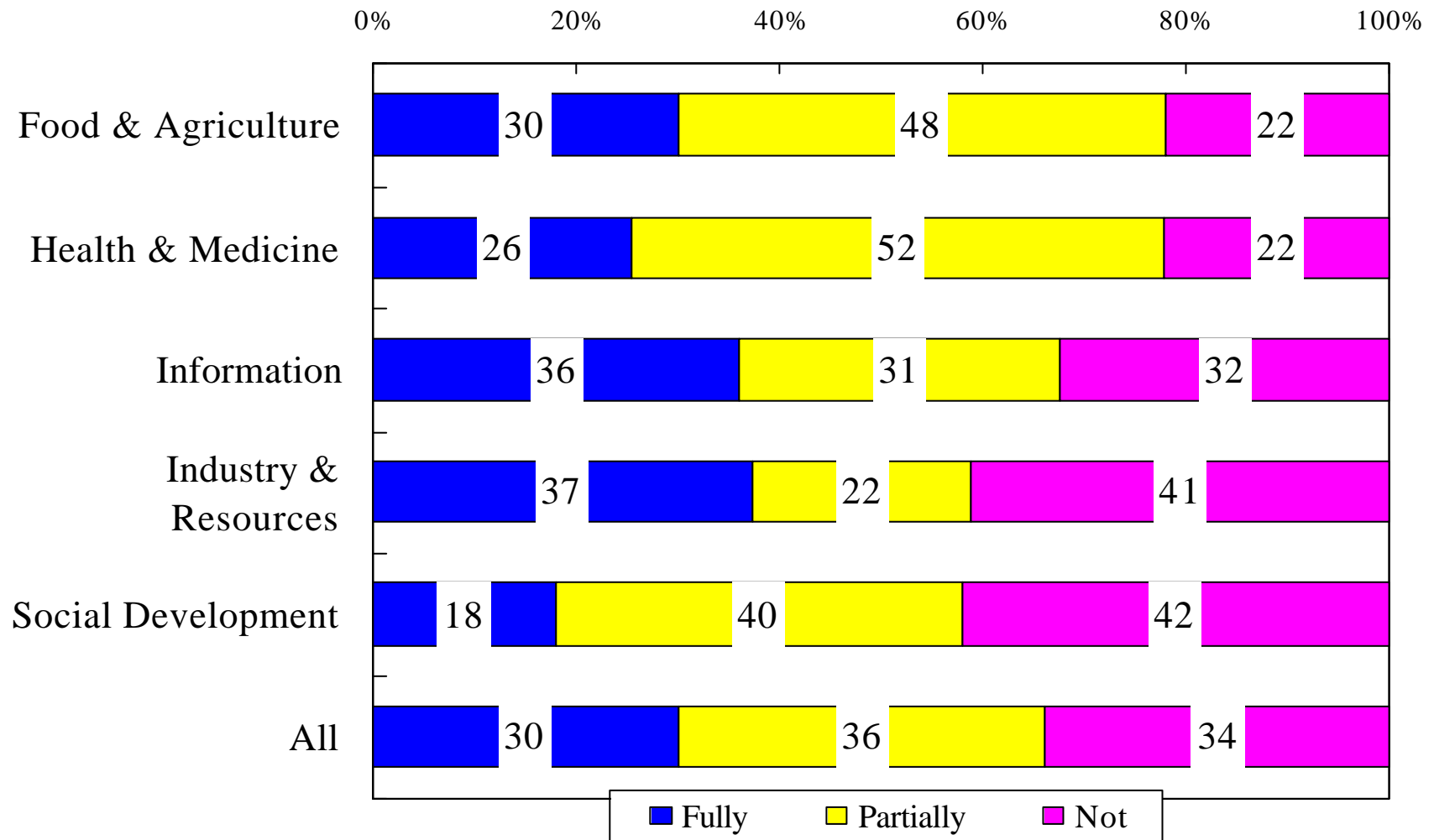
Individual companies
and research

institutes

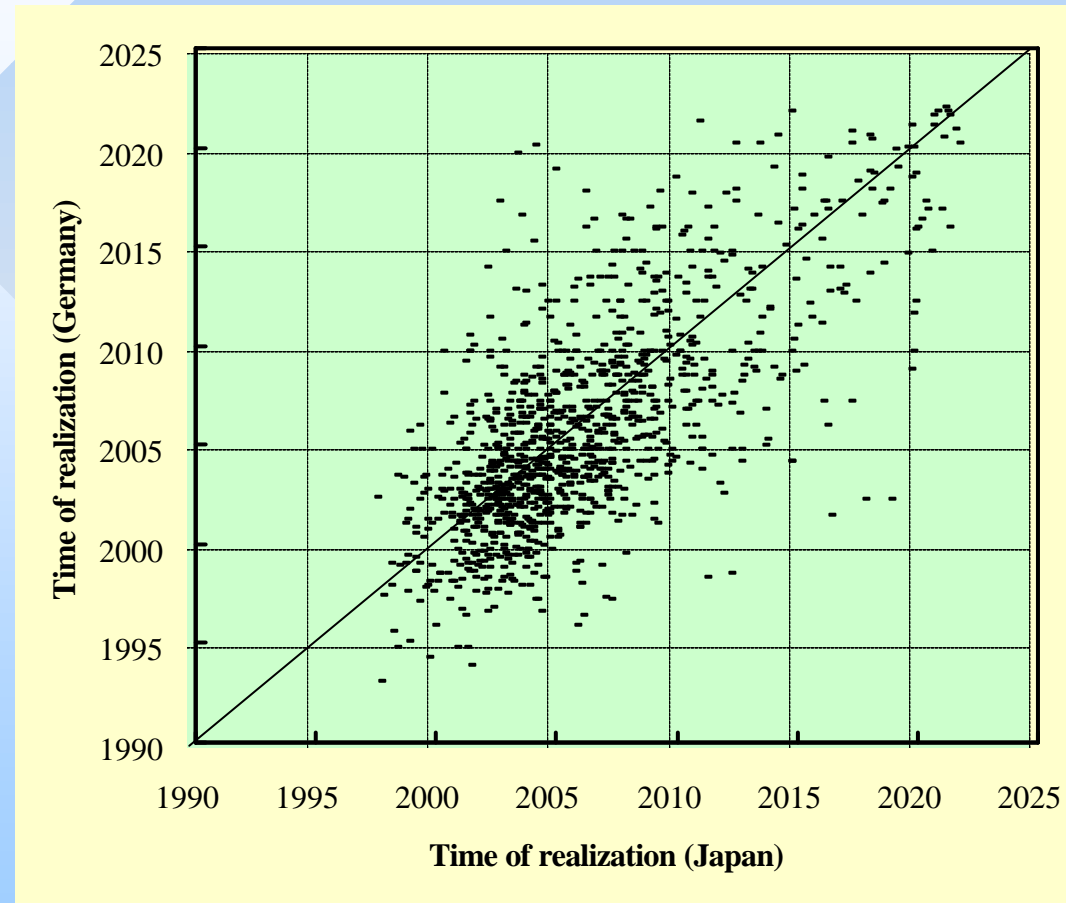
History of Japanese Delphi Survey

NO.	Survey Year	Fields	Topics	Experts
1	1970-1971	5	644	2482
2	1976	7	656	1316
3	1981-1982	13	800	1727
4	1986	17	1071	2007
5	1991	16	1149	2385
6	1996	14	1072	3586
7	2000	16	1065	3106

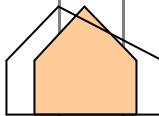
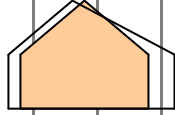
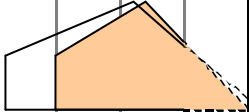
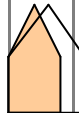
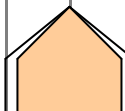
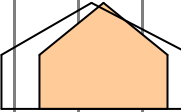
Evaluation of First Survey (1971)



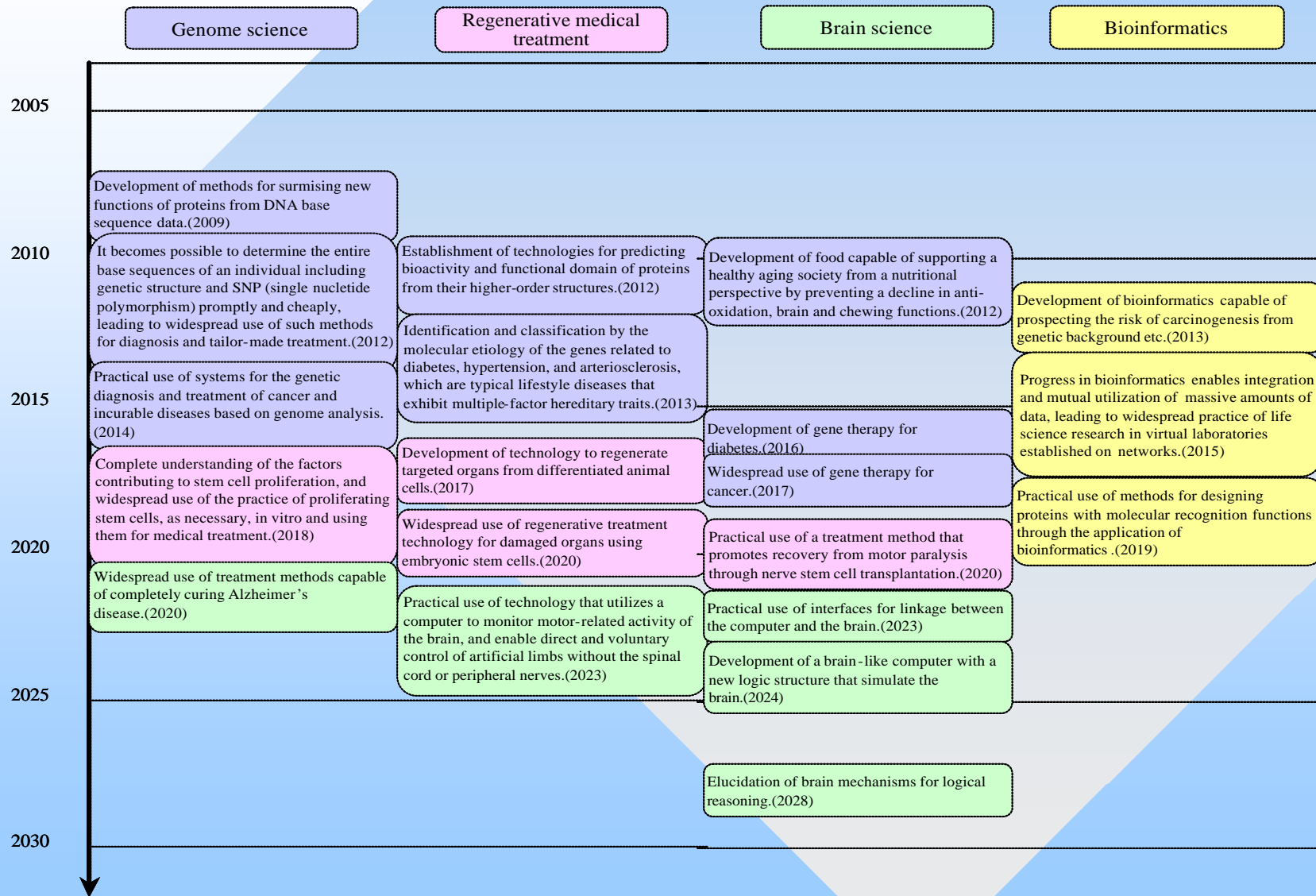
Japanese and German Time of Realization (Japanese 92 & German 93)



Examples of Delphi Topics

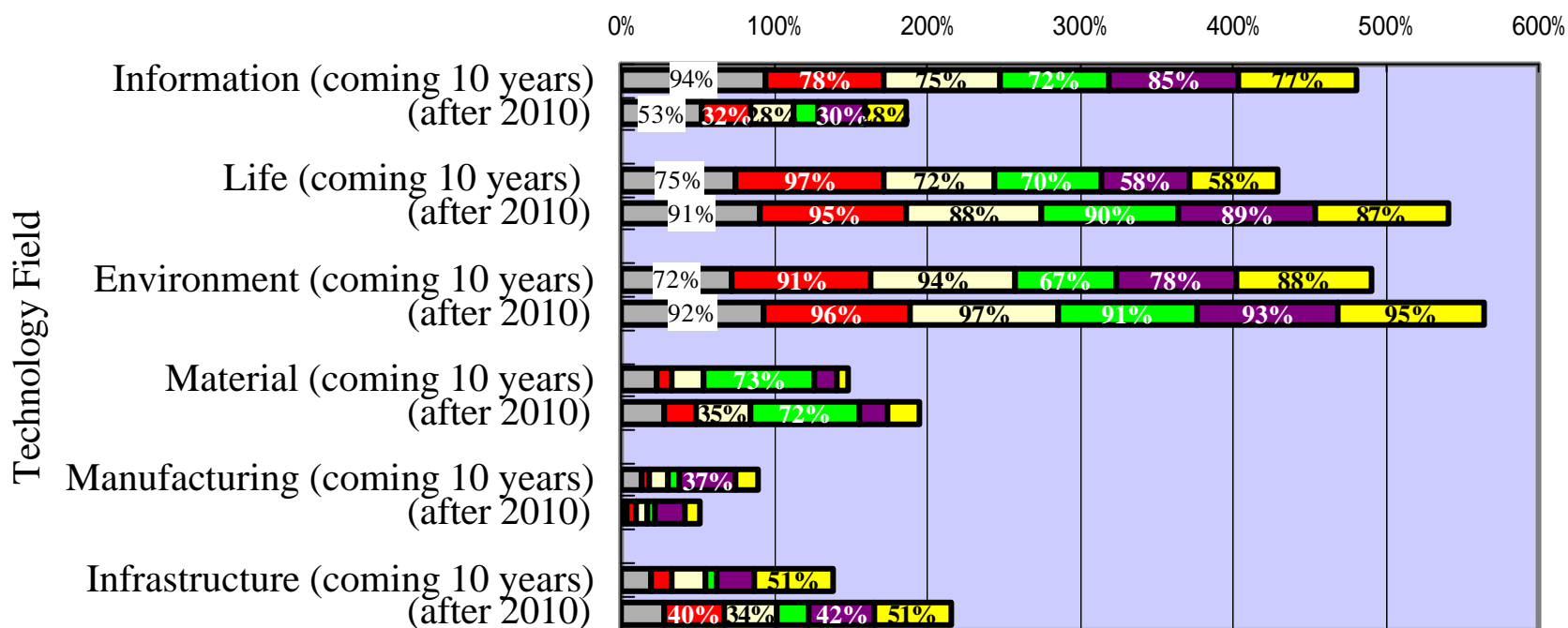
Topics	Number of respondents	Importance Index	Time of realization						Never	Don't know
			2001	2006	2011	2016	2021	2026		
Elucidation of carcinogenic mutation mechanisms.	113	88							2	6
Development of drugs capable of preventing the occurrence of certain types of cancer.	212	87							2	5
Development of technology capable of forecasting the occurrence of major earthquakes (magnitude 7 or above) several days in advance.	102	92							29	14
Practical use of a highly secure next-generation internet that allows the transmission of real-time information, leading to the implementation of internet-based telephone services and motion video broadcasts.	232	92							0	1
Practical use of large-area amorphous silicon solar cells with a conversion efficiency of more than 20%.	144	91							1	7
Widespread use of non-fossil energy sources (wind, geothermal, solar (photovoltaic/solar thermal) and waste heat) in all areas of life including household, industry and transportation.	93	94							1	10

Development in Life Science



Important fields in “coming 10 years” and “after 2010”

Important Fields (coming 10 years, after 2010)



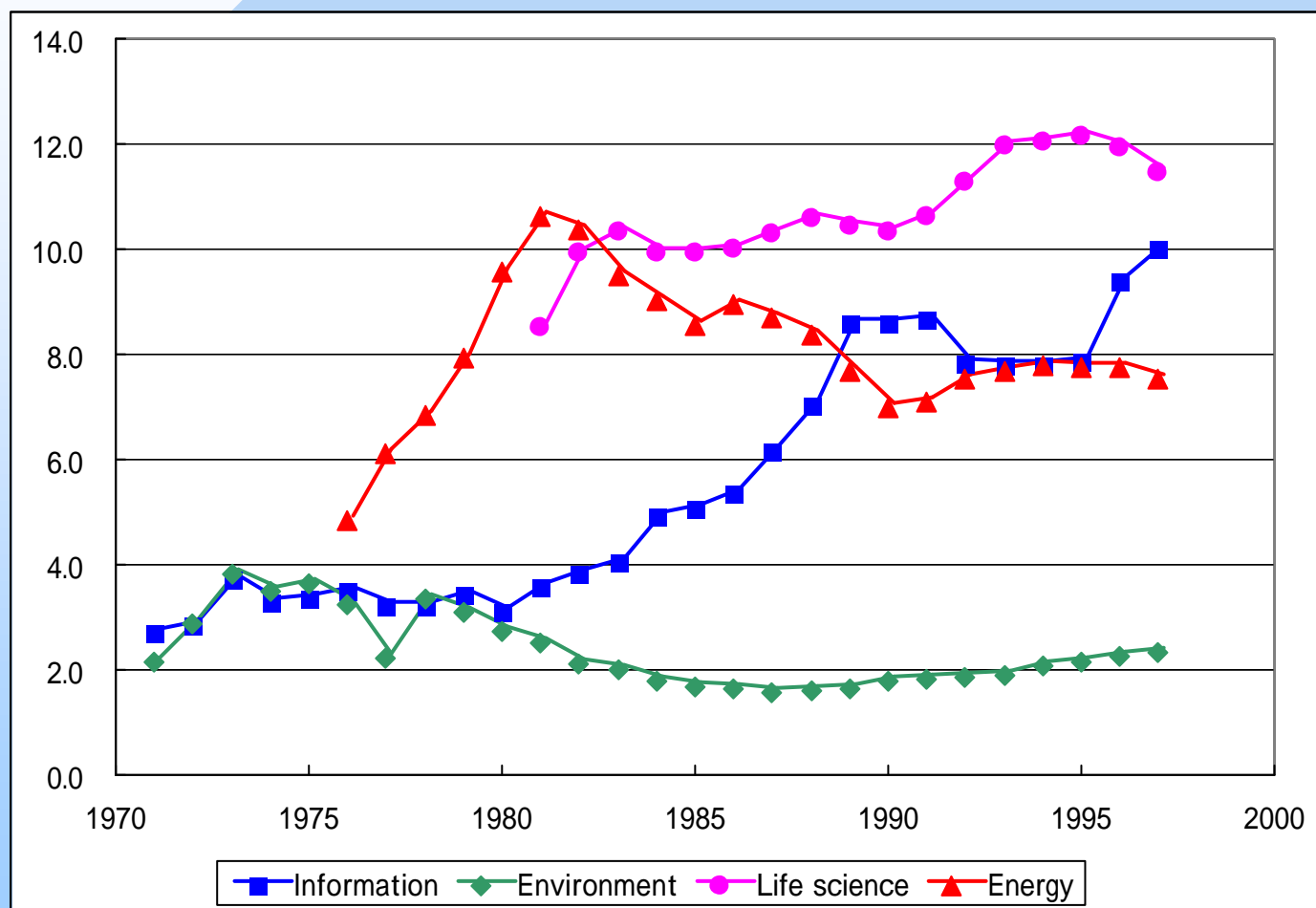
<Field of Respondents>

Information
 Life
 Environment
 Material
 Manufacturing
 Infrastructure

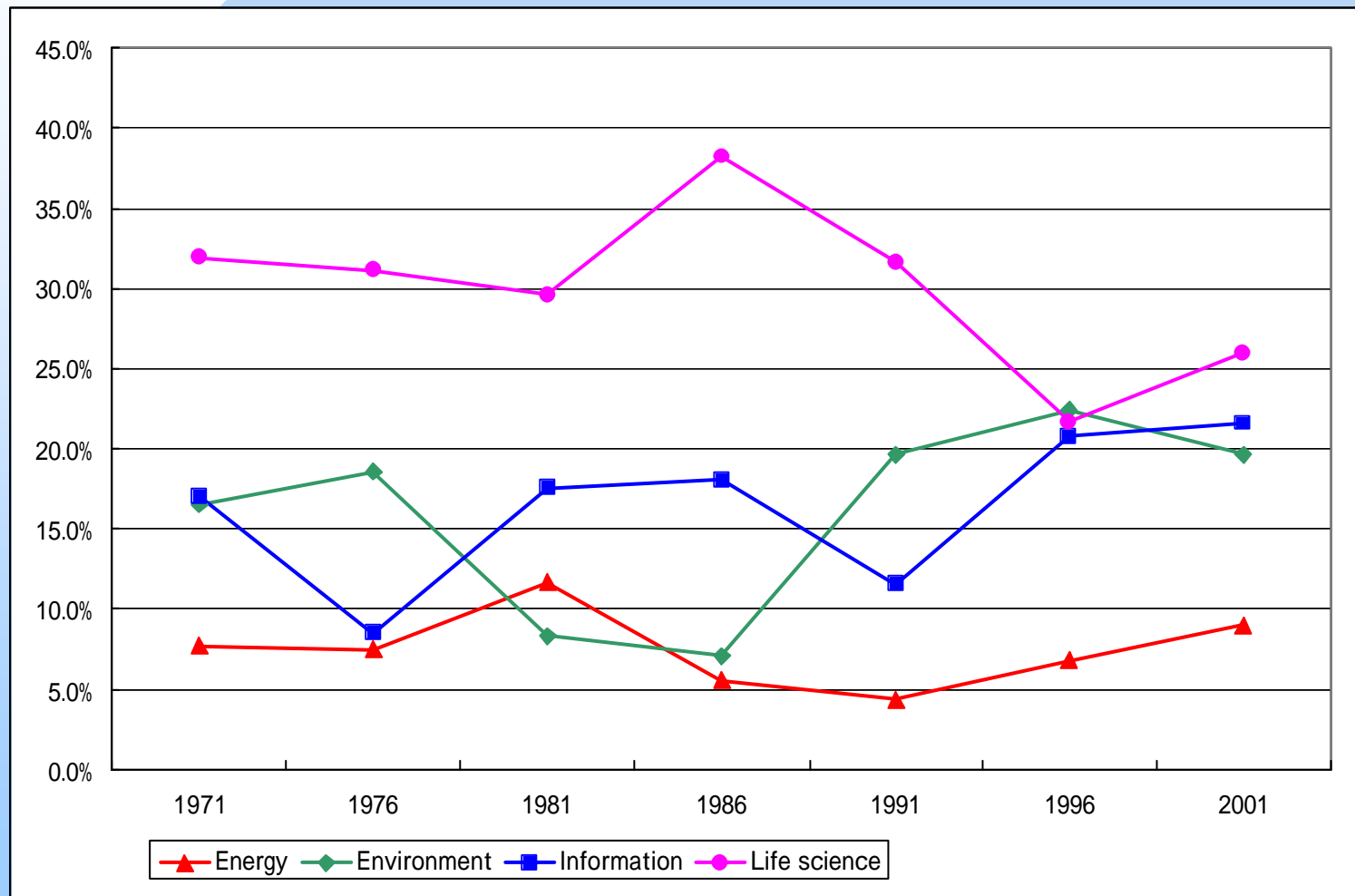
Categorization of the most Important 100 topics

Category	7th survey	6th survey	5th survey
Environment	27	25	28
Information	19	24	10
Life Science	28	17	37
Natural Disaster	8	11	9
New Energy	9	11	6
Others	9	12	10

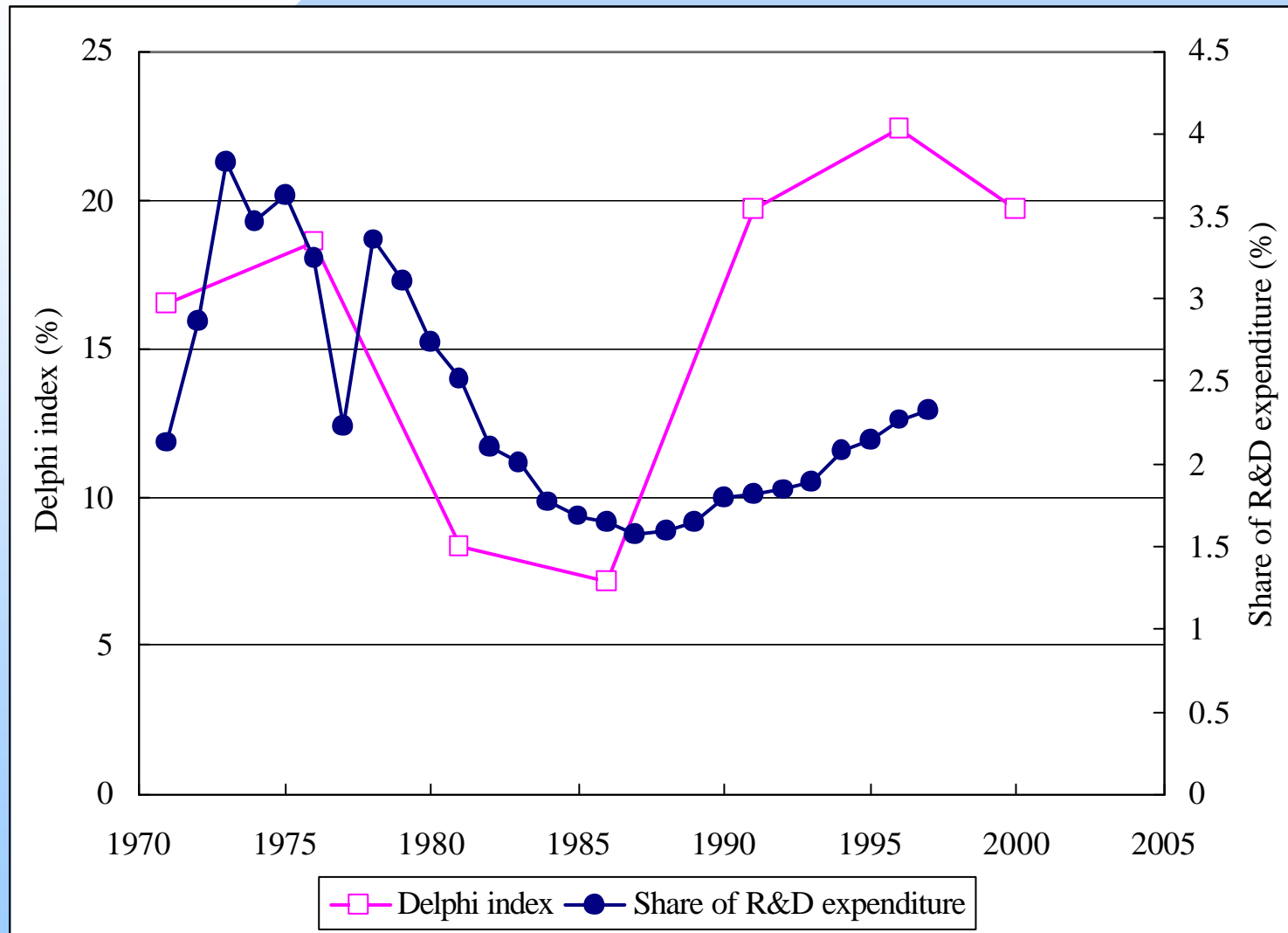
Trends in National R&D Investment by Area



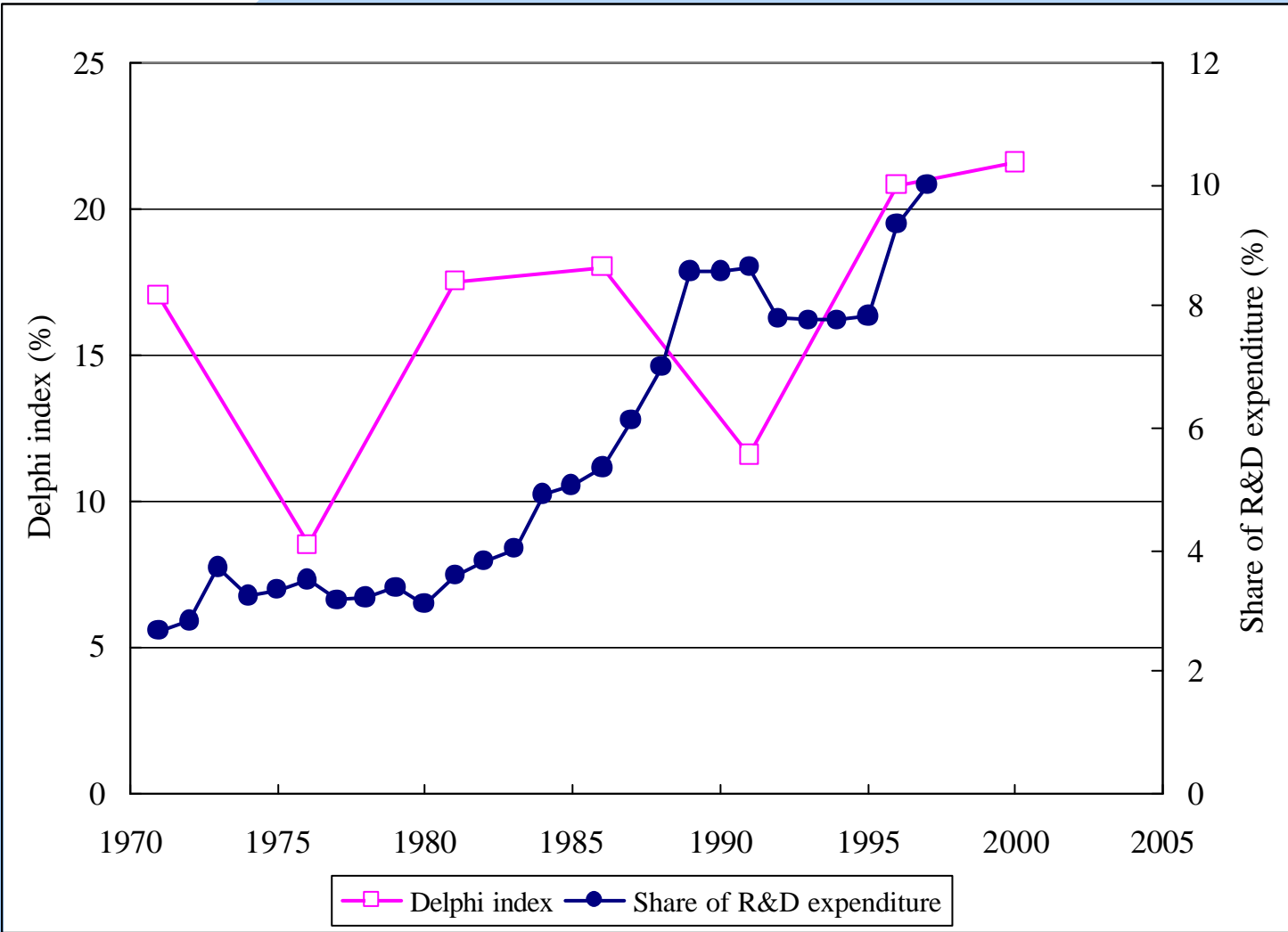
Trends in the Delphi Index by Area



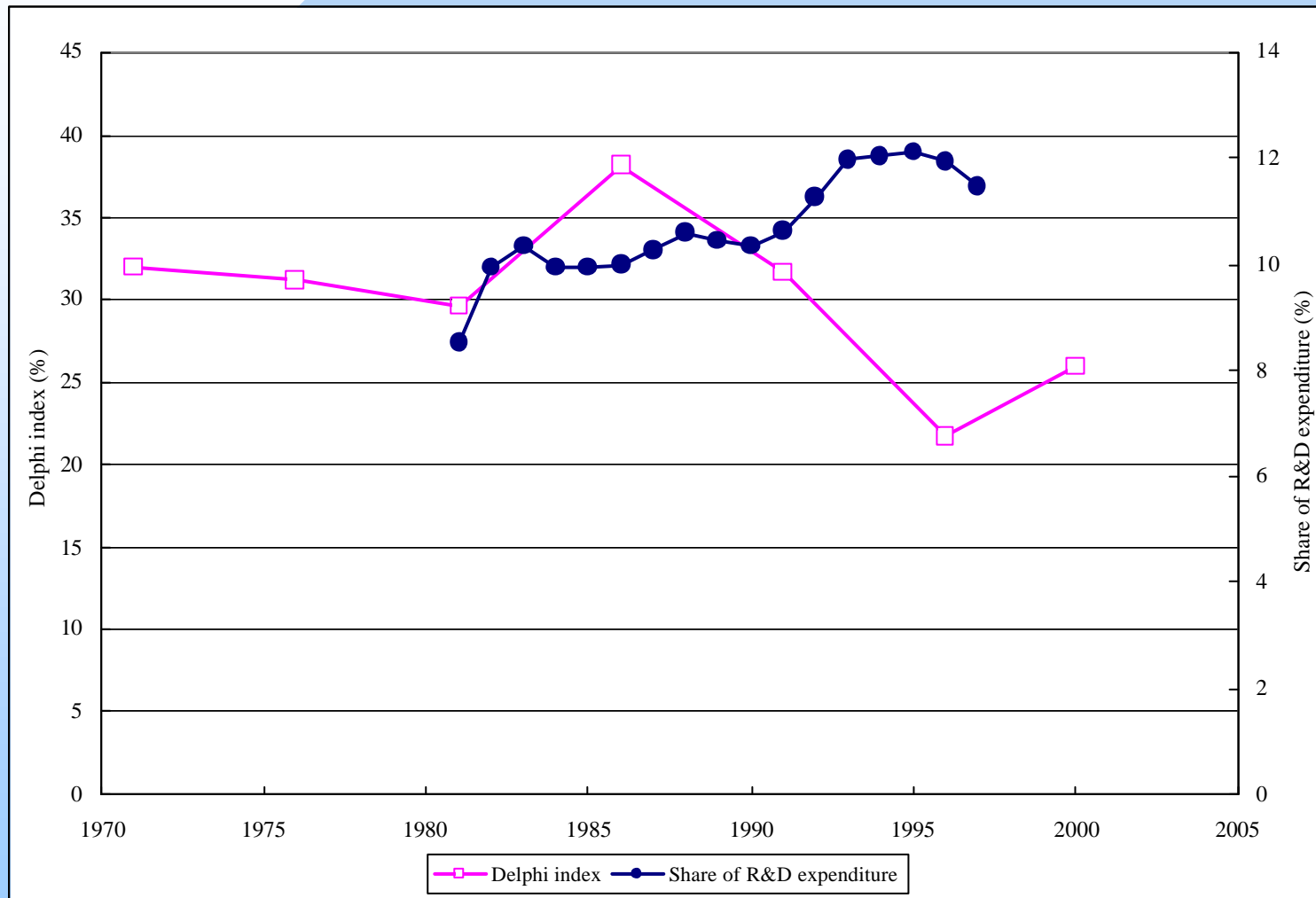
Environment



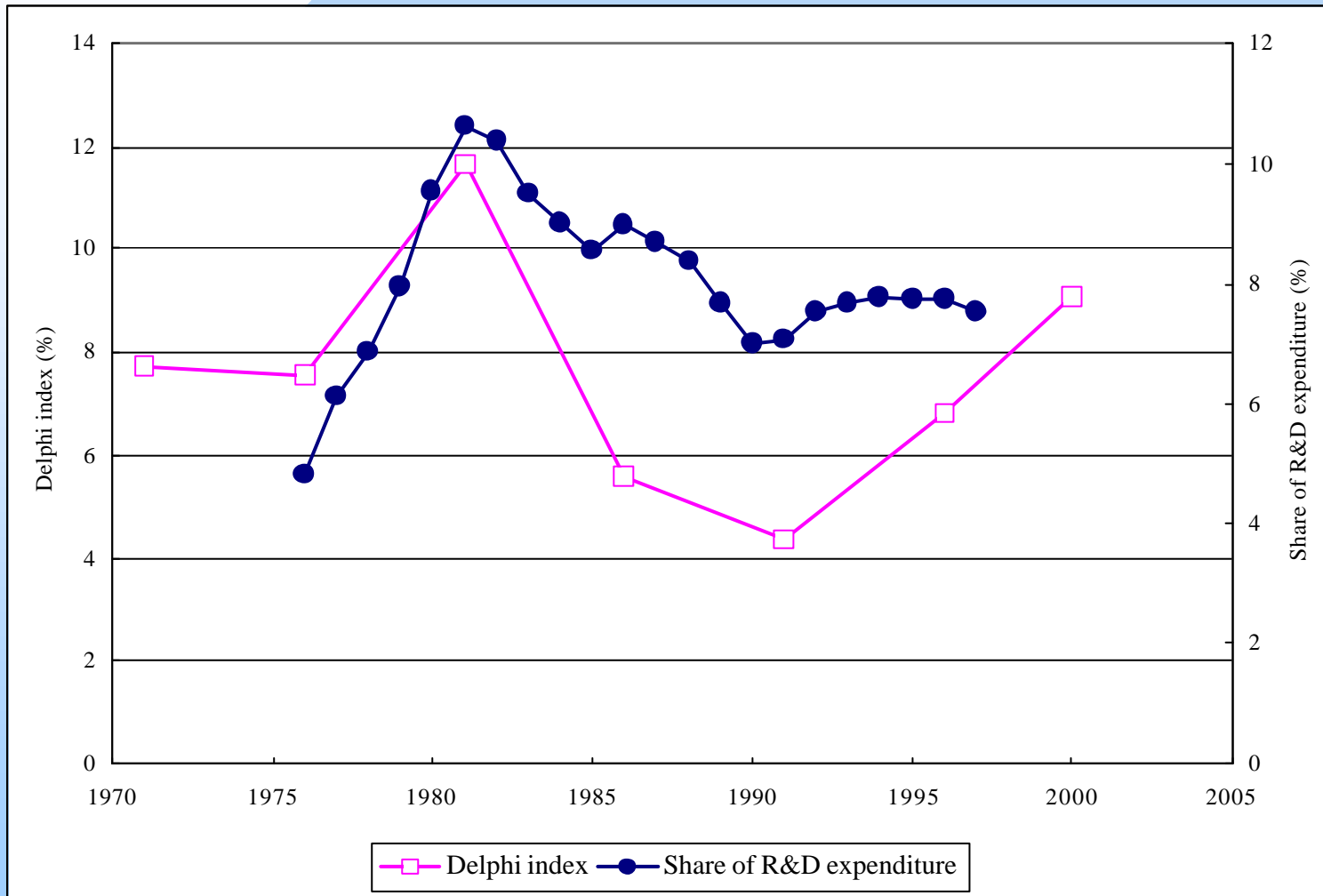
Information



Life Science



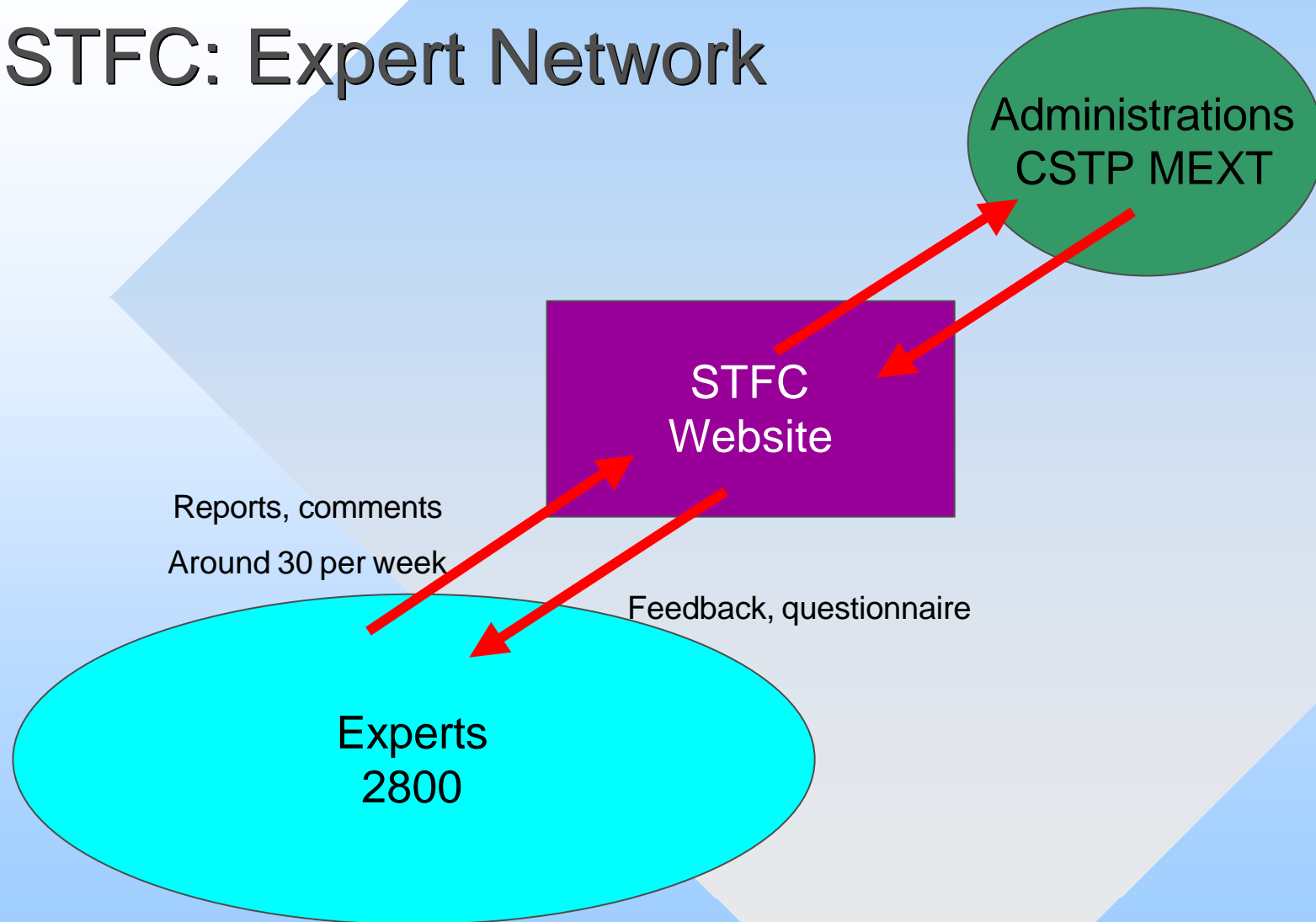
Energy



Science and Technology Foresight Center (STFC)

- Mission
 - To support decision makers in government
- Structure
 - STFC Researchers
 - Various backgrounds
 - From ministry, university and industry
 - Affiliated Fellow
 - STF Network members
 - Various fields and sectors

STFC: Expert Network



Science & Technology Trends (J & E)

Science & Technology Trends

科学技術動向

2003
1
No.22

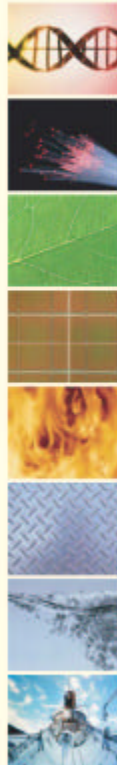
科学技術トピックス

- ▶ **ライフサイエンス分野**
 - ①新しい原理に基づいたバイオセンサー — 単一細胞バイオセンサー —
 - ②プロテオーム組換えが夢のがん治療になる可能性が示された
- ▶ **情報通信分野**
 - ①次世代半導体メモリに有望な新技術が開発される
- ▶ **環境分野**
 - ①バイオマス資源の統合設計 「バイオマス・エコゾーン統合戦略」が策定される
- ▶ **ナノテク・材料分野**
 - ①シリコン系光素子で化合物半導体に匹敵する効率を達成
- ▶ **エネルギー分野**
 - ①米国における高レベル放射性廃棄物処分研究の動向
 - ②軽量で逃げられるフレキシブルな プラスチック太陽電池の研究開発が進展
- ▶ **製造技術分野**
 - ①半導体デバイスの生産コスト低減をもたらす リングレーザー構築プロセス

特集1 RNA 研究の動向

特集2 バイオインフォマティクスの技術動向

特集3 循環型社会の構築を目指した 廃棄物処理の技術開発と研究動向



Science & Technology Foresight Center of NISTEP

Science & Technology Trends

Quarterly Review

No.5
January
2003

Life Sciences

- ▶ Recent Trend of Cancer Research — Molecular Target Therapy and Translational Research —
- ▶ Trends in Organic Synthesis Chemistry Research
- ▶ Trends in Plant Molecular Biology

Information and Communication Technologies

- ▶ Trends in Research and Development of the Quantum Computer
- ▶ Digital Content Distribution and Copyright Management Technology in the Broadband Age

Environmental Sciences

- ▶ Trends in the Development of Measures Against Global Warming Centered on CO₂ Underground Storage

Nanotechnology and Materials

- ▶ Trends in Nanobiology
- ▶ Trends and Problems of High-Level Radioactive Waste Disposal Projects — Technical and Social Aspects —
- ▶ Trends in Distributed Power Sources

Infrastructure

- ▶ Trends of Disaster Simulation Technologies

Science and Technology Policy

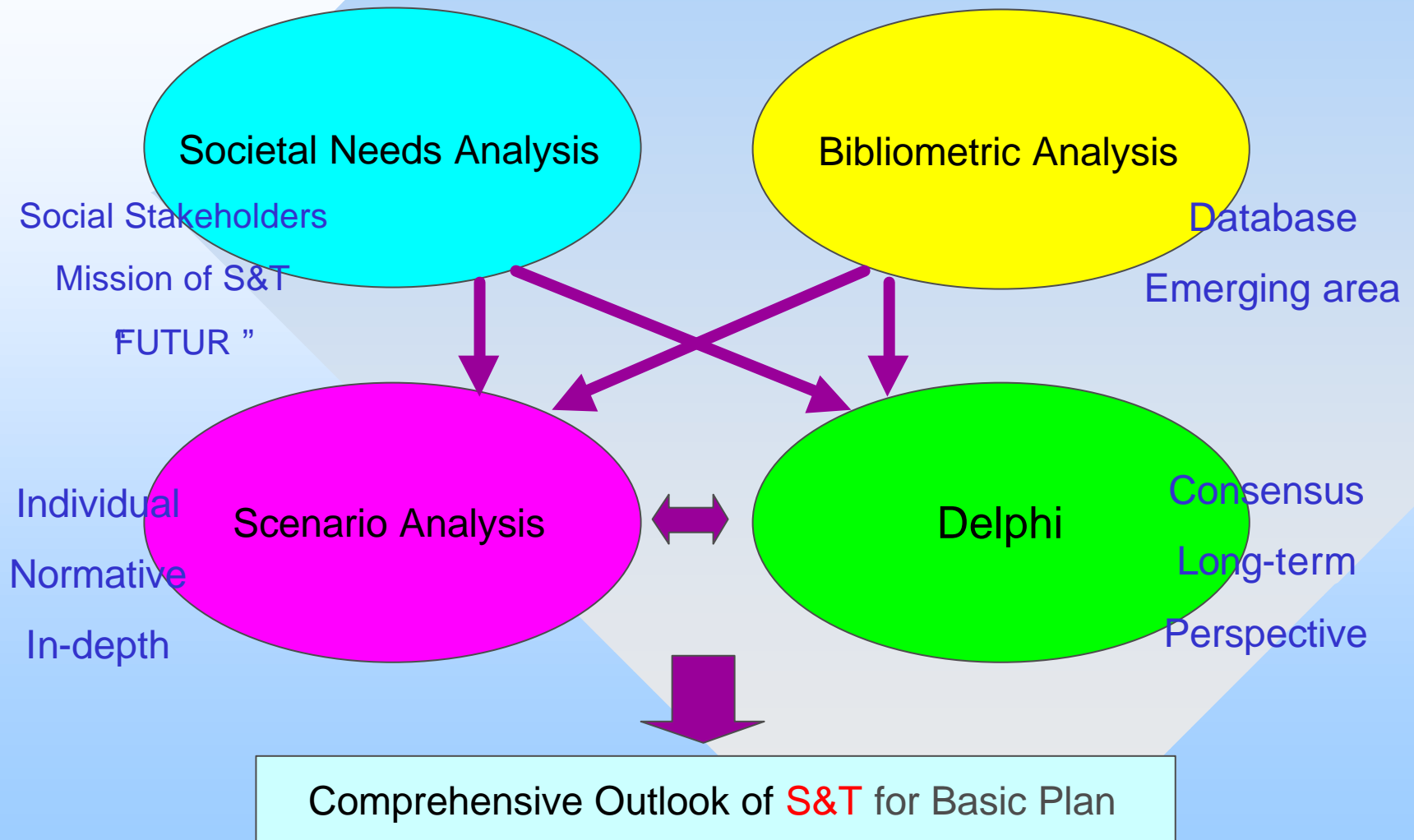
- ▶ Latest Trends in US Science and Technology Policy — Flash Report on 2002 AAAS Annual Colloquium —
- ▶ Outline of Drawing up the FY2002 budget for Science and Technology



Requirements for Next Foresight

- Positive inputs to S&T top-down prioritization
 - Penetration / Consensus
 - Normative View
 - Outlook of S&T and in-depth study of key areas
- Linkage to political process
 - Participatory approach
 - Mission analysis
 - Synchronization to political process

Structure of the Foresight Program



Concluding Remarks

- Accumulation of experiences for 30 years
- Assessed effectiveness and limits of Delphi approach
- Change of S&T backgrounds
- Foresight program to meet political and socioeconomic requirements